ATP 4-33

Maintenance Operations

JANUARY 2024

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Contents

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Preface

ATP 4-33 describes the roles, responsibilities, functions, and processes of Army maintenance operations. This publication applies to the range of military operations and supports ADP 3-0 and ADP 4-0.

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 armed conflict and the rules of engagement. (See FM 6-27/MCTP 11-10C.)

ATP 4-33 uses joint terms where applicable. Selected joint and Army terms and definitions appear in the glossary and the text. Terms for which ATP 4-33 is the proponent publication (the authority) are boldfaced and italicized in the text and are marked with an asterisk (*) in the glossary. 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 Ordnance School. The preparing agency is the Directorate of Training and Doctrine, Combined Arms Support Command. Send comments and recommendations on a DA Form 2028 (*Recommended Changes to Publications and Blank Forms*) to Commander, United States. Army Combined Arms Support Command, ATTN: ATCL-TDID (ATP 4-33), 2221 Adams Ave, Bldg 5020, Fort Gregg-Adams, VA, 23801-1809; or submit an electronic DA Form 2028 by email to: usarmy.gregg-adams.tradoc.mbx.leee-cascom-doctrine@army.mil.

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Introduction

Army maintenance operations ensure unit readiness by maintaining weapon systems and equipment in a fully mission capable status for immediate and continuous employment in support of operations. The Army conducts two levels of maintenance (field-level and sustainment-level) to generate combat power. Maintenance operations are focused on returning systems to an operational status as near to the point of failure or damage as possible. Fully mission capable means that readily available systems and equipment are safe and have all mission-essential subsystems installed and operating as designated by applicable technical manual and Army regulation.

The purpose of this ATP is to provide a clear and concise understanding of maintenance operations at all echelons to provide commanders the lethality and flexibility to meet operational objectives.

Soldiers are trained to perform field-level maintenance. Leaders should provide time on the training schedule to build their skills. Training serves as the cornerstone for successful unit support missions by ensuring that equipment is readily available for operations.

Leaders must emphasize safety in all maintenance activities and ensure that personnel use adequate safety precautions and personal protective equipment in every operation.

This publication contains numerous changes from the previous version of ATP 4-33. The most significant changes include an enhanced discussion on Army strategic contexts and maintenance; updates on maintenance formations in accordance with force management; and test, measurement, and diagnostic equipment.

ATP 4-33 contains seven chapters and three appendices:

Chapter 1 discusses the fundamentals of maintenance operations, which include maintenance fundamentals, the maintenance process, levels of maintenance, and maintenance support during Army operations.

Chapter 2 discusses the roles and force structure of maintenance organizations from the strategic to the tactical level. It explains support relationships between maintenance organization and their supported units and identifies areas of responsibility.

Chapter 3 discusses planning considerations for all maintenance-related activities that depend on the operational environments associated with either contiguous or noncontiguous battlefields. It also discusses the maintenance concept of support at different echelons.

Chapter 4 discusses maintenance management, levels of management, maintenance control, internal management procedures, and quality assurance and quality control for maintenance operations.

Chapter 5 discusses supply support operations, maintenance-related stocks, repair parts management, and reparables management.

Chapter 6 discusses the objectives, structure, employment, calibration, and repair of test, measurement, and diagnostic equipment.

Chapter 7 discusses maintenance for communications and electronics equipment, military intelligence systems, missile systems, Army watercraft, Army aviation, and medical devices. It also identifies low-density maintenance capabilities and their support to the commander.

Appendix A discusses climate considerations while conducting maintenance operations within different geographical regions. Environmental conditions could have an adverse effect on maintaining readiness.

Appendix B describes Army maintenance management information systems and how these capture maintenance data and assist commanders in making informed decisions.

Appendix C discusses maintenance allocation charts and uniform source, maintenance, and recoverability codes.

Introductory Table-1. Modified Army terms

Term	*Remarks*
direct exchange	ATP 4-33 becomes proponent.
field maintenance	ATP 4-33 becomes proponent.
sustainment maintenance	ATP 4-33 becomes proponent.
two-level maintenance	ATP 4-33 becomes proponent.

Chapter 1
Fundamentals of Maintenance Operations

The primary purpose of Army maintenance 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. This chapter describes the fundamentals of maintenance operations. It includes a maintenance overview and discusses the maintenance process and levels of maintenance support during Army operations.

MAINTENANCE OPERATIONS OVERVIEW

1-1. Maintenance is a commander's responsibility; however, every Soldier should take responsibility for it. The purpose of Army maintenance operations is to ensure unit readiness. *Readiness* is the ability of military forces to fight and meet the demands of assigned missions (JP 1, Vol 2). 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 (TMs) and Army regulations to the designed or engineered specifications.

1-2. The nature of the operational environment (OE), 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 should 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 a materiel condition indicating that 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 technical manual/ electronic technical manual XX–10 and XX–20 series preventive maintenance checks and services tables and AR 385-10 provisions that apply to the vehicle and/or system or its sub-system required by AR 700-138. The terms ready and/or available and fully mission capable refer to the same status: equipment is on hand and able to perform its combat missions (see 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 accomplish this work while also ensuring maximum equipment—

- 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.

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 need to keep existing systems fully mission capable for the duration of the operation or until the system is identified as damaged beyond field-level maintenance repair.

1-4. Units with an effective maintenance program that includes leader involvement have 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.

1-5. Army maintenance processes and procedures rely on commanders to complete the maintenance mission and achieve a high state of materiel readiness by—

- Emphasizing command responsibility for the readiness and safety of assigned equipment by fostering a positive culture of maintenance and instilling ownership throughout the organization.
- Holding subordinate leaders accountable for maintenance execution and equipment readiness.
- Achieving and sustaining the Army maintenance standard for assigned and attached equipment.
- Preserving the inherent reliability of equipment through PMCS, predictive maintenance techniques, diagnostics, and condition-based maintenance. These maintenance tools will allow the operator and the institutional school-trained maintainer to identify faults, take action on the maintenance faults, and provide updated status to unit leaders.
- Ensuring that all assigned equipment is maintained in accordance with appropriate TMs, AR 750-1, and Department of the Army pamphlets (DA Pams).
- Providing resources, assigning responsibility, and training their Soldiers to achieve maintenance standards.
- Ensuring expeditious return of non-mission-capable equipment to operational status.
- Ensuring proper manpower usage of assigned maintainers.
- Ensuring Command Maintenance Discipline Programs are implemented.

MAINTENANCE FUNDAMENTALS

1-6. The seven functions of maintenance include—

- Planning – Maintenance planning is integrated into all operations through the military decision-making 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 adjusting maintenance priorities to meet mission requirements. For more on planning for maintenance operations, see Chapter 3.
- 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 or 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 required to repair equipment.
- Disposition – Systematically removing materiel that is uneconomical to repair, damaged beyond repair, or obsolete.

MAINTENANCE PROCESS

1-7. 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. This encompasses PMCS before, during, and after operations PMCS required by equipment-specific TMs.
- Equipment services. These 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.
- Fault repair. Crews 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. This 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.

1-8. Maintenance managers anticipate maintenance requirements by using 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 maintenance management processes have a decided combat advantage when they pair it with the skillful use of assigned equipment.

COMPETITION, CRISIS, AND ARMED CONFLICT

1-9. The Army's primary mission is to organize, train, and equip forces to conduct prompt and sustained land combat to defeat enemy ground forces and to seize, occupy, and defend land areas. The Army supports joint campaigns by conducting Army operations within three strategic contexts. They are—

- Competition below armed conflict.
- Crisis.
- Armed conflict.

1-10. Maintenance plays a key role within all three strategic contexts. Effective maintenance enhances readiness, regardless of whether Soldiers perform maintenance during home station training, combat training center rotations, or large-scale combat. Readiness directly correlates to combat power. Combat power is reflected in the assets commanders are able to employ to accomplish the mission.

MAINTENANCE OPERATIONS DURING COMPETITION BELOW ARMED CONFLICT

1-11. Competition below armed conflict is a state of tension that exists when most of a specific adversary's national interests are incompatible with United States (U.S.) interests, and that adversary is willing to actively pursue them short of open armed conflict. Operations during competition are intended to deter malign adversary action, while simultaneously shaping the environment with allies and partners in ways that support U.S. interests. Army forces look to gain a relative advantage at all levels of warfare. They are necessary to help deter adversaries, assist the joint force in promoting U.S. interests, and set favorable conditions to prepare for operations during crisis and armed conflict. Army forces must demonstrate a credible level of readiness against regional peer threats to effectively deter adversaries and assure partners.

1-12. Generating optimal combat power is the most important shaping task for units as they train at home station and during combat training center exercises. Maintenance operations during competition are critical to the success of sustaining combat power during a crisis or armed conflict. Maintenance operations help set the conditions to allow operational commanders the freedom of action, operational reach, and prolonged endurance necessary to shape the OE. Maintenance planning at the theater strategic level helps to identify gaps, mitigate problems, and implement the measures needed to shape the OE, deter aggression, and help prepare for large-scale combat operations.

1-13. Sustainment commands need to be trained adequately to support anything from natural disasters to hostility between nations. Maintenance planners must understand the OE and resources available to be prepared for a crisis. During competition, theater Army and theater sustainment command (TSC) G-4s can provide valuable sustainment information in shaping and deterring adversaries during a crisis. Maintenance planners should collaborate with planners at all levels to enable operations during competition. This collaboration includes—

- Determining maintenance strategies for operation plans and contingency plans:
  - Validate time-phased force and deployment data (known as TPFDD) for maintenance support elements.
  - Identify test, measurement, and diagnostic equipment (TMDE) calibration and repair support (C&RS) requirements.
  - Determine host-nation maintenance capabilities.
  - Leverage Army field support brigade (AFSB) assets.
  - Validate Army pre-positioned stocks (APS) inventory and requirements.
  - Develop the theater maintenance plan for retrograding battle losses and battle-damaged equipment.
  - Develop concepts of support to determine support relationships.
  - Develop class IX requirements to fill shop and bench stock listings to support OEs with differing climates, such as desert or jungle conditions.
  - Recognize class IX throughput for maintenance repairs and visibility.
  - Identify high demand class IX for the OE (for example, more air filters in the desert, more vehicle batteries in cold environments, more tires in rocky terrain, or more track pads in urban areas).
  - Identify maintenance requirements (for example, equipment, recovery assets, class IX, and supplies for reception, staging, onward movement, and integration).
  - Leverage contract maintenance support if necessary.
  - Monitor systemic training (for example, new equipment or recovery for the environment).
- Identifying connectivity capabilities to enable maintenance operations.
- Conducting weekly maintenance meetings to track readiness and establish a common operational picture.

MAINTENANCE OPERATIONS DURING CRISIS

1-14. *Crisis* is an emerging incident or situation involving a threat to the United States, its citizens, military forces, or vital interests that develops rapidly and creates a condition of such diplomatic, economic, or military importance that commitment of military forces and resources is contemplated to achieve national and/or strategic objectives (JP 3-0). Army forces help joint forces maintain freedom of action and associated positions of relative advantage through the activities they conduct and the presence they generate on the ground.

1-15. The Army continues to shape the OE and deter aggression from adversaries during crisis. The primary focus is achieving the readiness required to successfully conduct operations in the contexts of large-scale land warfare against regional peer threats. Tele-maintenance in dispersed situations may also be necessary to optimize combat power to achieve objectives.

MAINTENANCE OPERATIONS DURING ARMED CONFLICT

1-16. Armed conflict encompasses conditions where adversaries use lethal force as the primary means for achieving objectives and imposing their will on the other. The Army must be ready for irregular warfare and conventional warfare during armed conflict. Irregular warfare can include counterinsurgency and unconventional warfare. Conventional warfare encompasses large-scale combat operations. Large-scale combat operations are extensive joint combat operations in terms of size and scope of forces committed, conducted as campaigns aimed at achieving theater strategic and operational objectives through the

application of force. Consolidating gains is critical to the success of an operation during armed conflict. Consolidating gains from a maintenance standpoint ultimately is to restore and maximize combat power for the next mission or operation.

1-17. Maintainers recover and repair damaged platforms during armed conflict, enabling them to shoot, move, and communicate to stay in the fight. Maintainers prioritize work on weapon systems based on the guidance of supported commanders. 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 PMCS as modified for the climate and terrain in which they find themselves. BDAR restores the minimum essential combat capabilities necessary to support a specific combat mission or to enable the equipment to self-recover using field-expedient components and means.

1-18. Maintenance operations during armed conflict need to increase in intensity to meet the demands of a high operational tempo. Large-scale combat operations introduce levels of complexity, lethality, ambiguity, and speed to military activities that are not common in other operations. As a result, maintainers will be challenged to sustain combat power to help commanders meet their objectives and defeat adversaries.

1-19. Maintaining equipment is fundamentally the same in all three strategic contexts. However, repair activities are more intensive during crisis and conflict due to the pace, the high risk to units on the ground, and the time available to return equipment back to the fight. In addition to support mentioned during the other strategic contexts, support during large-scale combat operations includes—

- Executing BDAR.
- Gathering and reporting information pertaining to battle damage of not mission capable (NMC) maintenance equipment. Provide feedback to unit commander for assessment and change of enemy tactics, techniques, and procedures.
- Exercising high operational tempo recovery methods.
- Conduct controlled exchange or cannibalization to maintain combat power.
- Expediting delivery of Class IX parts to reduce equipment down time.
- Refinement of running estimates to mitigate problematic maintenance issues.
- Rapid retrograding of battle losses and battle-damaged equipment.
- Conducting maintenance meetings or logistics synchronization meetings at a minimum of once a week.
- Cross-leveling military occupational specialties (MOSs) to optimize combat power.
- Utilizing United States Army Materiel Command (USAMC) capabilities including the Logistics Civil Augmentation Program (LOGCAP), forward repair maintenance, and civilian test, measurement, and diagnostic equipment (C-TMDE) support teams.

TWO-LEVEL MAINTENANCE

1-20. The Army uses a two-level maintenance system. ***Two-level maintenance*** **is a tiered maintenance system comprised of field and sustainment maintenance.** The Army streamlined and designed the maintenance system to be fast, agile, and responsive to the needs of the commander. 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 1-6 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 institutionally trained maintainers perform field maintenance.
- All Army modified table of organization and equipment (MTOE) maintenance units perform field maintenance.
- Sustainment maintenance is performed by 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. In most cases where a unit sends equipment to a sustainment maintenance organization, the owning unit removes the equipment from its property

book. The equipment is returned to the owning unit only in rare instances such as unit reset, watercraft maintenance, and TMDE.

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

Field Maintenance	*Sustainment Maintenance*
Operator/Crew	Army field support brigade (process manager)
Forward support company	Army field support battalion
Field maintenance company	U.S. Army Materiel Command support formations
Support maintenance company	U.S. Army depots
Other units with institutionally trained maintainers	Logistics readiness centers (installation)

1-21. 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 (MACs) provide repair time guidelines for field and sustainment-level tasks. For additional information on MACs, see Appendix C.

FIELD MAINTENANCE

1-22. ***Field maintenance*** **is on-system maintenance, repair and return to the user including maintenance actions performed by operators.** Three distinct groups of Soldiers perform field maintenance: equipment operators, equipment crews, and institutionally trained maintainers. The owning unit or supporting maintenance unit performs field maintenance using 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 unserviceable line replaceable units, components, modules, or parts. However, field maintenance is not limited to simply remove-and-replace actions. If the operator, crew, or institutionally 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.

1-23. Army maintenance organizations perform field maintenance on assigned and supported equipment. Chapter 2 identifies Army maintenance organizations by echelon. The brigade support battalion (BSB) has low-density specialty maintainers whose mission is to provide maintenance for specialty equipment in the brigade combat team (BCT). These personnel maintain equipment that the forward support companies (FSCs) are not structured to work on, including missile systems, fire control systems, signal systems, and medical devices. The biomedical equipment specialists reside in the medical company within the BSB.

1-24. Field maintenance also includes adjustments, alignments, services, applying approved field-level modification work orders, fault or failure diagnoses, BDAR, recovery, corrosion prevention, and common software updates. Field-level maintenance is typically repair-and-return to the user and includes maintenance actions performed by crewmembers, operators, and institutionally trained maintainers.

Operator and Crew Field Maintenance

1-25. Operators and crews perform field maintenance on their equipment as outlined in the operator's -10 TM. The operator or crew is typically the first to observe a fault or identify the development of a fault. In many instances, they can enable mission completion by repairing the fault or minimizing its impact using onboard spares. Condition-based maintenance indicators or instrumentation can initiate operator or crew tasks. These tasks typically consist of inspecting, servicing, lubricating, adjusting, corrosion prevention, and replacing minor components or assemblies as authorized by the MACs. TMs identify operator or crew tasks within a MAC. The MAC identifies the proper basic issue item tools and onboard spares required to complete a given service.

1-26. Operators and 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 operators and crews include Patriot missile system, signal, military intelligence (MI), or maneuver unit master gunners. In some instances, these personnel receive special tools to perform maintenance on their assigned system. Operator and crew maintenance falls into the crew subcategory of

field maintenance that is 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 or crews have exhausted their maintenance capabilities, they rely on maintainers to conduct field-level maintenance on the item of equipment. Operator-maintainers working with network-based defense; M1135 Stryker nuclear, biological, and chemical reconnaissance vehicles; joint biological point detection systems; and Warfighter Information Network-Tactical (WIN-T) routinely do work that would fall under sustainment-level maintenance on other systems.

Maintainer Field Maintenance

1-27. Institutionally trained maintainers conduct field maintenance using 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. The definition of a line-replaceable unit or shop-replaceable unit is flexible depending on the system and MOS involved. The characterization of line-replaceable or shop-replaceable units for wheeled and tracked vehicles, communications, or MI systems shifts as the field maintenance troubleshooting increases in complexity. Maintainers working with communication and electronics (C&E), armament, and missiles routinely do work that would fall under sustainment-level maintenance on other systems.

SUSTAINMENT MAINTENANCE

1-28. ***Sustainment maintenance*** **is off-system component repair and/or end item repair and return to the supply system or by exception to the owning unit, performed by national level maintenance providers.** Sustainment maintenance consists of two subcategories: below depot-level sustainment maintenance and depot-level sustainment maintenance. Units will require sustainment maintenance support when crew, operator, operator-maintainer, or institutionally 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 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 measurable level of reliability.

1-29. USAMC executes sustainment maintenance missions through Army Sustainment Command (ASC) and its subordinate AFSBs and logistics support elements. Sustainment maintenance supports operational forces and the Army supply system. Unless prior planning occurs, USAMC subordinate elements typically enter the theater after the initial tasks of setting the theater are completed.

Below-Depot Sustainment Maintenance

1-30. Maintainers generally perform sustainment maintenance below depot level on a component, accessory, assembly, subassembly, plug-in unit, or other portion after removal from the system. Sustainment maintenance performed in an operational area will normally be below depot-level sustainment maintenance. When authorized by USAMC, depot-level tasks can be performed at logistics readiness centers (LRCs), external maintenance activities, and AFSBs. Below depot-level sustainment maintenance can also apply to end item repair and return to the supply system.

Depot Sustainment Maintenance

1-31. Depot-level maintenance is performed on materiel requiring major overhaul or a complete rebuild of parts, assemblies, subassemblies, and end items, including the manufacture of parts, modification, testing, and reclamation, as required. It supports organizational and below depot-level maintenance activities with more extensive shop facilities and personnel of higher technical skill than are normally available at the lower levels of maintenance activities. End items are returned to the supply system or directly to a using unit (by exception) after maintenance is performed at this level.

Contract Maintenance Support

1-32. Contract maintenance is another source of maintenance support to the Soldier. Contractor logistics support and interim contractor support are integral to providing service and materiel solutions support for sustained operations. Contractor logistics support is a method of obtaining commercially contracted maintenance for a product or service for a specified period. Interim contractor support provides temporary contractor support in lieu of organic capability for a predetermined time, allowing a Service to defer investment in all or part of required resources while an organic capability is phased in (see JP 4-0).

1-33. Maintenance contracted support can come in the form of system support, external support, and theater support. The military uses contract support when there is a valid operational need to augment deployed military maintenance support capabilities and reduce the operational burden on military maintenance forces. All contract maintenance support requirements and issues should be coordinated with the supporting AFSB or subordinate AFSB element. Maintenance supervisors need to forecast contract maintenance support into unit planning requirements.

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 needed extensive repairs. A lack of class IX repair parts dead-lined two of the four M1 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 circle X status or command override, with multiple major maintenance deficiencies.

The sub-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.

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Chapter 2
Maintenance Organizations

This chapter will discuss Army maintenance organization roles and functions in support of equipment throughout its life cycle. Understanding the maintenance organizations at each echelon and their roles and functions will allow commanders, staff planners, maintenance personnel, and platform operators to successfully plan and conduct maintenance operations across the range of military operations.

SECTION I – MAINTENANCE ORGANIZATION ROLES AND FUNCTIONS BY ECHELON

THEATER ARMY

2-1. The theater Army's role in maintenance operations is based on its designation as an Army Service component command (ASCC). The ASCC is responsible for administration and support of all Army forces assigned, attached, or under the operational control (OPCON) of the combatant commander or transiting the area of responsibility (AOR). The ASCC G-4 establishes policy for maintenance operations, monitors the readiness posture of all Army units operating in the AOR, and identifies requirements for sustainment maintenance and contracted maintenance support. The TSC and ASCC G-4 make recommendations for required maintenance capability in the AOR to the ASCC G-3 based upon readiness requirements and maintenance trends identified in collaboration with subordinate maintenance organizations. These include requirements for sustainment maintenance, additional echelons above division support maintenance companies (SMCs), C-TMDE assets, or contracted maintenance support. See ATP 3-93 for more information on theater Army roles and functions.

THEATER SUSTAINMENT COMMAND

2-2. TSCs provide command and control and decentralized execution of logistics operations throughout the theater. The TSC role in maintenance operations is based on its role as the senior sustainment headquarters for the ASCC; it is responsible for synchronizing and integrating sustainment for an AOR. The TSC support operations (SPO) officer implements maintenance policy directed by the ASCC, coordinates sustainment maintenance support, provides field maintenance capability, and serves as the fleet maintenance manager for deployed Army forces in the AOR.

2-3. The TSC collects, analyzes, and monitors readiness data of subordinate and supported units in collaboration with the ASCC G-4. This enables the TSC to effectively manage maintenance support to units and systems in accordance with ASCC priorities. The TSC passes systemic issues that are beyond its capabilities to the appropriate national-level maintenance manager for resolution via the AFSB.

2-4. 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, allowing TSC maintenance managers to take action to ensure that the maximum number of combat systems remain fully mission capable. TSC actions may include disseminating technical information and allocating or reallocating resources and capabilities to support maintenance requirements.

2-5. The distribution management center (DMC) in the TSC SPO provides centralized planning, control, and management of maintenance operations of AOR. The DMC also establishes policies, plans, and procedures for all theater maintenance support programs.

2-6. The SPO maintenance section works closely with the AFSB to ensure sustainment-level maintenance support to Army forces. The TSC maintenance managers analyze readiness data for systemic problems and those associated with the unique aspects of the specific OE, such as environmental conditions and usage levels. This coordination and collaboration provide the basis for the effective employment of USAMC sustainment maintenance capabilities. See ATP 4-93 for additional information on the capabilities and organization of the TSC.

2-7. The DMC manages maintenance information through reports retrieved from Global Combat Support System-Army (GCSS-Army), sustainment information systems, and the logistics information warehouse. This provides a theater maintenance database for the commander.

EXPEDITIONARY SUSTAINMENT COMMAND

2-8. The expeditionary sustainment command (ESC) is a headquarters that that expands the command and control capabilities of the TSC. The ESC synchronizes and integrates sustainment for an operational area designated by the TSC. The ESC SPO implements maintenance policy directed by the ASCC, coordinates sustainment maintenance support, provides field maintenance capability, and serves as the fleet maintenance manager for an operational area designated by the TSC.

2-9. The ESC SPO 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. There are personnel within the staff tasked to provide oversite 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.

2-10. The ESC is also responsible for managing critical class IX supplies to support readiness requirements within the area of operations (AO) or joint operations area. 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 requisitions and the status of all inbound critical class IX. Once received in theater, the ESC ensures proper and timely distribution of the class IX supplies to the appropriate maintenance facility. See ATP 4-92 for additional information on the capabilities and organization of the ESC.

2-11. The ESC DMC provides centralized planning, control, and management of maintenance operations within the joint operations area. The ESC DMC maintenance section monitors the maintenance status and readiness posture of all units operating within their supported area and ensures adequate maintenance support capability and repair parts supply are available to support the mission. It also identifies any maintenance or class IX shortfalls and communicates them to the TSC or ASCC G-4 as requirements.

SUSTAINMENT BRIGADE

2-12. Sustainment brigades are the operational arm for the TSC and ESC and are composed of functional and multifunctional units. They provide mission command of theater opening, theater distribution, and sustainment operations and also provide distribution management and conduct support operations within an AO. The sustainment brigade is task organized with combat sustainment support battalions (CSSBs) that provide field maintenance support through the SMC to non-divisional units at the corps and theater echelons.

2-13. The sustainment brigade SPO maintenance section provides management of maintenance operations within its supported area, including electronic, armament, mechanical, special purpose, and engineer equipment maintenance. The maintenance section maintains detailed status of the maintenance and readiness posture of all units operating within the supported area and ensures that adequate maintenance support capability and repair parts supply are available to support the mission. It communicates shortfalls in maintenance and class IX to the ESC or TSC DMC. Refer to ATP 4-92 for more information on sustainment brigades.

COMBAT SUSTAINMENT SUPPORT BATTALION

2-14. CSSBs are modular multifunctional logistics units attached to the sustainment brigade that are task organized with functional companies, teams, and detachments that execute transportation, maintenance, munitions, and quartermaster operations. The CSSB can employ and control up to six company-sized units;

the number and type of units attached to a CSSB is mission dependent. The CSSB will typically oversee an attached SMC and direct its maintenance support efforts. All functional and multifunctional support brigades requiring additional maintenance support are incorporated into the SMC's concept of support.

2-15. The CSSB S-4 oversees the internal headquarters company field maintenance element supporting headquarters' organic equipment. The CSSB SPO staff maintenance management personnel provide oversight of the SMCs attached to the CSSB. The SPO staff coordinates maintenance, class IX management, evacuation for sustainment-level maintenance, and maintenance 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.

SUPPORT MAINTENANCE COMPANY

2-16. SMCs are typically attached to a CSSB or DSSB to provide field-level maintenance support. The commanding headquarters that a SMC is attached to identifies the units the SMC is to support.

2-17. A SMC has three platoons: the automotive armaments platoon, electronic maintenance platoon, and the ground support equipment platoon. The platoons provide the CSSB with maintenance control; field-level maintenance on wheeled vehicles, armament, radios, communications security (COMSEC) equipment, special electronics, and power generation; limited welding and machine shop capacity; and limited wheeled vehicle recovery assets. An area TMDE support team may augment the SMC and provide mobile and fixed-site calibration and repair of TMDE. The company can task organic maintenance teams to provide support in multiple locations. Figure 2-1 on page 2-4 depicts SMC organization.

***Note*:** The SMC is not designed to provide a source of backup maintenance support for the BSB. The SMC does not have maintenance capability to work on major combat systems, including the M1 Abrams, M2/3 Bradley, or Paladin.

2-18. The SMC may provide maintenance support on an area basis and support units not previously designated by a support relationship in the operations order. Units that are operating in close proximity to the SMC or transiting through its operational area may require SMC maintenance support. 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 support unless doing so will prevent it from meeting requirements designated in the operations order. The SMC commander should contact the higher headquarters commander or SPO to resolve any identified conflicting support requirements.

2-19. The SMC maintains communication with all supported units to enable effective maintenance support and coordination. This ensures the SMC has all supported unit locations and equipment densities. In some instances, the SMC may be required to coordinate with supporting transportation units designated to deliver materiel. The SMC manages all supply stocks required to support its maintenance function, predominately class III(p) and class IX.

2-20. SMCs may use liaison visits to supported units within their operational area 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. 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 supported unit maintenance status.

2-21. The SMC reports the status of its maintenance support capability and on-hand class IX to the CSSB via LOGSTAT. The LOGSTAT report also includes the status of the SMC's organic equipment and supplies including pacing items, critical maintenance sets, kits, outfits, repair parts, and TMDE (see ATP 4-91 for more information on SMCs).

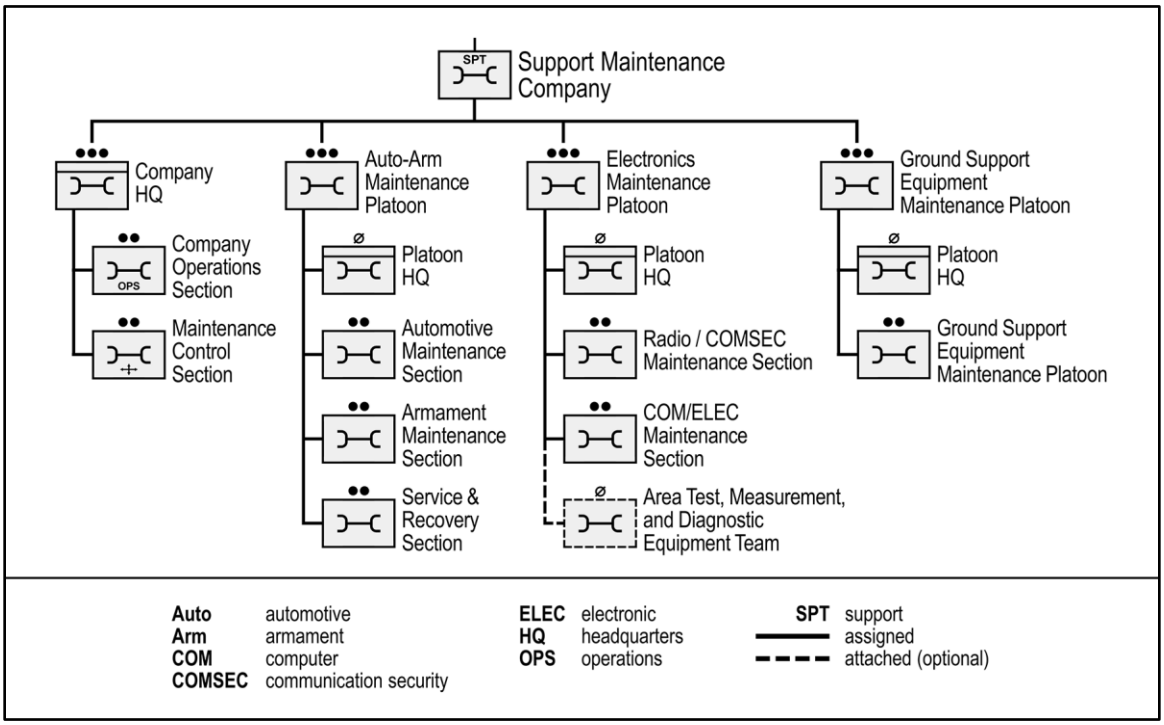

Figure 2-1. Support maintenance company

MULTI-DOMAIN TASK FORCE

2-22. Multi-domain task forces (MDTFs) vary in force structure. In variants that include a BSB, the S-4 may be focused on internal logistics. In those where a BSB is not present, the S-4, along with other coordinating staff, will also manage logistics for the task force.

2-23. MDTF variants with a BSB, the BSB synchronizes and integrates logistics. The BSB will have a headquarters and headquarters company, distribution company, medical support company, and field maintenance company (FMC). The FMC provides repair capability for automotive, ground support, C&E, and armament systems. The FMC also provides welding, machine shop, and recovery support. Some FMCs will have FSCs.

2-24. The FSCs provide field maintenance and recovery to supported battalions within the MDTF. Each FSC has maintainers for the specific weapon system supported. The FSCs work with the FMC for low-density commodities including communications, electronics, and armament equipment.

AIR DEFENSE ARTILLERY

2-25. Air defense artillery (ADA) brigades consist of a headquarters and headquarters battery and subordinate ADA battalions. The headquarters and headquarters battery has a small maintenance section that performs maintenance on battery equipment (this includes the brigade headquarters equipment). It may require support from an SMC for field maintenance requirements that exceed the capabilities of its assigned maintainers.

2-26. Each of the ADA battalions has either an assigned maintenance company or detachment (depending on battalion type) that provides field maintenance and recovery support. The company/detachment can conduct both base shop repair and on-site contact maintenance support for the supported units. Figure 2-2 illustrates maintenance companies supporting ADA battalions. See Chapter 7 for more information on ADA maintenance.

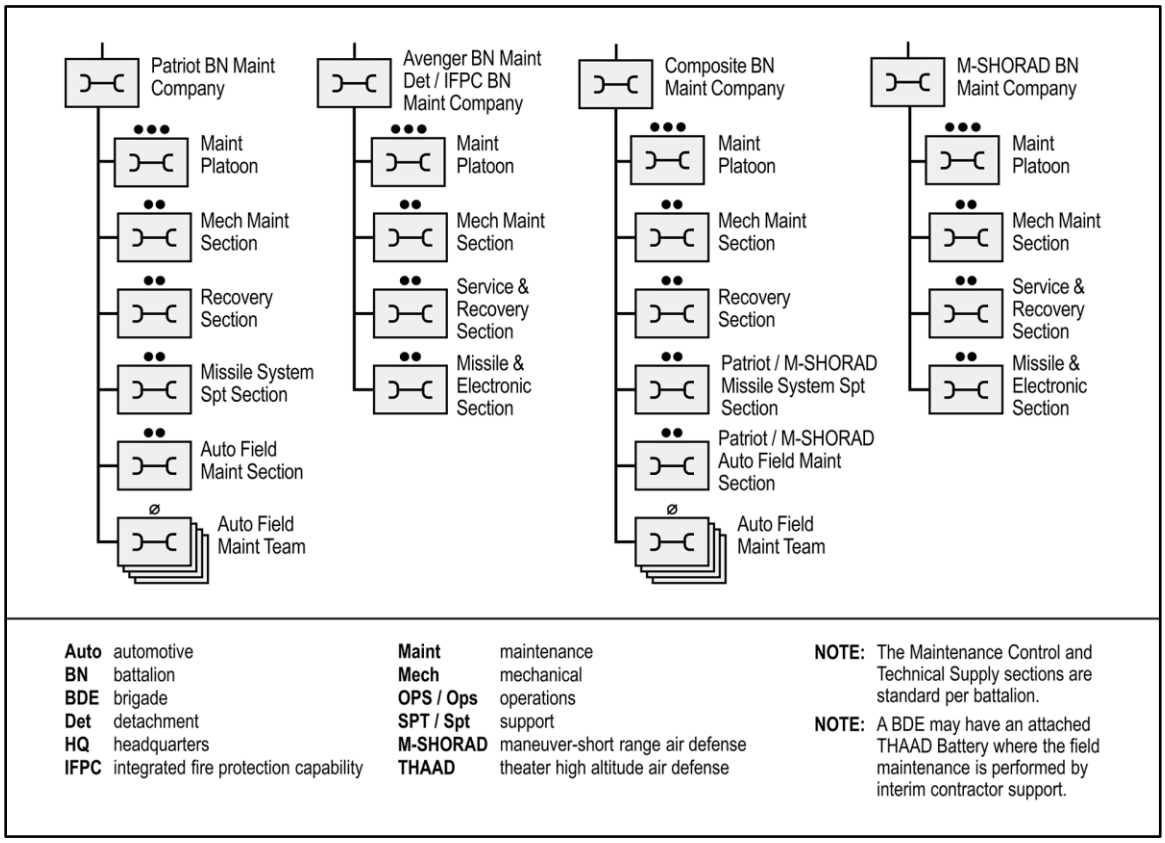

Figure 2-2. Notional maintenance support for air defense battalions

MAINTENANCE SURGE TEAM

2-27. The maintenance surge team provides an EAB surge maintenance capability that is tailorable and flexible to fill gaps in maintenance support for M1 Abrams, M2/3 Bradley, and Stryker weapon systems. The maintenance surge team enhances the division or corps commander's ability to rapidly generate combat power by providing maintenance depth and flexibility at critical points of need. This capability addresses reception, staging, onward movement, and integration maintenance requirements that enable rapid port clearance and onward movement. Maintenance surge team represents a temporary capability to accelerate repairs but does not offset workload performed by unit maintenance personnel. The team is organized deliberately to allow commanders to weight the main effort by providing a rapid surge capability at a specific place and time.

***Note*:** The maintenance surge team is not a third layer of maintenance. The team serves as a reinforcement element for two-level maintenance.

2-28. Each maintenance surge team consists of a platoon headquarters and two to four maintenance sections. The maintenance sections are composed of maintainers for M1 Abrams, M2/3 Bradley, and Stryker weapon systems. The platoon headquarters and each section have separate source requirement codes, which allows the teams to be tailored and attached independently to a supported unit. This flexibility allows planners to tailor critical maintenance capabilities based on specific mission requirements at any required location. Figure 2-3 on page 2-6 depicts the mix of maintenance surge teams.

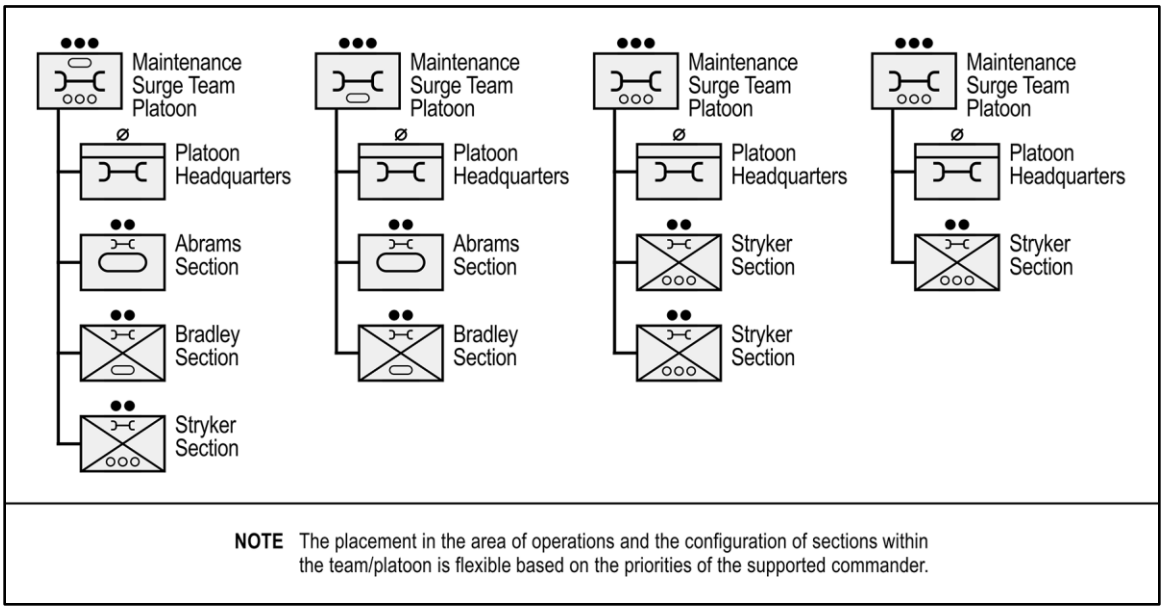

Figure 2-3. Maintenance surge team configurations

2-29. The maintenance surge team is normally be attached to an SMC in a CSSB or division sustainment support battalion (DSSB). The maintenance surge team assumes the support relationship of the unit to which it is attached. The CSSB or DSSB will designate a different support relationship based on priorities directed by higher headquarters if required. A direct, general, or reinforcing support relationship may be designated by order.

Note: Based on the corps or division commander's priorities, the maintenance surge team may be attached to an FMC within a BSB. In this configuration, the team operates within the BCT support or close area.

2-30. The unit to which the maintenance surge team is attached assumes administrative control over the team and is responsible for all life support, protection, logistics, field feeding, and Army Health System support. The maintenance surge team has no organic maintenance automation systems or personnel; it must leverage the supported organization’s maintenance automation infrastructure. The team also relies on its parent unit or SMC for wheeled vehicle, small arms, and communications maintenance.

2-31. The maintenance surge team can deploy in support of a division headquarters to provide surge capacity based on the commander's priority of support. The teams may also be employed in support of a corps headquarters with an attached or assigned armored or Stryker BCT. Additionally, these teams can support high demands on enhanced activity sets or mitigate risk based on geographical dispersion. Future initiatives which may also require maintenance surge team reinforcing support include the mobile protected fire systems and reconnaissance and security formations at division and corps echelons. Planning considerations for maintenance surge teams attached at the corps or division level include—

- Integration of the team into the SMC or FMC GCSS-Army system to track man-hours and class IX requirements.
- Limited bench and shop stock.
- The maintenance surge team movement needs to be incorporated into movement plans. The team requires security for independent movement.
- Maintenance surge teams for armored units require heavy equipment transport support to move the M88 tracked recovery vehicle for mid to long-range moves.

CLASSIFICATION AND INSPECTION COMPANY

2-32. The classification and inspection company (CICO) operates at the corps or theater level and is attached to a CSSB while operating in theater. This company supports USAMC in theater by rapidly returning repairable components to the repair facility and serviceable materiel back into the supply system for redistribution. The CICO receives, temporarily stores, classifies, inspects, and gains accountability of retrograde materiel, including supply classes II, III(p), IV, VII, IX, and X. Figure 2-4 on page 2-8 depicts the CICO organization.

2-33. The company's maintenance capabilities include a ground support equipment platoon, an automotive platoon, and an armament maintenance platoon. The ground support equipment platoon includes a radio and COMSEC section and a ground support equipment section. Soldiers in the sections perform field-level maintenance on radios; radar; electronic missile systems; power generation equipment; chemical, biological, radiological, and nuclear (commonly known as CBRN) defense equipment; and construction equipment. The automotive and armament platoon includes an armament section, a service and recovery section, and a maintenance section. The service and recovery section provides welding and machine shop field-level maintenance support on unit equipment. It also provides wheeled and tracked vehicle recovery of retrograde equipment in temporary storage. The automotive section performs field-level maintenance on wheel and tracked vehicles. The armament section performs field maintenance on small arms and fire control equipment.

2-34. All classification and inspection companies are assigned to the Army National Guard (ARNG). The companies are designed as a permanent replacement to ad hoc redistribution property assistance teams. 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, and Army Health System support. They also require the support of a medium truck company for distribution of supplies to the appropriate destination.

2-35. The CICO commander also provides recommendations to the CSSB SPO and commander regarding transportation requirements. The CICO establishes communication with designated supported units to enable effective support and coordination.

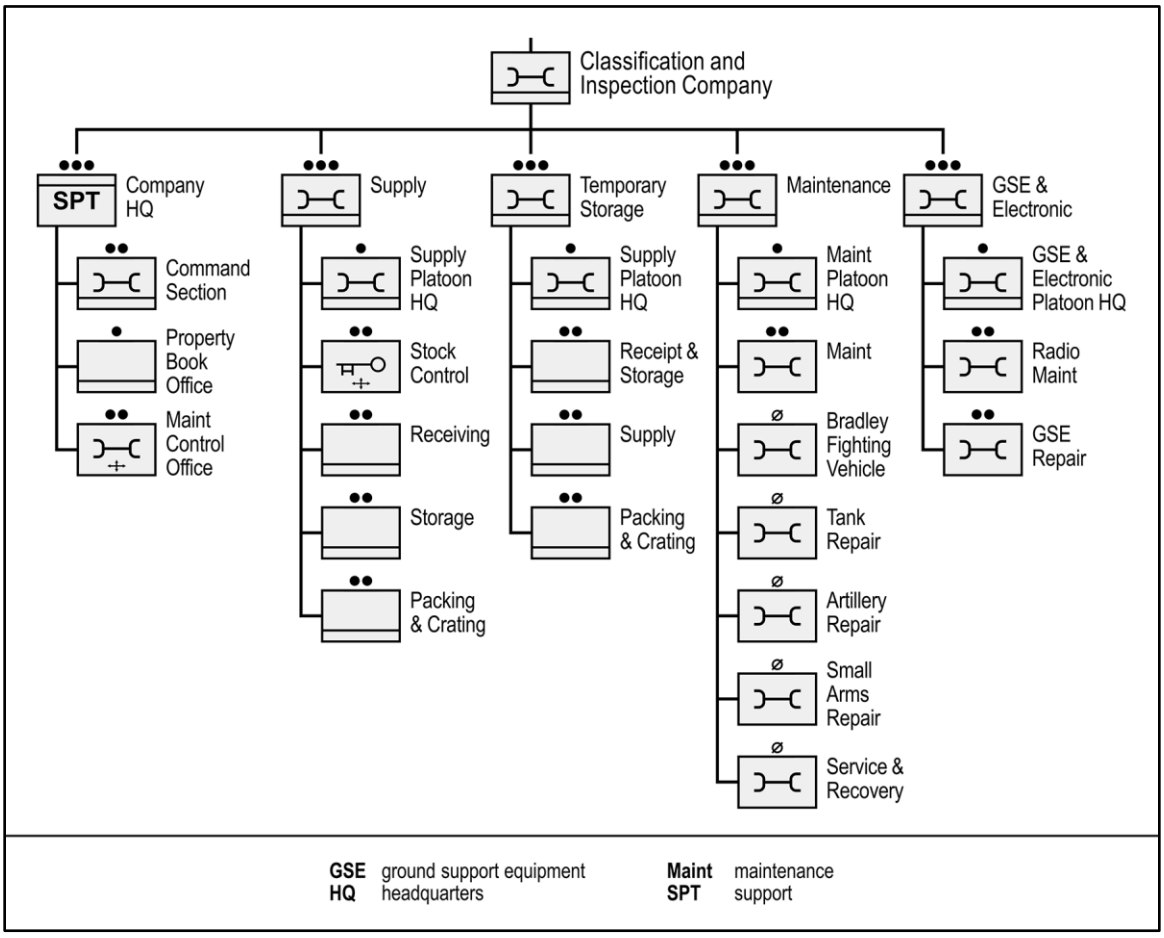

Figure 2-4. Classification and inspection company

CORPS

2-36. The corps headquarters provides administration and support of all Army forces assigned, attached, or OPCON to the corps. The corps G-4 establishes policy for maintenance operations and monitors the readiness posture of all Army units operating in the corps AO. The corps G-4 also works with the corps logistics support element (CLSE) to identify requirements for and coordinate sustainment maintenance and contracted maintenance support. The CLSE is discussed in detail later in this chapter.

2-37. The corps G-4 staff does 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 coordinates with the appropriate sustainment and division headquarters to ensure that systemic maintenance problems are understood and addressed during materiel readiness reviews. See ATP 3-92 for more information on corps roles and functions.

EXPEDITIONARY SUSTAINMENT COMMAND

2-38. The ESC's role in maintenance operations is based on its role as the senior sustainment headquarters for the corps, responsible for synchronizing and integrating sustainment for the corps echelon. The ESC and its subordinate sustainment brigades are structured by the theater Army and the TSC to support the corps task organization. This sustainment structure changes as the corps task organization changes. The ESC develops detailed plans, policies, and directives for sustainment that conform to corps policies, directives, and guidance. The ESC SPO implements maintenance policy directed by the corps, coordinates sustainment

maintenance support, provides field maintenance capability, and serves as the fleet maintenance manager for the corps echelon.

SUSTAINMENT BRIGADE

2-39. The sustainment brigade at the corps level provides distribution management and conducts support operations in the corps AO. The sustainment brigade is task organized with CSSBs that provide field maintenance support for units operating in the corps area that do not have organic maintenance capability.

COMBAT SUSTAINMENT SUPPORT BATTALION

2-40. The CSSB at the corps echelon, supports EAB units, multifunctional brigades (maneuver enhancement brigades, field artillery brigades, and CABs), and functional support brigades (military police, signal, and engineer brigades). The CSSB may also support Army special operations forces as part of its area support task. A SMC will be attached to provide field maintenance and recovery support as required by the mission. (See ATP 4-93.1)

SUPPORT MAINTENANCE COMPANY

2-41. The SMC is attached to the CSSB and provides field-level maintenance support to CSSB attached units and units operating in the corps AO that lack organic maintenance capabilities. The CSSB executes command and control over attached SMCs and identifies their supported units, the support relationship with each unit, priority of support, and attachments and detachments as required.

MANEUVER ENHANCEMENT BRIGADE

2-42. The maneuver enhancement brigade is a multifunctional command and control headquarters. The brigade contains only two organic units—a signal battalion and an HSC. The HSC includes a maintenance support platoon. The maintenance platoon provides field maintenance and recovery for the brigade. The field maintenance section provides base shop and on-site field maintenance on wheel vehicles, power generation, and quartermaster and utilities equipment. The section also performs maintenance on small arms for the brigade, and attachments/augmentees. The S-4's maintenance focus is primarily on the internal units. The S-4 staff includes a maintenance warrant officer and NCO. The maneuver enhancement brigade SPO oversees the actions of SMC when attached. The brigade is dependent upon an SMC to perform field support maintenance on COMSEC equipment, low-density maintenance, and reinforcing support beyond organic capabilities. Figure 2-5 on page 2-10 depicts maintenance structure in a maneuver enhancement brigade. For additional information on the maneuver enhancement brigade see FM 3-81

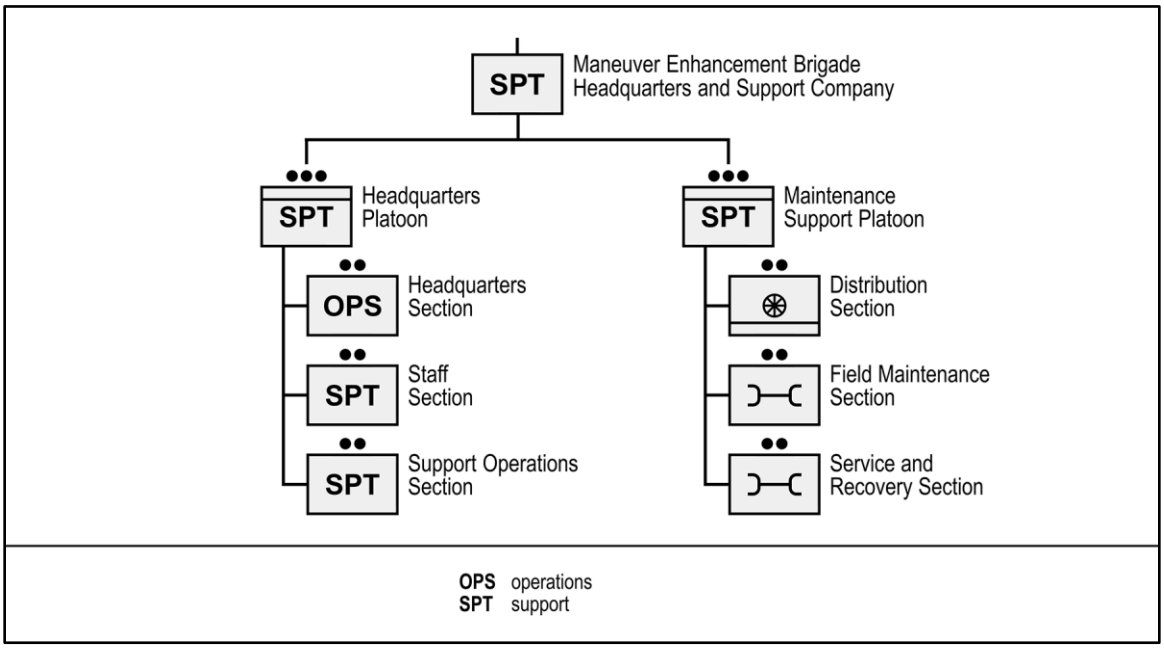

Figure 2-5. Headquarters and support company, maneuver enhancement brigade

ENGINEER BRIGADE

2-43. The engineer brigade is a multifunctional headquarters that can control up to five mission-tailored engineer battalions. Engineer brigades are typically attached to a corps or division. Not all engineer brigades are supported by a BSB. The engineer BSB is adapted to the engineer brigade in size, scope, and support. It is smaller than a BCT BSB and operates over longer distances. The engineer brigades within the heavy/reinforced divisions have a BSB. Engineer brigades within light divisions and airborne divisions do not have a BSB; they are supported by a CSSB.

2-44. Engineer brigades supported by a CSSB receive field-level maintenance support through an SMC. In engineer brigades supported by a BSB, each battalion is supported by an FSC. The FSC provides field-level maintenance for an engineer battalion and organic equipment. The FSC also provides limited wheeled and tracked recovery and welding support to the engineer battalion. Figure 2-6 illustrates the maintenance structure in an engineer battalion supported by an FSC.

2-45. The S-4 in an engineer brigade plans maintenance support for the brigade headquarters and coordinates with the SPO in either the BSB or CSSB for maintenance support. Engineer-specific equipment is often low-density, which poses challenges for conducting maintenance and repair. Obtaining engineer-specific Class IX repair parts frequently requires extraordinary coordination. The number of mechanics who are capable of maintaining and repairing engineer equipment may also be limited, increasing the difficulty of keeping engineer equipment operating. For more information on sustaining engineer brigade units, see FM 3-34 and ATP 3-34.22.

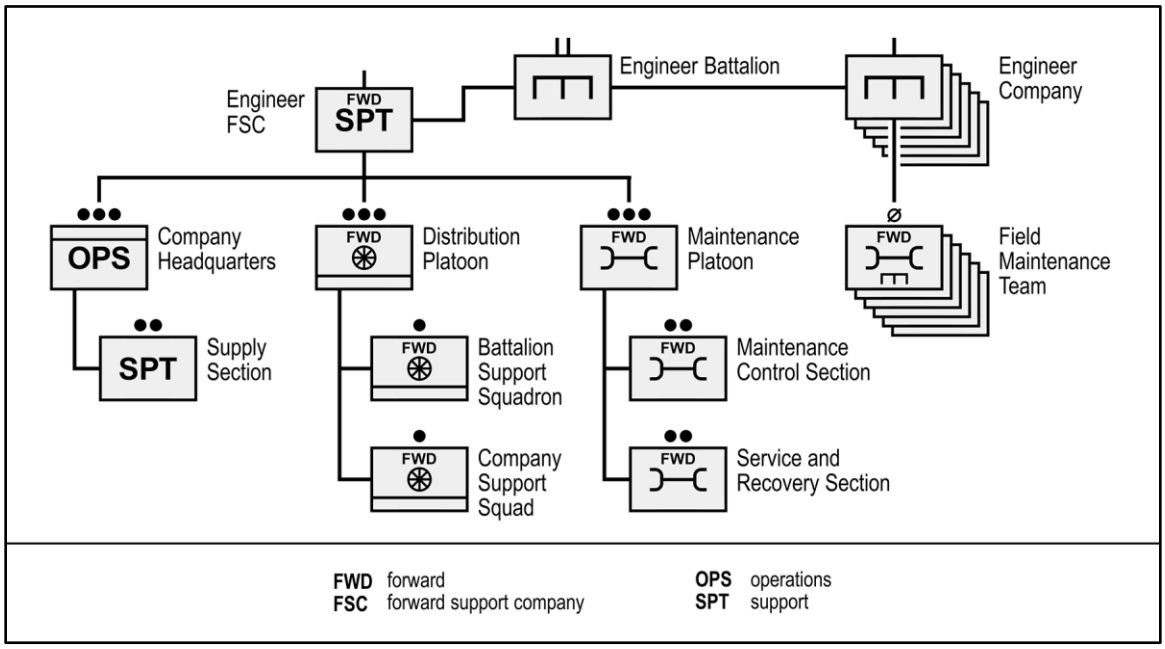

Figure 2-6. Engineer battalion maintenance support

SECURITY FORCE ASSISTANCE BRIGADE HEADQUARTERS AND SUPPORT COMPANY

2-46. The security force assistance brigade (SFAB) mission is to conduct worldwide security force assistance operations at the operational and tactical levels to develop the capacity and capability of foreign security forces and their supporting institutions in support of theater security cooperation objectives. Figure 2-7 on page 2-12 illustrates the SFAB.

2-47. The HSC provides command and control for units in the sustainment advising battalion, conducts security force assistance to foreign security forces, and provides limited direct logistics and Army Health System support for an SFAB. The headquarters support company has a small maintenance section, distribution section, and a medical support section. However, the unit possesses limited capacity when it comes to logistics support to the SFAB and may require significant augmentation when employed outside of an established joint operations area.

2-48. The maintenance section provides limited automotive, armament, ground support equipment, and recovery support to the SFAB. Generally, this includes limited field-level maintenance support to the brigade headquarters company and the maneuver, field artillery, engineer, and support battalion headquarters companies. This includes monitoring associated maintenance contracts in support of SFAB units. The maintenance team's secondary mission is to assess, advise, support, and liaise with foreign security forces regarding field-level (and potentially sustainment-level) maintenance operations depending on the foreign security force requirements. See ATP 3-96.1 for additional information on the SFAB.

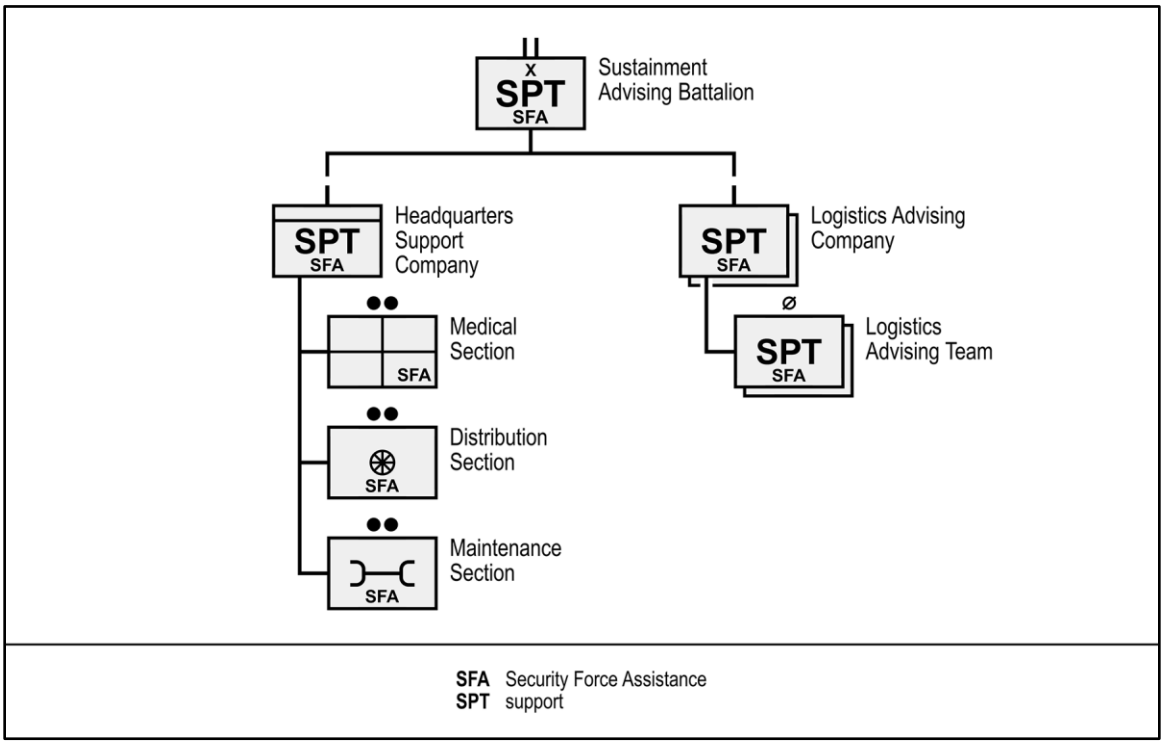

Figure 2-7. Security force assistance brigade

FIELD ARTILLERY BRIGADE

2-49. The BSB commander is the brigade commander's senior logistician and the primary advisor on the sustainment of all brigade operations. The BSB provides general supplies, fuel, and ammunition to the brigade. The BSB for a field artillery brigade consists of an HSC that includes a headquarters, support, and maintenance platoon. The maintenance platoon includes a maintenance control section, field maintenance sections, and a service and recovery section. The HSC also includes a SPO section responsible for planning and coordinating support requirements for subordinate field artillery organizations.

2-50. The BSB also has attached field artillery FSCs who provide missile and electronic, armament, automotive, and ground support equipment maintenance for the field artillery battalions. Figure 2-8 depicts the maintenance units in an field artillery brigade. For additional information regarding the structure of the field artillery brigade headquarters and service company, refer to ATP 4-90.

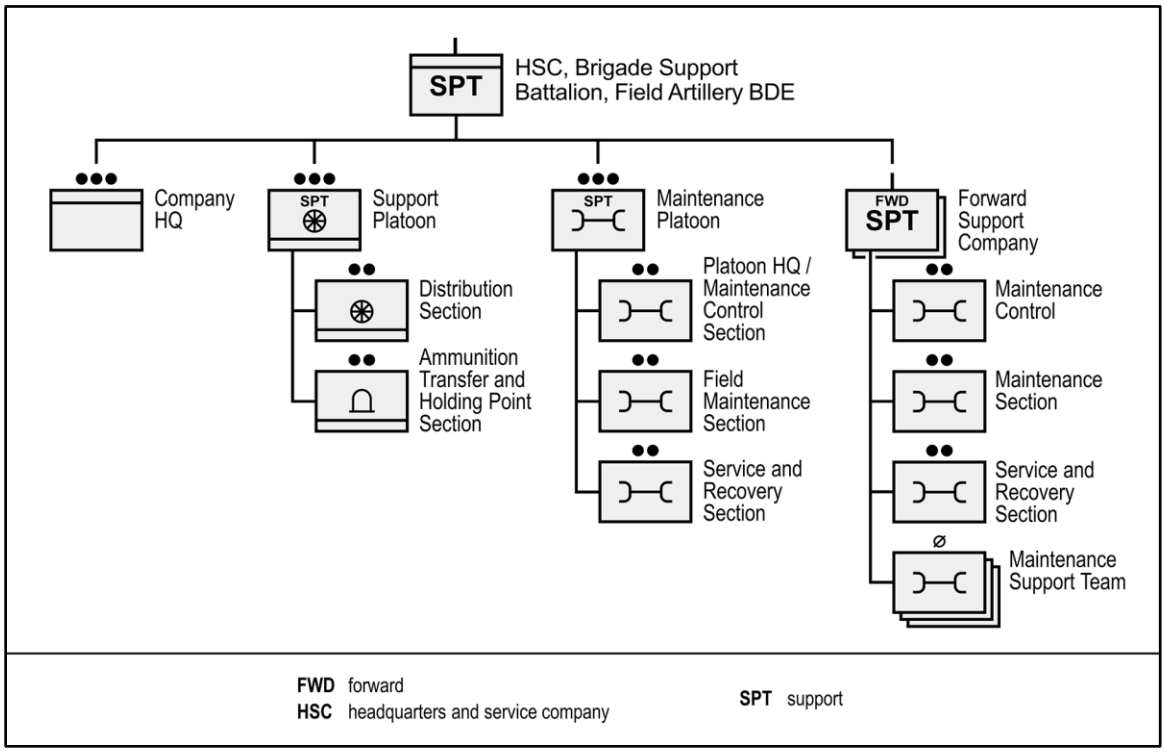

Figure 2-8. Field artillery brigade maintenance

SPECIAL FORCES GROUP SUPPORT BATTALION

2-51. The group support battalion is the primary logistics provider in the special forces group. Its mission is to plan, coordinate, synchronize, and execute logistics operations in support of the group. When ASCC logistics support is unavailable or not established in a joint operations area, the battalion will be the primary common-user logistics provider. The group support battalion commander is the senior logistician in the special forces group and advises the group commander in logistics management and execution.

2-52. The group support battalion establishes a support center that identifies maintenance requirements, directs and monitors field-level vehicle and power-generation maintenance, and coordinates for conventional force, host-nation, and contractor support when required. The diverse peculiar equipment density requires on-site contractor maintenance coordinated through the battalion/group S-4 section. The maintenance control section provides maintenance information to the SPO section. Army special operations forces liaison elements can provide access to continental United States (CONUS) and theater-level logistics systems.

2-53. The maintenance company in the group support battalion is responsible for consolidated special operations forces-peculiar field-level maintenance of wheeled vehicles and power-generation equipment along with vehicle recovery operations for the group headquarters and co-located elements. The maintenance company consists of the following sections: headquarters, maintenance control, ground maintenance, electronic maintenance, armament maintenance, and base support. Mechanical maintenance sections in FSCs perform consolidated field-level maintenance of wheeled vehicles and power-generation equipment along with vehicle recovery operations. Due to geographic dispersion, forward arrayed special operations forces elements may require replacement of components and parts through nonstandard logistics utilizing inconsistent methods and platforms. Figure 2-9 on page 2-14 depicts the special forces group support battalion structure.

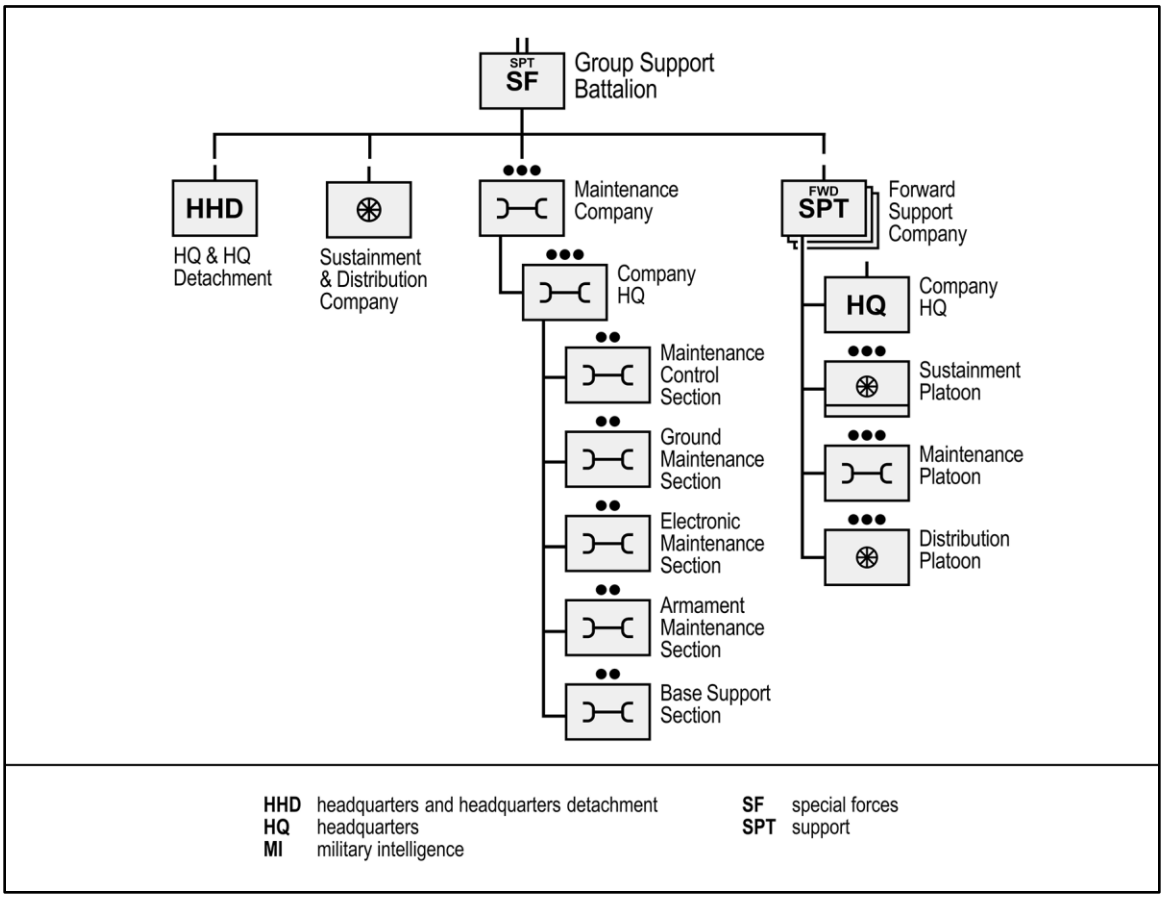

Figure 2-9. Group support battalion structure with attached forward support companies

DIVISION

2-54. The division headquarters role in maintenance operations is based on its responsibility for administration and support of all Army forces assigned, attached, or OPCON to the division. The division G-4 establishes policy for maintenance operations and monitors the readiness posture of all Army units operating in division AO. The division G-4 also works with the division logistics support element (DLSE) to identify requirements for and coordinate sustainment maintenance and contracted maintenance support. See ATP 3-91 for more information on division roles and functions.

2-55. The HSC within the division's headquarters and headquarters battalion contains a maintenance section that coordinates maintenance support. Maintenance sections within the main command post and tactical command post provide field-level maintenance support for vehicles, power generators and air conditioners assigned to the battalion. These sections also provide ground vehicle recovery on assigned equipment.

DIVISION SUSTAINMENT BRIGADE

2-56. The division sustainment brigade (DSB) provides general support logistics, personnel services, and financial management to non-divisional forces operating in the division AO. A task-organized DSB includes an organic division special troops battalion and an organic DSSB to support tactical-level sustainment operations. Depending upon operational and mission variables, the DSB can command up to seven battalions. The DSB and its subordinate units provide direct support to all assigned and attached units in an operational area as directed by the division commander. Divisions may have additional CSSBs attached to meet operational requirements.

2-57. The DSB SPO staff synchronizes and integrates maintenance at the division echelon maintenance. The staff section maintains running estimates of maintenance requirements for supported units within the division. Maintenance managers within the staff develop maintenance plans based on priorities of support established by the division G-4. See ATP 4-91 for more information on division sustainment operations.

DIVISION SUSTAINMENT SUPPORT BATTALION

2-58. The DSSB is a multifunctional battalion that is organic to the DSB. Each DSSB has an organic composite supply company, composite truck company, DSMC, and field feeding company. The DSSB provides maintenance support to divisional BCTs and other units operating in the division support area through the DSMC.

DIVISION SUPPORT MAINTENANCE COMPANY

2-59. Division support maintenance companies are organic to the DSSB and provide field maintenance and limited recovery support to designated units and as directed to other division units in the AO. The DSSB provides command and control. The company has three platoons: the automotive armaments platoon, the electronics maintenance platoon, and the ground support equipment maintenance platoon. Capabilities include maintenance control, field-level maintenance on wheeled vehicles, armament, radios, COMSEC equipment, special electronics, and power generation. The division support maintenance company has limited welding and machine shop capacity, limited wheeled vehicle recovery assets, and an organic area TMDE support team. This team provides TMDE support for the division and area support for units operating in the DSB area of operation. See figure 2-10 for the design structure of the division support maintenance company.

Note: The division support maintenance company does not provide maintenance support to BCTs or reinforce BSB maintainers—it does not have M1, M2/3, or M109A6 repair capability.

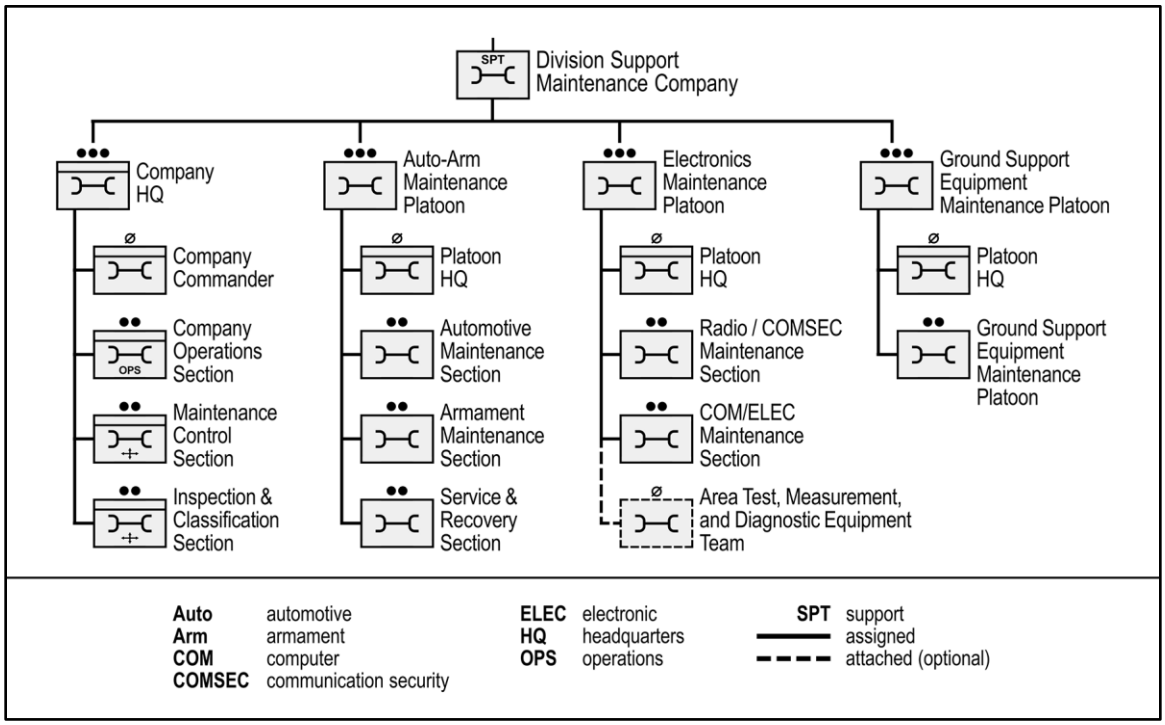

Figure 2-10. Division support maintenance company

DIVISION ARTILLERY

2-60. The division artillery (DIVARTY) is a brigade-level command that plans, prepares, executes, and assesses fires for the division. The DIVARTY S-4 is responsible for oversight of DIVARTY sustainment operations and is the lead sustainment planner in the sustainment cell. The S-4 provides input and staff oversight in the areas of supply, maintenance, transportation, medical, and field services. Each of the task organized artillery battalions is supported by an FSC with maintainers to support the fielded weapon system. See ATP 3-09.90 for more information on DIVARTY roles and responsibilities.

BRIGADE COMBAT TEAM

2-61. The BCT is the Army's primary combined arms, close combat force. The BCT commander has the overall responsibility for BCT equipment readiness and combat power. The BCT S-4 is the principal staff officer for logistics planning and operations and provides staff oversight to assigned units in the areas of supply, maintenance, transportation, and field services.

2-62. Infantry, armor, and Stryker BCTs each have an organic BSB that functions as their primary source of sustainment. The BSB commander is the senior logistician, logistics operator, and advisor for support to the BCT. The BCT commander should empower their BSB commander to cross-level maintenance assets to best employ them to support operations.

BRIGADE SUPPORT BATTALION

2-63. BSBs generally consist of an HHC, a distribution company, an FMC, a medical company, and up to six FSCs. The BSB S-4 monitors battalion internal maintenance. The BSB SPO staff coordinates field maintenance support of assigned equipment through their subordinate FSCs and the FMC. BSBs also provide support within the limits of their capability to elements transiting the BSB's area of support that are without assigned or organic maintenance capability. See ATP 4-90 for more information on the BSB. Figure 2-11 shows the BSB in a BCT.

2-64. 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 right 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, Army Health System (except field artillery and maneuver enhancement brigades), and distribution operations.

Note: 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 within the BCT above the FSC level.

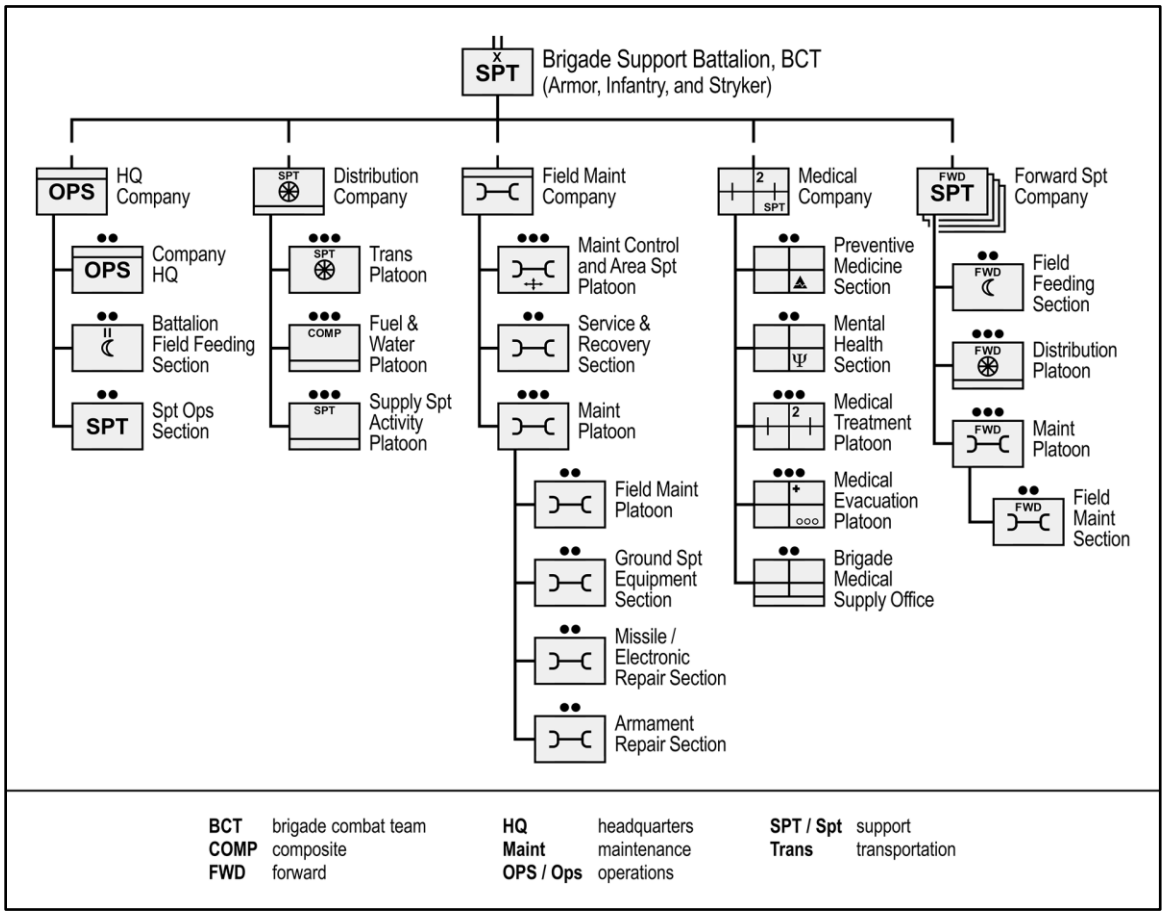

Figure 2-11. Brigade support battalion, brigade combat team

2-65. The SPO staff maintains visibility of maneuver unit readiness. The SPO section includes supply and field services, transportation management, maintenance, ammunition, mortuary affairs, and medical operations branches. The duties and responsibilities of the BSB SPO staff include the following:

- Conducting continuous logistics preparation of the battlefield.
- Submitting logistics forecasts to external SPO staffs and distribution elements.
- Coordinating and providing technical supervision for the BSB logistics mission, including supply activities, maintenance support, and transportation assets.
- Coordinating logistics for units passing through the brigade AO.
- Developing maintenance support standard operating procedures (SOPs).
- Monitoring daily battle loss reports to anticipate future requirements.
- Recommending maintenance priorities to the BCT S-4.

2-66. SPO maintenance management personnel provide maintenance oversight of the FMC and FSC maintenance sections. They 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—

- Working with the division logistics support element (DLSE) for logistics assistance representative (LAR) support.
- Coordinating external maintenance and recovery support when required.
- Coordinating field service representative (FSR) support as required or forecasted.
- Monitoring brigade LOGSTAT reporting and equipment readiness levels.

- Managing and tracking class IX replenishment support from the supporting CSSB.

FIELD MAINTENANCE COMPANY

2-67. The FMC provides field maintenance to the BSB. The FMC has a maintenance support platoon that performs automotive, armament, electronics, and ground equipment maintenance operations. The company provides limited maintenance support to the FSCs for low-density equipment maintenance such as C&E and armament equipment. The FMC provides recovery of organic equipment, recovery to supported units, and support for maintenance evacuation of equipment requiring sustainment-level maintenance. For additional information on the organization and capabilities of the FMC, see ATP 4-90.

2-68. The FMC does not have the ability to provide maintenance on the BCT's main weapon systems (M1 Abrams, M2/3 Bradley, Paladin, or Stryker). The maintainers for those systems are only in the FSC. The FMC in a Stryker BCT does include mechanics to maintain the medical company's Stryker medical vehicles.

2-69. The FMC maintains stocks of class III(p) and class IX in the form of bench stock and shop stock only. Additional class IX stocks are managed by the supply support activity (SSA) in the distribution company.

2-70. FMCs within armored BCTs use the Next Generation Automatic Test System (also called NGATS) or the soon to be retired Direct Support Electrical Systems Test Set 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 gunner's primary sight. The Direct Support Electrical Systems Test Set enables maintainers to perform diagnostics that 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 prevent line-replaceable units from being turned in to the supply system with no evidence of failure.

2-71. When a shop-replaceable unit or line-replaceable unit is identified as unserviceable, a work order is opened with the supporting BSB C&E shop. The C&E shop uses diagnostic spares to isolate the defective component in the unit and replace 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 nonrepairable, then the part is sent back to the FSC. The FSC then orders a replacement from the supporting SSA stocks or from wholesale stocks. Faulty line-replaceable and shop-replaceable units are typically replaced from BCT stocks.

2-72. BSBs and SSAs 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 unit is classified as nonrepairable. 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.

FORWARD SUPPORT COMPANY

2-73. The FSC is organic to the BSB in BCTs may be attached to field artillery and engineer battalions. FSCs provide distribution, field-level maintenance, and field feeding for their supported battalion.

2-74. The BSB can task organize the FSC, assign it to an AO, and establish authorities. The BSB provides administration and support authority over the FSC. Having support authority 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 effort to specific battalions within the brigade. FSCs depend on the BSB for administrative support, some logistics support, and technical oversight.

2-75. Depending on the current operation and situation, the brigade commander may place an FSC OPCON to 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 OPCON command relationship, the FSC will typically have reporting functions to the maneuver unit and the parent BSB. The BSB will continue to provide administrative support. FSC attachment or OPCON to its supported battalion is generally limited in duration and should only be for a specific mission

or phase of an operation. See ATP 4-90 for more information on command relationships between the BSB and FSC.

2-76. The FSC normally operates near 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. Figure 2-12 on page 2-20 depicts a typical structure of an FSC.

2-77. The FSC maintenance platoon performs field-level maintenance on battalion armament, C&E, and automotive and ground support equipment and executes 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.

2-78. 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 and 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 repairable items. The maintenance control officer is the senior maintenance representative in the maintenance control section and manages it, the maintenance section, the 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.

2-79. The FSC provides FMTs as far forward as possible and does the bulk of its work no further back than the maintenance collection point (MCP). A ***maintenance collection point*** **is a temporary location established within the battalion echelon for the collection of equipment needing or undergoing field maintenance**. Tasking orders should contain all the information required for the FSC to coordinate support for the assigned maneuver company.

2-80. The FSC establishes communication with all supported units to enable effective maintenance support and coordination. This ensures that the FSC has all supported unit locations and equipment density. The FSC uses this coordination to assist in planning and work-loading their FMTs.

***Note*:** The FSC supporting the brigade engineer battalion in the BCTs provides maintenance support to the armored vehicles assigned to the brigade's headquarters company.

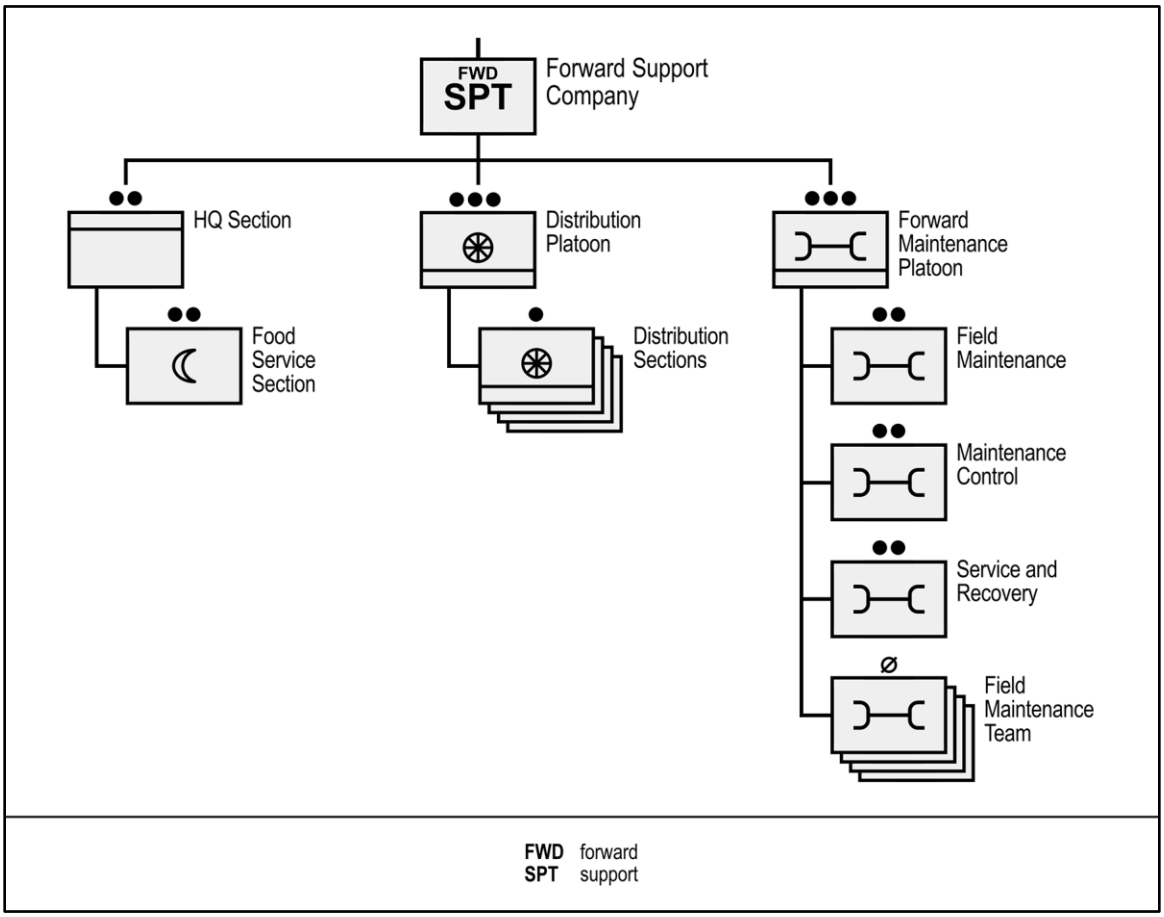

Figure 2-12. Notional forward support company

FIELD MAINTENANCE TEAM

2-81. The FMTs within the FSC maintenance platoons provide field maintenance, BDAR, and recovery for their supported companies. All or part of an FMT typically travels with the company trains.

2-82. The supported company commander and the maintenance control section establish FMT priorities in accordance with the battalion commander's guidance. The FMT maintenance NCOIC supervises the FMT, which works OPCON to the maneuver company. The maneuver unit fully integrates FMTs into their operational plans.

2-83. FMTs perform 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. FMTs focus on completing jobs onsite if the tactical situation permits. However, they may need to evacuate equipment to the MCP to conduct repairs. FMTs carry limited on-board combat spares to facilitate forward repairs.

SECTION II – STRATEGIC-LEVEL SUPPORT ROLES AND FUNCTIONS

2-84. In order for maintenance operations to be successful, commanders and maintenance managers must understand strategic-level forces and the capabilities each provides. Strategic-level support for maintenance operations includes USAMC and the Defense Logistics Agency (DLA).

UNITED STATES ARMY MATERIEL COMMAND

2-85. USAMC is the Department of Army's sustainment maintenance process owner. USAMC equips, resets, and sustains the Army by leveraging its capabilities, including LRCs on all major Army installations. In addition to sustainment maintenance, USAMC provides logistics support to Army forces as well as common support to other Services, multinational forces, and interagency partners. The diverse capabilities of USAMC are provided through national-level maintenance and supply programs managed and executed by its subordinate life cycle management commands (LCMCs).

USAMC LIFE CYCLE MANAGEMENT COMMANDS

2-86. The Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA[ALT]) program executive officers and product or project managers ensure support for fielded weapon systems and equipment throughout their entire life cycle. The LCMCs coordinate support to deploying and deployed forces through ASC and execute support under the control of the supporting AFSB. The exact organizational makeup of each LCMC varies. LCMCs provide support to field and sustainment maintenance operations through the Logistics Assistance Program and forward repair activities.

2-87. LCMCs assign LARs to Army field support battalions (AFSBns) and logistics support teams to support the Army maintenance mission. LARs are highly trained, deployable Department of the Army (DA) civilians who specialize in one of a variety of Army equipment sets. They assist units with maintainer training, fault diagnosis and repair, resolving systemic equipment and parts issues, battle damage assessments, and determining disposition of damaged or obsolete equipment. LARs can also assist the supported units in resolving repair parts and supply problems by facilitating adaptive manufacturing solutions through LCMC enterprise reach-back capabilities. In all cases, the LCMCs maintain technical authority and human resource management over their employed LARs working in AFSBns and logistics support teams.

2-88. Three USAMC LCMCs play a significant role in maintenance operations:

- United States Army Aviation and Missile Command (AMCOM).
- United States Army Communications-Electronics Command (CECOM).
- United States Army Tank-automotive and Armaments Command (TACOM).

2-89. AMCOM, together with ASA(ALT) program executive officers, program managers, and product managers, delivers 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. AMCOM also performs applied research, integrated logistics support, materiel readiness management, and maintenance support for Army aviation and missile systems, subsystems, and associated equipment.

2-90. CECOM, together with ASA(ALT), ensures the global readiness of 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.

2-91. TACOM, together with 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

2-92. United States Army Contracting Command provides contracting support to deployed sustainment units through its contracting support brigades. Refer to ATP 4-71 for additional information on operational contract support.

Types of Contract Support

2-93. Operational contract support is the process of planning for and obtaining supplies, services, and minor construction from commercial sources in support of combatant commander-directed operations.

Commanders and maintenance managers must understand the different types of contract support that help enable maintenance operations. The types of contract support are theater support, external support, and systems support. See ATP 4-10 for more information on types of contract support.

System Support Contracts

2-94. Systems support contracts are awarded by Services and are funded by directed appropriations and managed through acquisition program executive officers and their program managers. These contracts provide what is commonly known as contractor logistics support through deployed FSRs. LCMCs and separate Army program management offices prearrange system support contracts. Supported systems can include newly fielded weapons, command and control, and communication systems. System contractors provide support in garrison and may deploy with the force for training and contingency operations. System support contract maintenance can include technical assistance and support via contractor FSRs as well as complete field and sustainment-level support capabilities.

External Support Contracts

2-95. External support contracts are awarded by contracting organizations whose contracting authority does not derive directly from theater support senior contracting officials, contracting activities, heads of contracting activities, or from systems support contracting authorities. External support service contracts provide a variety of logistics and other related services and supply support. Contract authorities outside of the operational area provide external support contract maintenance. The largest and most used external support contract is LOGCAP. LOGCAP is an Army program executed by USAMC that provides the operational commander an alternative source for rapidly filling field and sustainment-level maintenance shortfalls from commercial sources.

2-96. The supported ASCC, in coordination with the supporting contracting support brigade and AFSB, will use LOGCAP-related maintenance support when it is determined to be the most effective, expeditious, and cost-effective means to augment deployed Army force maintenance capabilities. The operational commander should consider external support and theater support maintenance contract support options other than LOGCAP, especially for long-term, sustained operations and for operations with sufficient lead time to plan and coordinate other types of contracted support. See AR 700-137 and ATP 4-10.1 for additional information regarding LOGCAP maintenance capabilities.

Theater Support Contracts

2-97. Theater support contracts are contracts awarded by Service contracting officers deployed to the operational area. These contracts, normally executed under higher micro purchase and simplified acquisition thresholds, provide supplies, services, and minor construction from commercial sources within the operational area. 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 regionally available commercial support capabilities. Requiring activities or supported units should consult with their supporting AFSB to ensure that other contract venues are not already in place before submitting maintenance support contract requirements to the supporting contracting support brigade or designated Joint Theater Support Contracting Command.

Government-Furnished Equipment

2-98. The government may provide equipment for contractor use in the performance of the contract when determined to be in the best interest of the government by the contracting officer. The government maintains proprietary interest in the items, and therefore actions related to issue, maintenance, disposal, transfer, accountability, and return to stock remain the responsibility of the government. Some government-furnished equipment can be provided to the contractor prior to deployment into the operational area, while other equipment is issued as theater-provided equipment to the contractor in the operational area. See ATP 4-10 for more information and scenarios involving government-furnished equipment.

UNITED STATES ARMY DEPOTS

2-99. The mission of the USAMC Army Depot Maintenance Enterprise is to provide the resources, skills, and capabilities to sustain the life cycle readiness of weapon systems and equipment worldwide in a reliable and efficient manner. Depots provide sustainment maintenance support for contingency operations from 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. In addition to the maintenance depots, the Army Medical Logistics Command Medical Maintenance Operations Division provides sustainment and depot-level support for standard and nonstandard medical materiel to all Army components, authorized Department of Defense (DOD) activities, and other federal agencies. These sustainment medical equipment maintenance activities are performed in three locations: Tracy, CA; Hill AFB, UT; and Tobyhanna, PA.

2-100. Tobyhanna Army Depot is a subordinate element of CECOM that provides world-class logistics support for command, control, communications, computers, cyber, intelligence, surveillance, and reconnaissance systems (commonly called C5ISR) across DOD. Tobyhanna performs sustainment-level maintenance, including overhaul and repair, fabrication, manufacturing, engineering design, modifications, and software depot maintenance in support of Army readiness globally.

2-101. Letterkenny Army Depot and Corpus Christi Army Depot are subordinate elements of AMCOM. Letterkenny performs sustainment maintenance and modernizes missile, air defense, and space systems. Corpus Christi supports Army strategic readiness by providing repair and overhaul of rotary-wing components and aircraft.

2-102. There are three maintenance depots under TACOM. Anniston Army Depot performs depot-level maintenance on vehicle systems such as the M1 Abrams tank, M88 recovery vehicle, Stryker, M9 combat earthmover, and assault breaching vehicle. Red River Army Depot provides sustainment maintenance on ground combat and tactical systems. Sierra Army Depot is the depot-level maintenance for all petroleum and water distribution systems. Figure 2-13 illustrates the locations of LCMC, medical maintenance divisions, and maintenance depots.

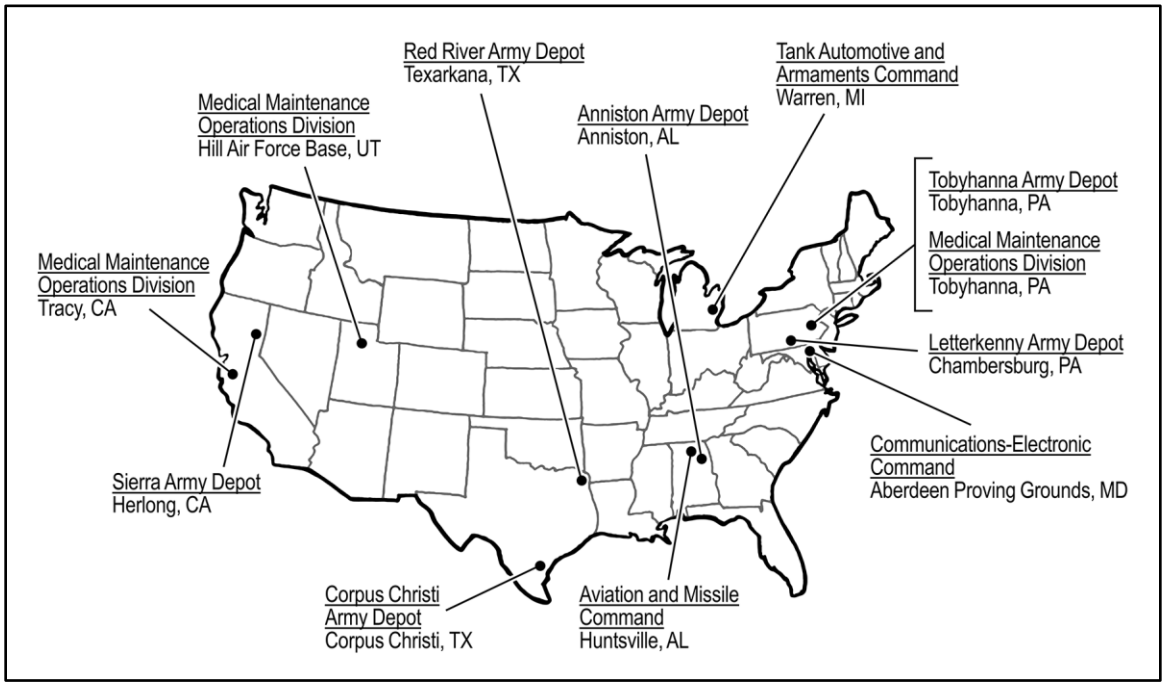

Figure 2-13. LCMC and depot maintenance enterprise

ARMY SUSTAINMENT COMMAND

2-103. ASC provides logistics support by synchronizing support from the strategic to the tactical level. ASC provides sustainment maintenance and facilitates reach-back across USAMC to enhance mission support. It supports Army, joint, and multinational forces; manages APS; and provides materiel management capabilities not provided by supporting sustainment brigades. ASC has AFSBs forward deployed at overseas locations regionally aligned to ASCCs and focused to serve as the bridge between the generating force and the operational force.

2-104. Major ASC responsibilities include—

- Field support. The ASC field support network of AFSBs, AFSBns, and logistics support teams identify and resolve equipment and maintenance problems as well as materiel readiness issues for their supported commands.
- Materiel management. ASC matches materiel to missions 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 made available to non-deployed units for training.
- APS. ASC maintains, accounts for, and manages combat equipment, supplies, and humanitarian mission stocks at land-based and sea-based positions located around the globe.

ARMY FIELD SUPPORT BRIGADE

2-105. The AFSB provides national-level sustainment support to the theater Army and supports the building of combat power and the regeneration of battle-damaged equipment. AFSBs are assigned to ASC and OPCON to the supported theater Army when deployed. This relationship is normally delegated to the supporting TSC or ESC as appropriate.

2-106. AFSBs administer the Logistics Assistance Program to include command and control of their subordinate AFSBns and logistics support elements 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. It 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 will be made through the AFSB.

2-107. USAMC manages APS through select AFSBns that can receive, store, maintain, and issue them. These AFSBns manage and maintain APS equipment when it is not issued to training units. Once APS are issued, the receiving unit will maintain that equipment while in its possession. See ATP 3-35.1 for more information on APS.

2-108. Large-scale combat operations may generate requirements to redistribute and retrograde commodities (especially class VII) that exceed in-theater sustainment unit capacity. The theater AFSB may request CICO support or establish redistribution property assistance teams to meet these requirements. For additional information on AFSBs, refer to ATP 4-98.

Logistics Readiness Centers

2-109. ASC manages LRCs through its AFSBs. The fundamental mission of the LRC is to support the Soldier at home station by providing installation and Army logistics readiness. Depending on the location and authorities assigned, LRCs may conduct field and sustainment maintenance for organizations on the installation. Soldiers and commanders can access not only supply and maintenance support, but also technical reach-back to the entire USAMC enterprise.

2-110. The LRC's primary maintenance mission is garrison equipment support, but it can also provide pass back maintenance support for units that fund parts and labor appropriately per MOS authorization and document type such as table of distribution and allowances (TDA) or MTOE. LRCs are located on installations both within and outside CONUS.

Corps Logistics Support Element

2-111. The CLSE is a mission-tailored organization formed from an AFSB's structure that deploys with its supported corps headquarters. Its composition depends on operational and mission variables, but it generally includes AFSB senior leaders and embedded LCMC senior command representatives. The CLSE supports the corps by synchronizing and integrating acquisition, logistics, and technology capabilities into plans and operations. The CLSE provides visibility of forward repair activity workload, redistribution property assistance teams, and class VII redistribution operations and synchronizes DLSE and LAR technical support across the corps AO. The CLSE also supports reconstitution if executed.

Army Field Support Battalion

2-112. AFSBns are scalable and tailored TDA organizations comprised of military and DA civilians augmented with LCMC LARs. They are responsible for the LRC functions of supply, services, maintenance, and transportation support on their installations. See ATP 4-98 for additional information regarding the organization and capabilities of the AFSBn.

2-113. Designated AFSBns have habitual support relationships with their supported divisions and serve as USAMC's lead materiel integrator for the division and tenant units. The AFSBn employs LCMC LARs to provide equipment technical expertise to assist in identifying and resolving systemic maintenance problems to build and maintain combat power. AFSBns that have responsibility for LRC installation functions provide installation support and power projection capability, including sustainment-level maintenance and pass-back field-level maintenance. These AFSBns may perform modification work orders on selected items of equipment or coordinate for ASA(ALT) maintenance activities to apply modification work orders.

2-114. AFSBns are capable of conducting split-based operations to meet mission requirements at both home station and forward locations. They deploy a DLSE forward with their aligned division headquarters when needed, while the remainder of the AFSBn continues to support operations at home station.

2-115. Logistics Assistance Program maintenance assistance and instruction teams may provide technical instruction and guidance to enable supported units to perform their missions more efficiently. Team functions include determining the nature and scope of required maintenance support. This enables USAMC to send properly staffed and equipped maintenance support teams (MSTs) to provide onsite maintenance. Maintenance assistance and instruction teams discuss and resolve mutual maintenance support issues regarding personnel, equipment, or operational procedures and policies. They also assist the unit commander with the evaluation of equipment condition, the effectiveness of the maintenance program, and the development of remedial action to correct deficiencies.

Division Logistics Support Element

2-116. The DLSE is a mission-tailored organization that is formed from an AFSBn's structure and deploys with its supported division headquarters. The composition of the DLSE depends on operational or mission variables, but it generally includes AFSBn senior leadership and LCMC lead system technical representatives. It assists the division in identifying and resolving systemic logistics problems and provides equipment technical expertise to aid in building and maintaining readiness. The number of LARs within a DLSE is dependent upon the equipment and technology densities within the supported unit.

2-117. The mission of the DLSE is to synchronize and integrate USAMC capabilities at the division level to increase combat power. The DLSE's roles and responsibilities include—

- Providing LAR technical expertise at the division level to assist in diagnosis, repair, determining battle damage, and disposition instructions.
- Assisting and coordinating ASA(ALT) assistance called forward to support the division, BCT or combat aviation brigade (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.

USAMC CALL FORWARD MAINTENANCE CAPABILITIES

2-118. Several USAMC national-level provider organizations may deploy capabilities forward to augment a deployed AFSB. These call forward capabilities are ad hoc organizations formed from existing USAMC capabilities based on mission variables. The actual size and composition of these organizations varies from mission to mission. They include a mixture of DA Civilians and civilian contractors. See ATP 4-98 for additional information about USAMC support formations.

Equipment Support Activity

2-119. Equipment support activities provide sustainment maintenance. They are ad hoc organizations, normally formed from depot and arsenal capabilities, 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 control scheduling of maintenance shop operations. The equipment support activity is attached to an AFSB or designated AFSBn. It relies on the supported unit for logistics and force protection support, while the AFSB retains command responsibility.

Combat Vehicle Evacuation Team

2-120. 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 operations. The teams evaluate combat equipment faults and damage, and they 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.

2-121. Combat vehicle evacuation teams are normally attached to an AFSBn and are assigned work by either a designated equipment support activity or directly by the AFSBn. The team relies on the supported unit for logistics and force protection support, while the AFSB retains command responsibility.

Forward Repair Activity

2-122. Forward repair activities can be called forward from select LCMCs. Forward repair activities are task-organized and designed to repair specific types of equipment and components.

2-123. Forward repair activities perform sustainment maintenance. They may augment the AFSBn 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.

2-124. Forward repair activities are attached to an AFSB or AFSBn and are assigned work by either a designated equipment support activity or directly by the AFSBn. The unit relies on the supported unit for logistics and force protection, while the AFSB retains command responsibility.

CECOM Regional Support Center

2-125. Field Sustainment Support Division has seven regional support centers aligned with the AFSBs. They provide forward logistics support, including care of supplies in storage, warehousing, below-depot sustainment maintenance, and return maintenance authorizations for warranty items. These regional support centers can react rapidly to deployed unit requirements and support surge requirements, if necessary. They mainly support commercial off-the-shelf (COTS) and non-standard equipment.

DEFENSE LOGISTICS AGENCY

2-126. DLA is the national combat logistics support agency, providing nearly 100 percent of the military's consumable items. During large-scale combat operations, DLA closely coordinates with the combatant

command and Services to provide critical commodity and services support in the AOR. DLA deploys critical enablers such as a rapid deployment team to form the DLA support team and additional liaison officers to coordinate requirements. Maintenance managers need to incorporate DLA into operational plans and concepts of support to enhance the class IX readiness posture in their footprint.

2-127. DLA manages approximately 85 percent of the Army's class IX materiel in support of maintenance operations. The agency has locations around the world to better assist maintenance organizations with long lead-time repair parts and dispositioning procedures. When repair parts are backordered with a long-estimated shipping date, it is usually due to no parts in the pipeline and will require assistance from DLA to assist maintainers in reducing that timeline. The support team or liaison team will work closely with item managers to help expedite the procurement process of repair parts in need of an awarded contract or item procurement.

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Chapter 3

Planning Considerations for Maintenance Operations

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 planning considerations for successful maintenance operations.

OPERATIONAL ART AND MAINTENANCE OPERATIONS

3-1. Commanders 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 staffs use their collective skill, knowledge, experience, creativity, and judgement to integrate ends, ways, and means. Sustainment assets are prime targets for near-peer threats during large-scale combat operations. Maintenance units should expect to displace frequently. Static or fortified maintenance facilities will be vulnerable to prolonged surveillance by drone and artillery attacks. Survivability of maintenance units will require careful planning. Because sustainment is often vulnerable to enemy attacks, sustainment survivability depends on active and passive measures and maneuver forces for protection. See FM 4-0 for more on sustainment operational art.

3-2. Maintenance planners in an operational headquarters generally do not drive the planning process but need to be fully integrated throughout. Army design methodology helps commanders and staffs with the conceptual aspects of planning. These aspects include understanding, visualizing, and describing operations. MDMP helps commanders and staffs translate the commander's vision into an operations plan or operations order that synchronizes the actions of the force in time, space, and purpose to accomplish missions. Maintenance planners use the commander's intent, planning guidance, Army design methodology, and MDMP to develop the maintenance concept of support. They derive the concept of support from running estimates that are developed using a variety of planning tools. These running estimates project casualty figures, maintenance requirements, software patches, and other sustainment requirements (see ADP 5-0 for additional information). Maintenance planners participate in all aspects of MDMP to ensure synchronization and unity of effort.

3-3. Effective maintenance plans have three elements:

- Identify maintenance requirements for supported equipment.
- Identify available maintenance capabilities and capacities to sustain mission success.
- Balance maintenance capability and capacity against priorities of support.

Figure 3-1 on page 3-2 illustrates the maintenance planning process.

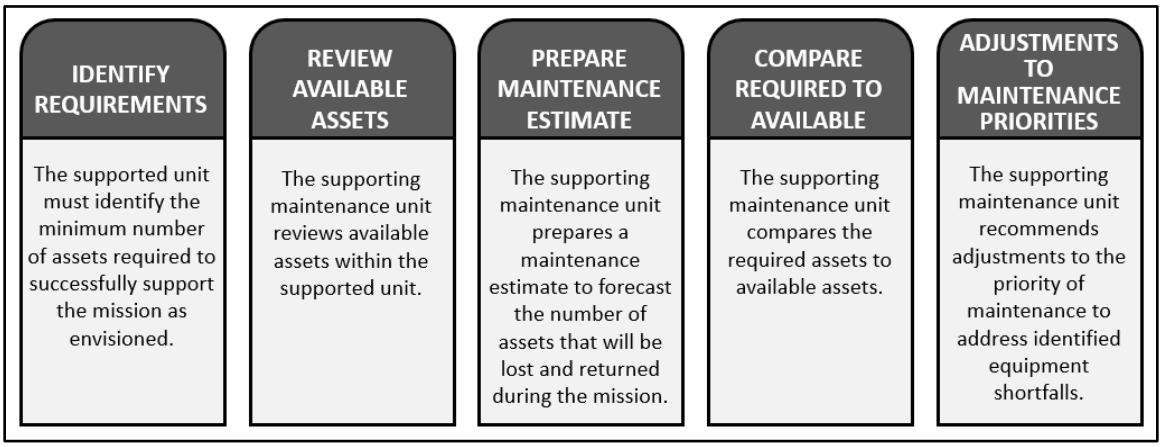

Figure 3-1. The maintenance planning process

3-4. As soon as the higher headquarters identifies a mission, the staff should initiate mission-specific maintenance planning. The S-3/G-3 initiates planning and identifies tasks and priority of support. The S-3 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.

3-5. Staff planners calculate the minimum number of weapon systems required to complete the mission. Staff logistics officers, operations officers, and maintenance planners work together to assess the requirements for employment of maintenance capability and capacity and make recommendations to the commander.

3-6. Maintenance planners assess the requirement to conduct BDAR procedures on damaged equipment when standard maintenance repairs are not practical and make recommendations to the commander for approval. They also assess the requirement for controlled exchange or cannibalization to meet repair parts requirements and make those recommendations to the commander for approval. *Cannibalization* is the authorized removal of components from materiel designated for disposal. Cannibalization supplements supply operations by providing assets not immediately available through the Army supply system. Costs to cannibalize, urgency of need, and degradation to resale value of the end item should be considered in the determination to cannibalize (AR 750-1). Cannibalization should only be used during combat to quickly repair equipment to fully mission capable. It is intended for equipment requiring non-procured class IX parts and is zero balance in the Army supply system. *Controlled exchange* is the removal of serviceable parts, components, and assemblies from unserviceable, but economically repairable, equipment and their immediate reuse in restoring a like item of equipment to a combat mission capable condition (AR 750-1). 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 SPO 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.

3-7. Maintenance planners assess the requirement to fabricate materials to enable rapid replacement of critical repair parts or enhance BDAR. Commanders at corps and below can use fabrication to meet those requirements. Fabrication on the battlefield is a critical capability that uses many different technologies including additive and subtractive processes. Additive and subtractive manufacturing are intended to enhance the supply system, not to replace the procurement of class IX repair parts and the ordering process. Emerging additive manufacturing technologies can drastically reduce the amount of time it takes to obtain or make parts. Subtractive manufacturing using computer numerical controlled mills and lathes enhances Soldiers' ability to fabricate and replicate items in an expeditionary environment.

3-8. Commanders position maintenance personnel and teams as far forward as possible to support maneuver units. They require the necessary transportation, communication assets, tools, security, and repair parts to ensure rapid repair and return of non-mission-capable equipment to the mission. Reliable sustainment

information system connectivity is required for these teams to replenish supplies and share maintenance information rapidly. Staffs should consider aerial delivery of critical repair parts to speed repairs when feasible.

3-9. The Army currently uses the very small aperture terminal (known as VSAT) and the Combat Service Support Automated Information Systems Interface (known as CAISI) to facilitate maintenance reporting and supply operations using 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 staffs at all levels need to develop and practice disconnected operations for use when automated systems are not available.

3-10. Maintenance work continues during periods of degraded communications. Maintenance planners need to 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 use cannibalization or controlled exchange to maintain combat strength. Additional information about cannibalization and controlled exchange is provided later in this chapter. Requests for class IX must be expedited.

3-11. EAB maintenance support is planned and executed through a combination of modular support units (sustainment brigades, CSSBs, and SMCs), divisional units (DSB, DSSB, and SMCs), and USAMC forward repair activities. The exact number of units allocated to the maintenance effort is dependent upon the size and scope of overall TSC, ESC, or division-centered logistics operations.

3-12. Maintenance in support of maneuver brigade operations requires continuous cross talk between the BCT commander and staff, the BSB commander and SPO section, and FSC commanders. Planning for maintenance should be fully integrated into the operations process to ensure maximum responsiveness. Cross talk continues throughout an operation as it changes and evolves.

BATTLEFIELD MAINTENANCE PLANNING CONSIDERATIONS

3-13. 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.

3-14. The BSB establishes a base or base cluster from which to operate within the BSA. The BSB commander simultaneously supports BCT operations while ensuring BSA security. The BSB commander must balance constant support operations and security requirements while establishing and operating the BSA. The BSB commander normally tasks the HHC to manage perimeter defense.

3-15. 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 brigade equipment not supported by an FSC.

3-16. 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. It may seem advantageous to place FSC maintenance capability in the BSA to move the maintenance burden out of the supported battalion operations area, but doing so creates evacuation problems and increases the time it takes to return repaired equipment to the owning unit.

TRAINS

3-17. 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 AO. They array subordinate sustainment elements including unit personnel, vehicles, supplies, and elements of their supporting FSC.

3-18. 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 the BCT's concept of support and the brigade commander's guidance. The commanders and staffs also determine the best allocation of personnel between the trains 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

3-19. Field trains are positioned based on mission variables 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 BSA.

COMBAT TRAINS

3-20. Combat trains typically consist of elements of the maneuver battalion or squadron's HHC, battalion aid station, MCP, and elements of the FSC. The preponderance of FSC maintenance and recovery capabilities are normally located in the combat trains. The combat trains location is a compromise between proximity to the supported unit and security.

3-21. 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 equipment is evacuated, the more time it adds to its repair and return to service.

COMPANY, BATTERY, AND TROOP TRAINS

3-22. 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 and assist the company with fault verification. 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-person 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

3-23. The BCT has all the necessary field maintenance capabilities required to support every equipment item it employs. These maintenance capabilities reside within the field maintenance platoons of the FSC and the FMC. 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 in 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 requests at the BCT level enable field maintenance organizations to access each other's capabilities. In peacetime, a best practice is to consolidate FSC low-density MOS Soldiers within the FMC for efficiency, ease of training, and mentoring by the senior NCOs and warrant officers.

REPAIR AND RECOVERY PLANNING

3-24. The key unit personnel responsible for developing unit repair and recovery plans are the battalion S-4, the unit maintenance warrant officer or maintenance NCOIC, and the FSC commander. They develop a plan of action for repair and recovery of disabled equipment based on the request for assistance. The action plan includes battle damage assessment and establishing priorities for support, tactical situation, workload, and availability of maintenance and recovery personnel.

3-25. The maintenance warrant officer or maintenance NCOIC assigns repair or recovery missions to the field maintenance platoon. At a minimum, the checklist will contain the following information: breakdown location or grid coordinates, cause of the breakdown, specific designation of required support (such as personnel by rank and MOS and equipment by type and quantity), and supply requirements (class I, III, V, and IX).

3-26. 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.
- The extent of repairs required.

3-27. Recovery personnel require special training on the following when recovering abandoned or unmanned equipment:

- Identification of the visual and physical indicators of chemical, biological, and radiological contaminations.
- Identification of visual indicators. Scanning for and reacting to possible explosive ordnance.
- Proper wearing of mission-oriented protective posture gear when chemical, biological, or radiological contamination is suspected.
- Clearing or disarming weapon systems to prevent accidental discharge.

3-28. Before initiating the action to recover equipment showing signs of contamination, commanders should coordinate with the higher headquarters to determine if the benefits of decontamination exceed the risks. If decontamination of the equipment is not the preferred course of action, the equipment may be marked to warn friendly forces of the hazard until weathering reduces it to acceptable levels. However, destruction may be required if the equipment could be captured by enemy forces.

3-29. 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 or recovery as directed.

NIGHT AND LIMITED VISIBILITY

3-30. Sometimes the tactical situation prevents access to disabled equipment. When that occurs, the maintenance warrant officer or the maintenance NCOIC receives 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.

3-31. 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 should anticipate a potential increase in workload.

FOREIGN MATERIEL

3-32. 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 are no disposition instructions should not be retrograded until it is coordinated with technical intelligence elements.

3-33. 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 onsite preliminary examination by technical intelligence personnel. When materiel does not need to

remain in place for intelligence evaluation and the discovering unit cannot retrograde it, the unit may request recovery and retrograde assistance from the sustainment brigade, CSSB, or BSB.

EXPLOSIVE ITEMS

3-34. The presence of ammunition and explosives often complicates recovery. Personnel should 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.

3-35. 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

3-36. Maintainers use BDAR to return disabled equipment rapidly to combat or enable equipment to self-recover. The objective of BDAR is to sustain the vehicle/equipment until permanent repairs can be performed. 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 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. BDAR fixes will be replaced with standard repairs at the first opportunity. Qualified maintenance personnel will evaluate repairs to ensure the equipment is either fully mission-capable according to -10 and -20 maintenance standards or can continue to be operated with the BDAR fix in place while awaiting parts. Peacetime BDAR repairs are temporary and will be replaced with standard maintenance repairs at the first opportunity.

3-37. Battle damage assessment appraises 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 and GTA 01-14-001.

Note: Commanders should always consider standard maintenance over BDAR whenever possible.

3-38. Commanders should address the use of BDAR in the logistics section of the 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.

3-39. Maintenance assets are heavily strained on the battlefield. Maintenance resources (personnel, tools, and parts) are limited, and it is imperative that they not be wasted. Crew members need to 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. Conduct on-the-job training and cross train personnel whenever possible.

3-40. On the battlefield, the objective is to return the system into battle with enough combat capability to accomplish the mission. 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.

3-41. Priorities of repair, personnel and parts availability, 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 can enable innovation.

PLANNING CONSIDERATIONS IN THE OFFENSE

3-42. Offensive operations include movements to contact, attacks, exploitations, and pursuits. 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.

3-43. Planners ensure that 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 and establishment of command maintenance priorities. Offensive operations place a heavy requirement on BCT transportation assets, increase equipment maintenance requirements, and affect sustainment information systems connectivity. Because of the fast pace of offensive operations and communication limitations, maintenance planning requires extensive effort to make it work effectively. Planners should—

- 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 pre-position 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 them for contamination before use).
- Ensure that maintenance preparations such as excess stockpiles of vehicles and supplies do not compromise the tactical plan.
- Anticipate increased consumption of class III(B) and class IX due to substantial maneuver.

3-44. The maneuver battalion establishes the location of the MCP during MDMP. The battalion S-3, battalion S-4, FSC commander, and maintenance control officer provide input and select the location. The S-3 communicates the MCP location to the BCT S-4 and SPO staff. The MCP should be located as far forward as possible during offensive operations.

MOVEMENT TO CONTACT

3-45. Maintenance personnel place maximum effort on preparing equipment for combat during the preparation phase of movement to contact. During execution, maintenance assets move closely behind the combat unit's main body to ensure rapid recovery, repair, and return of damaged and disabled equipment. Commanders position maintenance assets in the march column to best support the combat units while being protected from enemy fire.

ATTACK

3-46. 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, identifies and provides the current and future locations for MCPs. The maneuver company first sergeant and executive officer array the FMTs.

3-47. The maintenance teams are positioned forward with the maneuver companies during the attack. Onsite 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, discussing the current situation, priority of effort, and transition plan for the next operation.

EXPLOITATION AND PURSUIT

3-48. The maneuver brigade covers a large area during the exploitation and pursuit phase. Combat units strike at objectives deep in the enemy's AO while keeping pressure on retreating enemy forces. Command and control and communication are extremely difficult.

3-49. Commanders must keep in mind the considerations noted under time limits discussed in Chapter 4. FMTs or contact teams perform onsite repairs to bring weapon systems online to maximize combat power during this key phase of offensive operations. Equipment that cannot be repaired onsite will be recovered to the MCP. Evacuating equipment to the BSB should be the last resort for the maintenance control officer and maintenance warrant officer. The maintenance tactical SOP should address time limits for not mission-capable equipment evacuation from the MCP to the BSB.

PLANNING CONSIDERATIONS IN THE DEFENSE

3-50. Defensive operations include area defense, mobile defense, and retrograde. Operators, crews, and maintenance personnel are located in the rear of the formation fixing inoperable equipment that has been evacuated to the MCP.

3-51. Maintenance considerations for defensive operations include—

- Planning to reorganize to replace lost maintenance capability.
- Using maintenance teams well forward at MCPs.
- Planning to displace often.
- Emphasizing recovery and retrograde of equipment that requires extended repair time (if the commander has positioned maintenance personnel to repair them in the BSA).

3-52. 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 is 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 and allows more maintainers to concentrate on repair operations.

3-53. The FSC 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. See ATP 3-90.5 for additional information on defensive operations.

3-54. The MCP is often located with the maneuver battalion combat trains command post in order to support defensive operations. Dispersal is important within the combat trains as it provides greater protection from hostile artillery and aviation. The MCP can gain greater disbursement by not co-locating with the combat trains command post; however, this requires more personnel for defensive operations. The BSB commander must consider the effect on repair rates when using maintenance personnel for perimeter defense. Crews accompanying not mission-capable platforms to the MCP should be integrated into BSA security operations.

CONTINGENCY OPERATIONS

3-55. Maintenance is still important during contingency operations. Maintenance priorities may change based on operational or mission variables.

STABILITY

3-56. Interagency coordination is the key to success with stability tasks. The U.S. military provides relief directly to those in need only in the most extreme situations. In most stability operations, the U.S. military assists nongovernmental organizations in providing the required level of support to the affected population.

Multinational support, host-nation support, and support from nongovernmental organizations may increase the demands on transportation, medical, food, water, and housing.

3-57. Situations that lack optimal sustaining capabilities may require using other methods that augment or replace existing logistics capability. Contracting personnel should support or travel with the lead elements of Army forces if feasible. The Army may employ nonstandard logistics for supply, maintenance, forklift support, fixed facilities, and mobile communications.

3-58. Maintenance operations may include assisting intergovernmental agencies. While stability operations are not considered combat operations, a defensive posture should be maintained. See FM 3-07 for additional information on maintenance considerations in stability operations.

PEACEKEEPING

3-59. When planning maintenance support during peacekeeping operations, logisticians must take into consideration national forces, risk assessment, security of maintenance operations, and environmental impact. Maintenance planners need to account for maintaining any U.S. equipment provided to coalition or partner nations.

3-60. The Army most often conducts peacekeeping operations as part of a multinational coalition. This presents new challenges for all commanders who could potentially support host-nation military, coalition forces, 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

3-61. National policy may require the Army, either singularly or as part of a joint or multinational task force, to conduct peacekeeping 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 need to anticipate this and be prepared to provide maintenance support in hostile, potentially life-threatening situations.

Lack of Host-Nation Support

3-62. Since friendly forces often operate in hazardous and politically sensitive areas, commanders should never assume availability of dedicated host-nation support during peacekeeping operations. Instead, they need to plan for maintenance support using organic resources.

FOREIGN HUMANITARIAN ASSISTANCE

3-63. As in peacekeeping operations, maintenance doctrine does not change during humanitarian operations. However, humanitarian operations do introduce unique challenges. Depending on the regional political situation, the Army may conduct humanitarian missions in either friendly or hostile environments. See ATP 3-57.20 for additional information supporting humanitarian operations.

3-64. Because the Army conducts humanitarian missions in friendly and potentially hostile environments, logistics planners should consider the situation and locate maintenance operations away from dense population centers. Planners should 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.
- Consider the impact on the environment.

MULTINATIONAL SUPPORT CONSIDERATIONS

3-65. Multinational operations may complicate sustainment support and possibly reduce the degree of flexibility inherent in host-nation logistics systems. Although responsible for logistics support of their national forces, not all nations have sustainment support infrastructure. Such nations depend on other nations for all or part of their support. In these cases, the multinational force provides deployment and sustainment to military and civilian authorities. Commanders must 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 that logistics planners deliver timely maintenance support to customer units (see FM 3-16 for additional information).

3-66. When planning or conducting sustainment for multinational operations, commanders use allied or other appropriate doctrine according to the situation. Maintenance managers should anticipate support to all friendly forces. To accomplish that task, they should contact higher headquarters as well as known supported units to coordinate support requirements. Managers also need to verify if an acquisition and cross-servicing agreement exists. An acquisition and cross-servicing agreement is an agreement, negotiated on a bilateral basis with countries or international organizations, that allows U.S. Armed Forces to exchange most common types of support, including food, fuel, transportation, ammunition, and equipment. It sets forth the terms and conditions under which the reimbursable acquisition or transfer of logistics support, supplies, and services can occur between the U.S. Armed Forces and foreign governments or international organizations with which the U.S. has a concluded agreement (JP 3-16). At times, support to multinational forces may present unique logistical challenges. In such cases, logistics planners must take the initiative to determine customer equipment type and density.

DEFENSE SUPPORT OF CIVIL AUTHORITIES CONSIDERATIONS

3-67. Defense support of civil authorities includes tasks that address the consequences of natural or man-made disasters, accidents, terrorist attacks, and incidents in the U.S. 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 them. 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 are always subordinate to civilian authority control. For additional information, see ATP 3-28.1.

3-68. 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.

3-69. Planners should evaluate and prioritize repair of equipment for infrastructure, firefighting, law enforcement, medical, construction, and power generation, organic equipment, and equipment belonging to other military elements involved in the operation.

PLANNING FOR SUSTAINMENT-LEVEL MAINTENANCE

3-70. Units use historical maintenance data combined with combat loss estimates to project sustainment-level maintenance requirements. They access sustainment-level maintenance chiefly through USAMC forward theater assets. CLSEs and DLSEs work with their corresponding staffs to integrate and synchronize USAMC sustainment-level maintenance support into operations. See ATP 4-98 for additional information on USAMC support capabilities.

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 through their chain of command to request forward-deployed sustainment-level maintenance capabilities.

Chapter 4

Maintenance Management, Recovery, and Non-Standard Repairs

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, internal control evaluation, and internal management procedures for maintenance operations.

SECTION I – MAINTENANCE MANAGEMENT

4-1. Effective maintenance management includes anticipating maintenance requirements, tracking and analyzing maintenance reports, properly identifying and diagnosing maintenance faults, applying the appropriate maintenance capability, and managing class IX. Maintenance managers should allocate the proper number and type of maintenance units to provide adequate maintenance support to the force.

MAINTENANCE MANAGEMENT PROCESS

4-2. The maintenance management functions include forecasting, scheduling, production control, quality assurance (QA), technical assistance, resourcing repair parts, work-loading or cross-leveling regional workloads, and developing repairable programs to meet local, regional, and national needs. Engaging 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. SOPs and operation orders must address safety concerns.

4-4. The ability to forecast, plan, and employ maintenance assets is essential for maintenance management at every level. By using 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 USAMC, generate the requirement for sustainment maintenance structures and operations. Sustainment maintenance leaders will perform the following tasks:

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

4-6. 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 operations, creating a seamless process that is transparent to the user.

4-7. 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.

4-8. 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. There are two operational regional sustainment maintenance manager offices in the U.S.—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.

4-9. Sustainment maintenance managers at corps and above focus on materiel management. They focus on fixing by repair, sustaining units, supporting joint and multinational 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 facilitate resolution.

4-10. 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 will support the materiel maintenance officer within an installation, staff, or for the ARNG at a state surface maintenance management office.

4-11. 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 to and receive from 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.

4-12. 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.

MANAGING BATTLEFIELD MAINTENANCE

4-13. 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 4-1 shows the basic concept for managing maintenance support. In a similar manner to the maintenance planning process, the maintenance manager needs to 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.

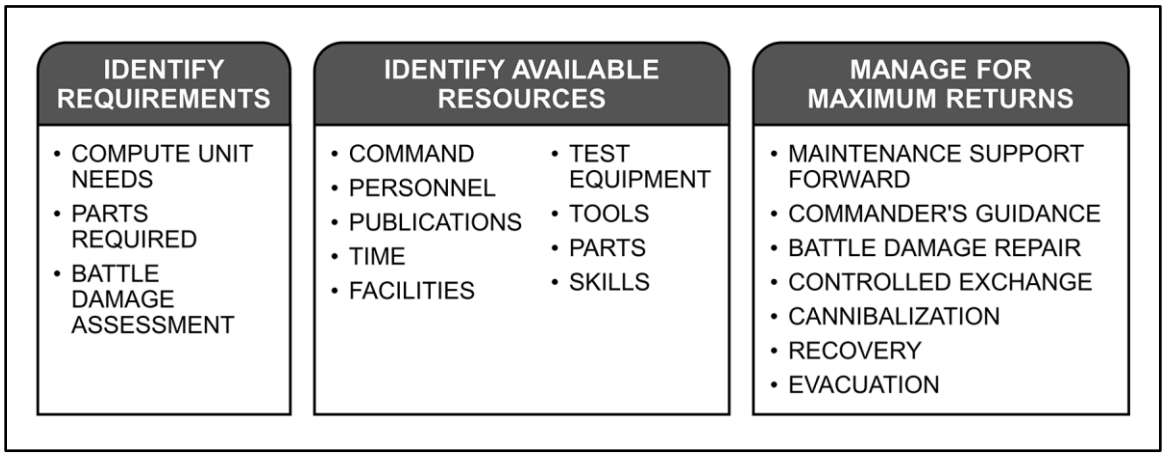

Figure 4-1. Managing battlefield maintenance support

CRITICAL INFORMATION FOR MAINTENANCE SUPPORT

4-14. Timely maintenance support relies 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 through each level of sustainment. Units may use communications to rapidly pass information up the chain of command but must use a DA Form 5988-E (*Equipment Maintenance and Inspection Worksheet*) to maintain a permanent record.

4-15. The information flowing from maneuver units on vehicle and equipment status is complemented by the statuses entered in GCSS-Army. There is often a delay before a DA Form 5988-E is entered into GCSS-Army. Vehicle and equipment statuses need to be synchronized on a regular basis to ensure the commander has an accurate maintenance picture. This critical information can be incorporated into a unit's common operational picture. Reports pulled from GCSS-Army can be used to help populate the common operational picture.

TIME LIMITS

4-16. 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 SOP but should provide flexibility to adjust to local conditions and operational tempo.

4-17. 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 need to keep in mind that if they elect to use time-factored evacuation, there is no maintenance support for key weapons systems above the FSC level. To have key weapons fixed in the BSA, the commander should 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.

4-18. 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. Equipment may not be accepted in some of the following situations:

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

4-19. During large-scale combat operations, units may reach a point at which the number of NMC vehicles affects the unit's freedom of maneuver and freedom of action. At that point, the unit needs to decide whether to remove an NMC 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 to repair the vehicle or piece of equipment. The commander should also keep in mind that the further back an NMC 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.

MAINTENANCE AND LOGISTICS SYNCHRONIZATION MEETINGS

4-20. 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 use both maintenance and logistics meetings. However, they are typically held within maneuver units at the brigade and battalion level.

MAINTENANCE MEETING

4-21. The brigade maintenance meeting ensures that 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 conducts specific actions to generate combat power for future operations; and when these actions should occur. The meeting also serves as a forum to close the loop on any open actions and ensures that all maintenance resources are used effectively to increase combat power for future operations.

4-22. The brigade or battalion maintenance meeting is a weekly meeting normally overseen by the BCT or battalion executive officer. The meeting is typically held in the BCT or battalion's headquarters. Other key participants include—

- BCT or battalion S-4.
- BSB SPO officer.
- BSB SPO maintenance officer.
- Supported battalion or task force executive officer or shop officer.
- Separate company executive officers or motor sergeants.
- SSA officer.

Note: Maintenance meetings can be held more than once a week to sustain combat power during combat operations due to a higher tempo.

4-23. Participants are expected to be prepared for the meeting and arrive with up-to-date information on their areas of responsibility. For example, maneuver battalion executive officers should have an accurate list of non-mission-capable vehicles along with the national stock numbers for parts required to repair the vehicles. 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 through a secure communication device. Units should identify primary and secondary means of communication as

part of their planning. For additional details on maintenance meetings, see the Ordnance Maintenance Meeting Playbook on the Army Sustainment Resource Portal (websites listed in references).

4-24. The agenda should meet the commander's intent and focus on issues the commander deems critical. A sample agenda includes—

- Brigade or battalion mission next 24/48/72 hours.
- Brigade or battalion 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.
  - Overdue services.
  - Overdue modification work orders.
  - Delinquent TMDE items.
  - Projected combat power based on maintenance management.
- Miscellaneous.
- Review of issue assignment.
- Closing comments.

LOGISTICS SYNCHRONIZATION MEETING

4-25. The brigade or battalion logistics synchronization (also called LOGSYNC) 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 or battalion's mission. The brigade or battalion 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 LOGSTAT reports, synchronize resupply operations, and create shared understanding amongst all sustainment planners.

4-26. For maintainers, this meeting has the most impact on the 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.

4-27. Participation is critical in validating the LOGSTAT reports. 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).

4-28. Brigade logistics synchronization meetings are typically conducted in the BSA. Attendees include the brigade key leaders, maneuver battalion executive officer, S-4, S-1, FSC key leaders, representative from the supported units, and a representative from the BSB S-1, S-2, and SPO staffs. A typical agenda for the logistics synchronization meeting includes—

- Brigade or battalion executive officer update.
- BSB executive officer update.
- Forecast items and quantities on the LOGSTAT report.
- Specific delivery times.
- Convoy reception plan.
- Subordinate battalion or company updates:

  - Class I status.
  - Class III and III(B) status.
  - Class IV status.
  - Class V status.
  - Class VIII status
  - Class IX status.
  - Maintenance status.
  - Current combat power.
  - Issues and challenges.
  - Requests for assistance.
- BCT or battalion executive officer guidance and priorities.

LOGISTICS STATUS REPORT

4-29. LOGSTAT reports give sustainment planners, materiel managers, and leaders a daily snapshot of on-hand quantities and future requirements. A synchronized LOGSTAT 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. LOGSTAT reports include the units on-hand stockage levels and what they expect to have over the next 24, 48, and 72 hours. The LOGSTAT 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.

4-30. LOGSTAT reports normally contain personnel headcount, on-hand quantities of class I, class III, and class V, and maintenance status of weapon systems, vehicles, and communications equipment. The amount of information required in a LOGSTAT 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 LOGSTAT report submissions. During periods of increased intensity, the commander may require more frequent status updates.

4-31. Accurately forecasting logistics requirements is a crucial process. Planners conduct forecasting and mission analysis during each phase of the operation to provide commanders with logistics estimates that will ensure uninterrupted 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 LOGSTAT reporting results in more precise forecasting because accurate and timely reporting enables and drives materiel decision making.

COMMON OPERATIONAL PICTURE

4-32. Logisticians develop a common operational 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.

4-33. Maintenance LOGSTAT reports are typically used to inform the common operational picture, running estimates, and logistics synchronization. Commanders and staff use maintenance LOGSTAT reports, including data pulled from GCSS-Army, to identify requirements to support decisive action. The LOGSTAT 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.

4-34. 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 requirements.

4-35. Items in the maintenance portion of the common operational picture include—

- The unit’s reportable systems.
- Total number of reportable systems on hand.
- Number of NMC reportable systems.
- Number of NMC systems reportable due to maintenance issues.
- Number of NMC systems reportable due to supply issues.
- Number of reportable systems coded as catastrophic loss.
- Status of crews and operators.
- Status of mechanics.

4-36. The organization's battle rhythm is critical when considering cutoff times, as-of times, and reporting times. Adequate time should 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.

Fully Mission Capable

4-37. 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 -10 and -20 series TM PMCS tables. Fully mission capable equipment must also meet all AR 385-10 and AR 700-138 provisions that apply to the vehicle and system or its subsystem. 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

4-38. Not mission capable is a materiel condition indicating that equipment cannot perform any of its combat missions. NMC is divided into NMC maintenance or NMC supply (see AR 750-1). There has been damage to the equipment or failure of components that has 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). A status of NMC requires the application of standard maintenance and repair parts.

LEVELS OF MANAGEMENT

4-39. Maintenance operations at each echelon should have careful direction, supervision, and management. Higher headquarters elements concerned with maintenance operations are the TSC DMC’s materiel readiness branch, the sustainment brigade maintenance branch, and the BSB SPO 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 SPO office is essential.

4-40. Unprogrammed requirements have a significant impact on the maintenance mission. The materiel readiness branch, the maintenance branch, and the SPO office should identify known requirements in advance. Commanders and supervisors seek out information, predict future requirements, and assess requirements for their impact. Figure 4-2 on page 4-8 shows the organizational chart for a TSC.

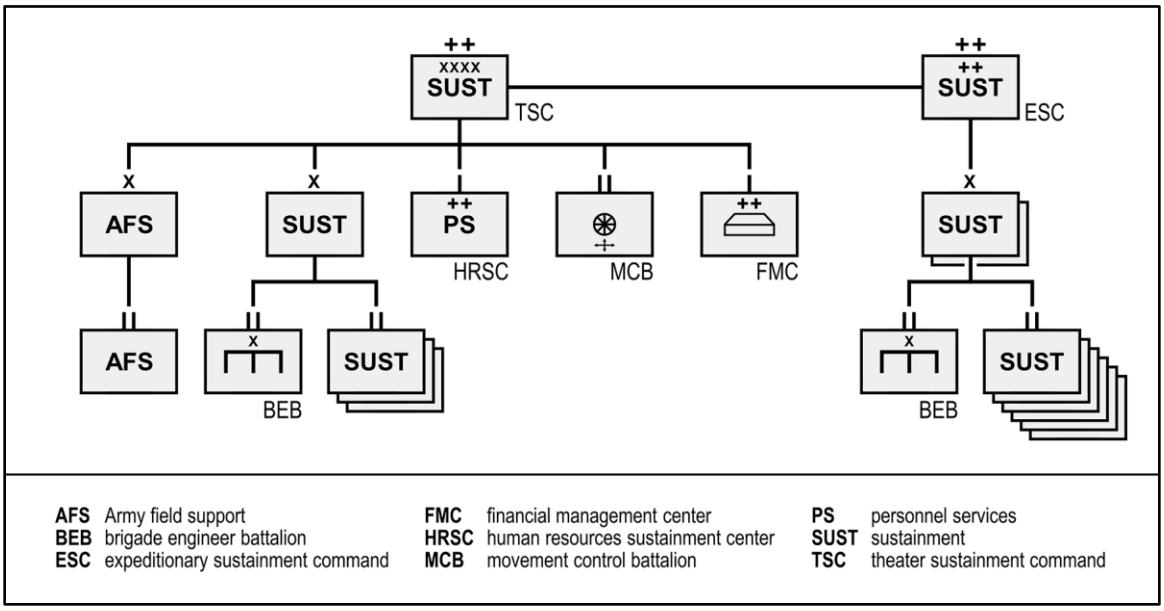

Figure 4-2. Theater sustainment command organizational chart

4-41. The TSC and ESC conduct support operations through their DMCs. The SPO officer heads the DMC. 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 AOR. For additional information on the DMCs in the TSC and ESC, refer to ATP 4-93.

TSC DISTRIBUTION MANAGEMENT CENTER

4-42. The DMC 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. The four branches are the distribution integration branch, the materiel management branch, the fuel and water branch, and the transportation operations branch.

4-43. 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.

4-44. The DMC is the fleet maintenance manager for Army forces deployed to the AOR. 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 that the maximum number of combat systems remain fully mission capable. Their actions may include disseminating technical information, allocating or reallocating resources and capabilities to support maintenance requirements, and coordinating for sustainment maintenance.

4-45. The TSC DMC also develops plans, policies, programs, and procedures for ground missile and aviation equipment maintenance in accordance with requirements established by the theater Army. The TSC passes systemic issues beyond their capabilities to the appropriate national-level maintenance manager via the AFSB for resolution.

4-46. The materiel management branch's maintenance section plans, recommends resourcing, monitors, and analyzes maintenance readiness and support for subordinate units. It determines requirements and manages the maintenance capabilities for the TSC's supported units. The maintenance section includes aviation, electronics, and ground maintenance. It conducts trend analysis, identifies equipment maintenance issues,

and coordinates with theater strategic national providers for theater maintenance issues. Maintenance managers work closely with the AFSB to ensure effective sustainment maintenance support to Army forces. Managers also analyze readiness data for systemic problems and those associated with the unique aspects of the specific OE, such as environmental conditions and usage levels. Figure 4-3 depicts a SPO section within the TSC.

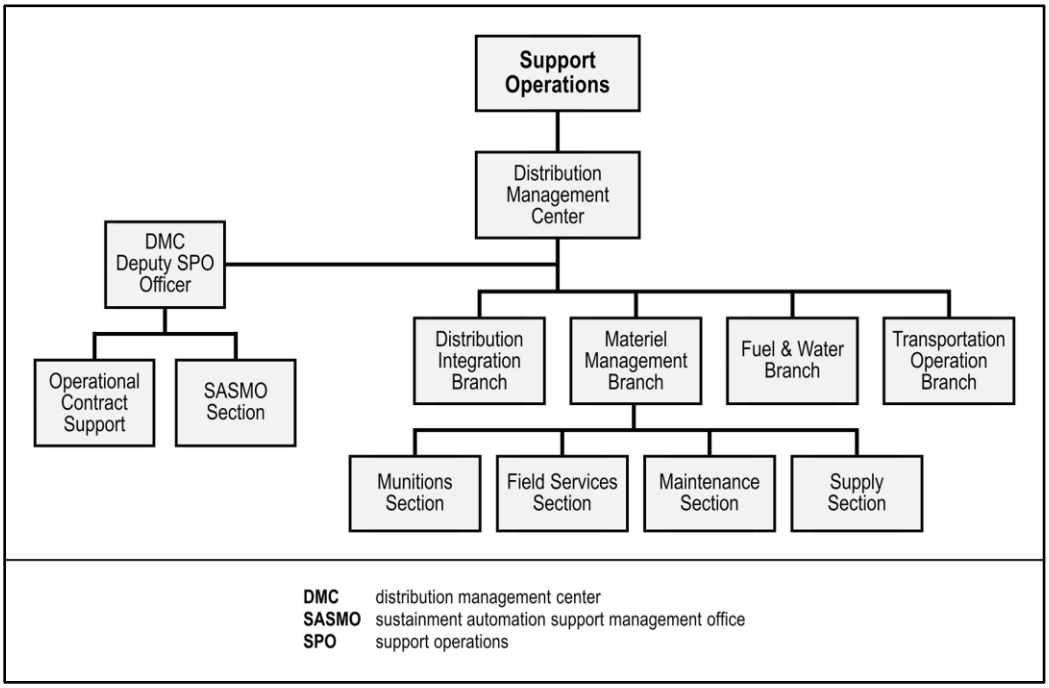

Figure 4-3. Theater sustainment command support operations section

ESC DISTRIBUTION MANAGEMENT CENTER

4-47. The ESC's DMC contains six subordinate branches. The branches are distribution integration, transportation operations, materiel management, operational contract support, human resources operations, and finance and comptroller operations. Execution of maintenance management is the responsibility of the materiel management branch.

4-48. The ESC sustainment automation support management office section responsibilities include executing ASCC sustainment automation policy and designing the systems architecture for the sustainment transport system to ensure connectivity at the theater echelon. The section (organic to the DMC) serves as the focal point for new enterprise business systems fielding, software changes, engineer change proposals, and other sustainment automation actions, to include coordination with organizations external to the command.

4-49. The materiel management branch develops plans, policies, programs, and procedures involving supply activities. The branch liaisons 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.

4-50. 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, electronics, and ground maintenance. It conducts trend analysis, identifies equipment maintenance issues, and coordinates with theater strategic national providers for theater maintenance issues. The ESC passes systemic issues beyond its capabilities to the appropriate national-level maintenance manager for resolution via the AFSB.

4-51. 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 that the maximum number of combat systems remain fully mission capable. Managers will provide courses of action to commanders to make an informed decision.

4-52. The TSC normally works with an AFSB or ASC on sustainment maintenance trends. When an ESC deploys without a TSC, the ESC works closely with the AFSB or battalion to ensure effective sustainment maintenance support to Army forces. The ESC analyzes readiness data for systemic problems and for those associated with the unique aspects of the specific OE, including 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 AND BATTALION-LEVEL MAINTENANCE MANAGEMENT

4-53. Commanders and maintenance managers will manage field maintenance in accordance with the procedures contained in this publication, AR 750-1, DA Pam 750-8, DA Pam 750-3, and DA Pam 750-1.

4-54. The FSC commander assists the SPO staff with planning and coordinating equipment services with the supported 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 is a key element in maintenance data collection. It ensures that its units provide automated data and generate appropriate maintenance reports.

4-55. At the battalion level, the SPO office manages supported 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 SPO office and shop office is vital to mission success.

4-56. The CSSB and BSB SPO officers provide updates to the sustainment brigade on maintenance and repair parts supply matters. These include recommendations concerning personnel, facilities, and equipment requirements, maintenance performance, and repair parts supply status. The SPO officers also report the state of materiel readiness, deployment, and employment of battalion units.

4-57. Company-level maintenance management focuses on each job. The maintenance mission is resourced and accomplished at company level. The company should effectively manage its assets, including personnel, time, and repair parts to provide the best support possible with the resources available.

4-58. 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.

4-59. Production control involves production planning, scheduling, and proper routing and rerouting of work. It also means attaining maximum production by keeping all shop elements working at or near capacity and properly laying out the shop.

4-60. Workload analysis is part of the overall production control process. It is a prime responsibility of the maintenance control sergeant and requires a continuous review of new work and work in progress. It helps prevent over-commitment of resources with unrealistic priorities and deadlines.

4-61. 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, and aircraft landing areas, and denotes field maintenance point locations. Equipment density lists keep personnel up to date on how much equipment is supported and where it is located.

4-62. Every unit applies work simplification and measurement techniques. Work measurement standards are developed and applied to measure and compare Soldiers' work. Maintenance units engage in similar types of operations and keep records that show production results on a week-by-week basis.

4-63. 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. 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.

4-64. 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 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 the property book officer to ensure serial numbers and registration numbers are the same.

MAINTENANCE CONTROL

4-65. 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.

4-66. A primary function of maintenance control is to reduce or correct overload conditions. While a maintenance section should always work at or near capacity, it should minimize backlogs. Poor management, lack of personnel, or continuous operations can cause overloads.

PROCEDURES

4-67. 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.

4-68. 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

4-69. 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.

4-70. 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 backup management plan in the event that GCSS-Army is unavailable.

4-71. The maintenance control section needs to effectively coordinate with the supporting SSA to ensure prompt availability of required repair parts and other maintenance supplies. The coordination steps include scheduling shop input, assigning work to various shop sections to keep all shops working at capacity, and 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 should keep abreast of the status and quantity of work in each section, minimize overloads, take corrective action when necessary, and aggressively pursue repair parts that are not available within the unit.

OVERLOADS

4-72. A prime function of the maintenance control section is to take action to reduce backlogs 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. Backlogs 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.

4-73. 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.
- Quickly identify hard-to-procure items or items with long lead times. The maintenance control section should work with the available resources for assistance.
- Resolve problems 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, setup, and details.
- Work with the chain of command to ensure necessary details are properly apportioned amongst sections.

MAINTENANCE CONTROL OFFICER

4-74. For an effective maintenance control operation, the maintenance control officer should have a thorough knowledge of the mission of the entire company and the supported battalion. The maintenance control officer should be thoroughly familiar with the capabilities and capacities of the individual sections, and stay informed of priorities assigned to supported units, expected workloads, shop progress, and maintenance supply status.

4-75. 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

4-76. Production methods used include bay shop, job or bench shop, onsite maintenance, and production line operations. The method used depends on the type of materiel to be repaired and the personnel, facilities, and time available.

4-77. 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. Under a modified bay shop operation, maintenance managers group

the personnel or equipment performing the same or similar jobs in sections. The equipment to be repaired moves from one section to another at irregular intervals until the work is complete.

4-78. Maintainers use job and bench shops 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 and electrical system components, electric motors, leather and textile items, C&E equipment, and missile electronic items.

4-79. FMTs, recovery teams, or contact teams perform onsite 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.

4-80. Maintenance managers organize the teams providing onsite maintenance based on known requirements. Therefore, leaders 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; the requesting unit point of contact, frequency, and call sign; and the enemy situation and current threat.

4-81. The production line, similar to an assembly line, is a production method primarily used by sustainment-level maintenance activities. Maintainers use 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 items are portable. The production line passes similar equipment through a series of workstations. Maintainers perform work in a sequential order until all items are repaired.

QUALITY ASSURANCE AND QUALITY CONTROL

4-82. The objective of QA is to produce high-quality work the first time. A strong 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 should 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 headquarters assistance visits and inspections provide additional technical and process-oriented assistance to the QA team. Regardless of the source, QA focuses as an independent set of eyes on products and processes to ensure maintainers meet expressed standards.

4-83. Quality control (QC) is a separate and distinct function. It is a leadership function and should be applied to all aspects of unit operations, including initial, in-process, and final inspections. Commanders need to ensure that QC team members are trained and motivated to balance quality concerns with production concerns.

4-84. 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. Repairers or repair teams accomplish the tasks necessary to complete the job and are subject to in-process QC inspections at 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.

4-85. 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 who know proper procedures, correct standards, and most importantly, apply 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.

4-86. Supervisors need to continually motivate personnel to perform to Army maintenance standards. Commanders and shop officers should develop incentive programs that reward superior performance. Commanders can award drivers, mechanics, and special equipment operators with the Driver and Mechanic Badges 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.

TOTAL ARMY QUALITY MANAGEMENT

4-87. 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 always apply total quality management in all functions. For more information on total Army quality management, refer to AR 5-1.

TECHNICAL INSPECTION

4-88. 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 or crew and identify training deficiencies of operators and mechanics. Accurate initial, in-process, and final inspections are vital in maintaining efficient maintenance operations and ensuring quality repairs. Units also perform materiel classification inspections to determine the overall serviceability and repairability of equipment.

MATERIEL CLASSIFICATION INSPECTIONS

4-89. 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.

4-90. 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

4-91. 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 or crew has been fulfilling their maintenance responsibilities. The inspection provides a basis to—

- Validate equipment faults and extent of work required.
- Determine economical repairability and parts requirements.
- Recommend further disposition.
- Recommend action on determining financial liability or investigation of property loss (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).
- Determine necessary maintenance tasks.
- Estimate required maintenance man-hours.

IN-PROCESS INSPECTIONS

4-92. 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

4-93. 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.

WORKFLOW

4-94. Figure 4-4 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 workflow 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 or crew.
- Readiness reporting at the point of fault identification until fault correction.

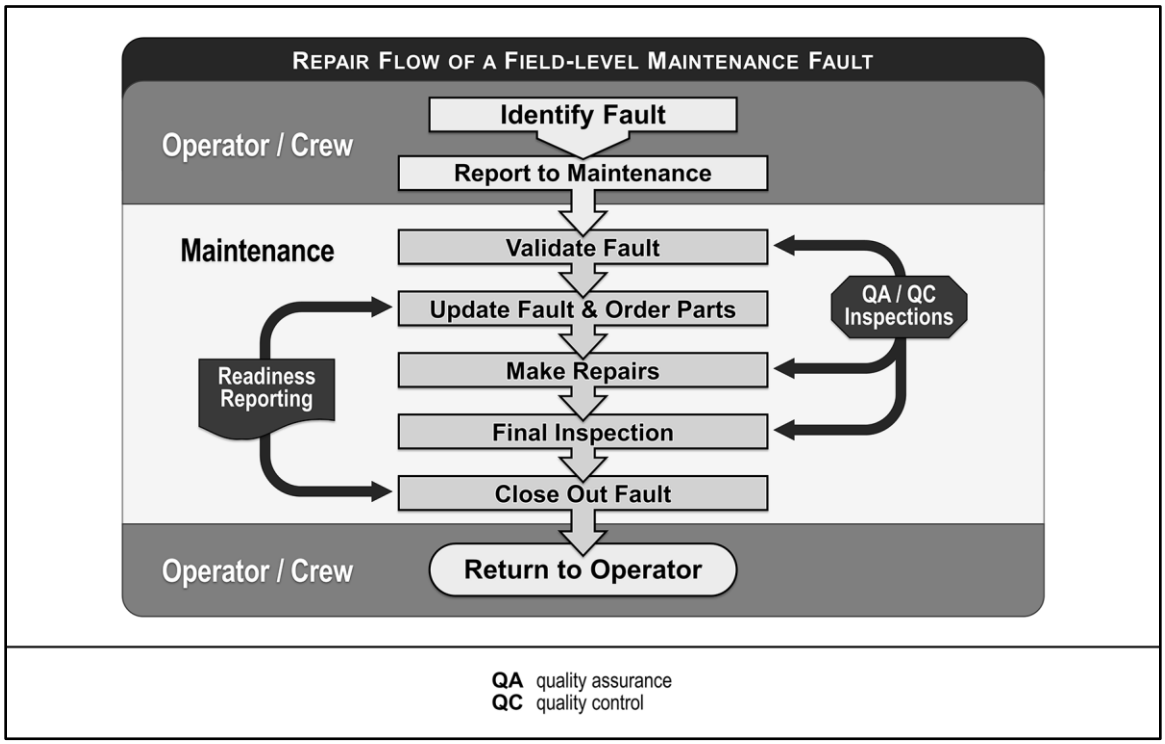

Figure 4-4. Field-level maintenance repair flowchart

SECTION II – RECOVERY AND NON-STANDARD REPAIRS

4-95. 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. Operator/crew and maintainers use recovery and non-standard repairs retrieve and restore a vehicle to limited or full capability while operating within field-level maintenance.

RECOVERY OPERATIONS

4-96. Recovery includes actions taken to extricate damaged or disabled equipment for return to friendly control or repair at another location. These actions typically involve extracting, towing, lifting, or winching. Towing is usually limited to moving equipment to an MCP. Crew, operator, or dedicated recovery personnel accomplish the recovery based on the mire level or the severity of battle damage.

4-97. Damaged and inoperable equipment on the battlefield can strain dedicated recovery resources. Commanders should employ dedicated recovery assets throughout the operational area to effectively support battlefield recovery operations. Commanders should 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 that recovery vehicles are used only when absolutely necessary. Only properly trained and certified recovery personnel will operate wheeled and tracked recovery vehicles. There are two skilled recovery operation identifiers. H8 is the skill identifier for wheeled vehicle recovery operations and H9 is the skill identifier for tracked vehicle recovery operations. One or more additional skill identifier H8-certified maintainers must be present for wheeled vehicle recovery missions. At least two additional skill identifier H9-certified maintainers must be present during tracked recovery missions.

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

4-98. Dedicated recovery vehicles should be returned as quickly as possible to a central location to support the unit. Maintenance operations often use recovery equipment to provide heavy lift in addition to recovery. Recovery managers and supervisors should use all available resources carefully to provide sustained support. Wheeled vehicle recovery specialists (additional skill identifier H8) cannot be substituted for tracked vehicle recovery specialists (additional skill identifier H9), nor can H9 be substituted for H8.

RESPONSIBILITY

4-99. The FSC has recovery assets located in the recovery section and FMTs within the field maintenance platoon. The maintenance warrant officer or maintenance NCOIC are responsible to the FSC commander and the maneuver battalion or squadron S-4 to track and manage recovery operations.

4-100. Field maintenance companies are responsible for recovering their own organic equipment and providing 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. The FSC should request additional recovery assets through the BSB SPO staff, if required.

MANAGEMENT

4-101. The maintenance warrant officer or maintenance NCOIC is 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.

4-102. 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.

4-103. Recovery operations should be coordinated with the maintenance effort and commander's priorities. Maintenance personnel should 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-recover decisions.

4-104. Use the right recovery equipment for the recovery mission. In general, wheeled recovery systems should recover wheeled vehicles, and tracked recovery systems should recover tracked vehicles. Wheeled recovery vehicles may flat-tow tracked vehicles that are under their weight. Tracked recovery vehicles should not flat-tow wheeled vehicles, due to potential damage to the wheeled vehicle's front steering components caused by the tracked vehicle's pivot turn. When a unit has only limited assets, it is critical to select the right recovery vehicle for the mission.

4-105. The maneuver commander should provide the BSB commander with the flexibility to concentrate recovery assets 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.

4-106. Units should position 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 is 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.

4-107. 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 need to be recovered. As a rule, always recover weapon systems before tactical vehicles.

***Note*:** Maintenance planners need to identify their recovery assets and capabilities to support those assets. Equipment that cannot be pulled due to weight limitations must be transported on a flatbed.

NON-STANDARD REPAIRS

4-108. Non-standard repairs consisting of expedient repairs and BDAR are key enablers in maintaining military capability. Expedient repairs use basic common maintenance engineering skills, non-conventional or improvised repair techniques. BDAR returns disable equipment to operational condition by bypassing and restoring minimum functions to essential systems in wartime conditions.

BATTLE DAMAGE ASSESSMENT

4-109. BDAR is a set of expedient repairs that can be implemented rapidly on disabled equipment to return it to operational condition in wartime by repairing, bypassing, and restoring minimum function to essential systems expediently using minimal resources. Expedient repairs are temporary in nature. Maintainers should perform more reliable repairs as soon as possible. Examples of expedient repairs include temporarily using safety wire to secure a broken exhaust hanger or using duct tape or bungee cords to secure a partially detached fender or section of slab armor.

4-110. The first and most important phase of BDAR is battle damage assessment. Maintainers' quick and accurate assessments are critical to determine 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 should 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.

4-111. Maintainers triage equipment when performing battle damage assessment on multiple pieces of damaged equipment. This establishes the order in which battle-damaged equipment is repaired or reconfigured. It also informs the decision on whether spare parts acquisition through controlled exchange or cannibalization will be required. Major weapon systems should have top priority for repairs unless the immediate mission dictates otherwise. The goal is to return as many of the major weapon systems to service as possible with the ability to shoot, move, and communicate.

4-112. In the forward battle area, attempt to move the damaged equipment to a covered or concealed position away from enemy fire. Mission variables 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.

4-113. Familiarization with the operation of damaged equipment is extremely important to prevent further damage to the equipment or injury to personnel. Only experienced individuals should operate systems during a battle damage assessment and functional checks.

Battle Damage Indicators

4-114. 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 or 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 expedient 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.

4-115. 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 or control, or degraded system performance.

Perform an Assessment

4-116. 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.

4-117. Maintainer should 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 should attempt to move the vehicle to a covered or concealed position to prevent additional damage. The best practice is to move the vehicle at least one terrain feature or one kilometer away from enemy contact.

4-118. If the vehicle is not self-recoverable, use any like or heavier class vehicle to recover the vehicle or 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.

4-119. Assessments enable maintainers to accurately determine which subsystems are affected and estimating the time, personnel, and materials required for repair. Assessments also assist in performing equipment triage. Equipment triage is the process used to decide in which order battle-damaged equipment will receive repairs. Maintainers make this determination based on combat or combat support equipment, time, urgency, materials, and personnel required to conduct the required repairs.

EXPEDIENT REPAIRS

4-120. Commanders ensure personnel train in various expedient and BDAR skills to prepare for wartime operations. Commanders should address both expedient and BDAR training in the logistics and maintenance section of their operation order. This will provide the crews and maintainers with a clear understanding of when and at what risk level the commander authorizes expedient repair and BDAR. Local command policy directs the degree of repair maintainers apply and when to use standard maintenance.

4-121. Maintenance assets will be heavily strained on the battlefield. Maintenance resources are often logistically limited (personnel, tools, and parts), and it is imperative that they are not wasted. Operators and

crews should perform expedient repairs within their capabilities immediately rather than requesting maintenance personnel to perform simple mechanical tasks. Soldiers will not find most expedient repairs in TMs. Training, flexibility, and ingenuity are the keys to successful expedient repair and BDAR. Personnel shortages and equipment readiness require maintenance team members have some knowledge of other skills needed to achieve critical repairs. A lack of key maintainers should not deter a team from doing repairs. Commanders should stress the importance of on-the-job training and cross-training of personnel.

Shortcuts

4-122. Shortcuts are inherent to BDAR. The removal, installation, and repair of components not performed in sequence or to a standard outlined in TMs are considered shortcuts.

Bypassing

4-123. 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, conduct an assessment of the repair to determine the risks associated with the procedure.

Fabrication

4-124. Fabrication involves using readily available materials and fashioning them by computerized layering of raw material, bending, cutting, or welding them in the place of a damaged component. Fabrication involves 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.

4-125. 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.

Note: Only specific type 2 metalworking and machine shop sets have a 3-D printer integrated for additive manufacturing capability.

Substitution

4-126. 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 restore function to the starting circuit quickly. These substitutions may require some modifications for the application to work, and additional time to prepare.

Controlled Exchange and Cannibalization

4-127. 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 to restore another like item of equipment to combat-serviceable condition. The maintainer should install the unserviceable component in place of the serviceable component or retain 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.

4-128. During combat, commanders may authorize the cannibalization of disabled equipment only to facilitate repair of other equipment for return to combat. 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. Salvage supplements supply operations by providing assets not readily available through normal supply channels. Unlike controlled exchange, a serviceable part acquired through cannibalization from a salvaged 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 parts demand 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 for more information on cannibalization).

CLASSIFICATION OF BATTLE DAMAGE REPAIRS

4-129. BDAR may enable the equipment to either self-recover or to continue the mission. The battle damage assessment provides the commander with necessary information to make decisions concerning whether to continue the fight or recover the equipment to the appropriate maintenance location. Maintainers should report battle damage as soon as possible according to the local operating procedure.

4-130. All expedient repairs are classified based on the risk level associated with each repair. If possible, maintainers should use a DD Form 2977 (*Deliberate Risk Assessment Worksheet*) to assess the risk for a BDAR repair. The risk levels are extremely high, high, medium, and low. Only qualified maintenance personnel can classify the risk of an expedient repair. For additional information on risk assessment and levels, see ATP 5-19. Repair risk levels are defined in the following paragraphs.

4-131. Extremely high-risk repairs are expedient repairs that may cause catastrophic damage to personnel and equipment. For example, bypassing a driver's hatch interlock on an M1A2 Abrams will notify the display that the hatch is closed, but the hatch may still slide open. If the hatch is open during movement of the gun or turret, it could kill or injure personnel and damage the equipment. Maintainers should only perform extremely high-risk repairs under extreme circumstances. All expedient repairs and damages must be corrected with standard maintenance procedures as soon as possible.

4-132. 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 urgent situations, and the damage must be corrected at the earliest opportunity with standard maintenance.

4-133. Medium risk repairs are expedient repairs that may cause further damage to equipment but pose 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 existed 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 refilled.

4-134. 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 spliced the wires together and insulated 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.

TELE-MAINTENANCE

4-135. Tele-maintenance can be used in remote or dispersed theater operations when there is a need for maintenance support. Under the supervision of ASC, the tele-maintenance and distribution center advises forward-positioned maintainers on field and sustainment-level maintenance to rapidly repair combat equipment, connecting virtual maintenance specialists with sustainers at the point of need. Tele-maintenance engagements typically consist of cellular calls or direct conferences with depot-level facilities, LARs, FSRs, and ASA(ALT) engineers. When NMC equipment is reported or identified, the tele-maintenance and distribution center manually inputs that equipment into GCSS-Army. The forward tele-maintenance and distribution center then connects technicians within USAMC to help troubleshoot, identify specific faults, and generate a list of necessary parts. Using the manually created GCSS-Army work order, the repair parts ordered in GCSS-Army can be filled by the tele-maintenance and distribution center shop stock listing, SSAs, or national level stocks.

REPLENISHMENT OPERATIONS

4-136. Demand for class IX supplies will increase due to combat, environmental effects, and maintenance tempo. Units maintain a supply of small high-usage rate items as far forward as practical. Resupply of high demand class IX is distributed as part of a logistics package. These items typically include—

- 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.

4-137. 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.

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Chapter 5
Repair Parts Supply Operations

This chapter discusses supply support operations, repair parts supply, and reparables management. 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.

MAINTENANCE-RELATED STOCKS

5-1. Units obtain repair parts from the SSA or maintenance shop supply. The SSA performs all functions related to receipt, storage, and issue of supplies for the brigade 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. Shop supply receives, stores, and issues class IX supplies required to support the maintenance mission. AR 710-2 and DA Pam 710-2-1 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 for short notice deployments.

5-3. Shop stocks and bench stocks in nondeployable organizations should be stored separately from the supporting SSA. These stocks should be 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 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. AR 710-2 states that the unit commander is the approval authority for shop stock and the maintenance control officer is the approval authority for bench stock.

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 MTOE, TDA, or joint table of allowances maintenance organizations. 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 use 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 manages the shop stock.

BENCH STOCK

5-7. The using maintenance activities and sections manage 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 criticality 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 coded "U").

5-9. The FMT positions select shop and bench stock items in accordance with priorities and requirements to achieve readiness of a specific supported unit. The FMT replenishes 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 or crew manages 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, and 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 nonstandard items (COTS items) because they are more economical for the Government to purchase and field rather than developing 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. COTS equipment may increase the maintenance section's workload because COTS items are usually not part of the MTOE and nonstandardized 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 need to ensure that all sets, kits, outfits, and special tools are properly used and maintained, accounted for, and promptly replaced when unserviceable or lost. Field-level maintainers cannot be expected to troubleshoot, remove, or replace components properly 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 need to 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. However, maintainers may need to use a different approach for newly fielded systems and systems having special tool sets not yet available for order. 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 that the unit transfer a set so that 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 it sends a system for maintenance that requires the use of those 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 obtain required repair parts immediately is one of the most serious maintenance management issues. Maintenance managers need to check to ensure requests are filled out correctly to help reduce delays and prevent zero balances. Supervisors should perform regular follow-ups on all requests and ensure that maintainers order the correct part the first time, validating that the stock numbers or part numbers are in the current catalog prior to submitting requisitions.

5-17. Maintainers and supervisors must ensure proper storing of sensitive class IX parts used to perform maintenance on weapons, COMSEC equipment, or any other materiel that is sensitive. To ensure proper storage of these class IX parts, units should follow AR 190-11 and local SOPs.

5-18. Below are the key steps in the class IX requisition process that maintenance managers should know:

- GCSS-Army verifies if the repair part is in the requesting units shop stock or in the supporting SSA. If the repair parts are in the unit's shop stock, GCSS-Army will notify the user that they are 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.

5-19. Aviation, communication, medical, and missile maintenance stocks have varying sources:

- The aviation brigade normally stocks required aviation repair parts.
- The signal battalion's C&E maintenance shop normally stocks required C&E repair parts.
- Medical maintenance elements maintain a limited stock of medical device repair parts. Medical logistics channels provide resupply.
- The missile maintenance element stocks missile-related parts.

5-20. Alternate sources of supply can also be used to fill high priority requisitions. These include controlled exchange, cannibalization points, and local purchase. If the unit obtains an item by performing one of these methods, it should capture demand and cancel or redirect open requisitions.

REPARABLES MANAGEMENT

5-21. Reparables management involves leaders in the areas of supply, maintenance, and finance at all levels. Maintainers should ensure when removing an old repair part, it is cleaned and tagged to be turned in to the local supporting SSA. Some repair parts will require drainage of any fluids to avoid environmental hazards during shipment. Most reparables can be repaired many times before becoming obsolete or uneconomically repairable, therefore maintenance managers should closely monitor to ensure timeliness and accountability. Maintenance personnel must be familiar with the MAC to understand what items are recoverable or require other means of disposition.

5-22. USAMC manages the Army reparables process as part of its supply pipeline management mission. Strategic-level materiel managers count on sustainment maintenance operations to overhaul reparables as one means to replenish the supply system. Sustainment maintenance is performed by USAMC elements normally comprised of civilians and contractors who restores equipment to a national standard, after which the repair parts (component, accessory, assembly, subassembly, plug-in unit) are placed back into the Army's overall supply system. Maintainers at the unit level begin the reparable management process when they

replace a reparable on Army equipment. Two items are involved: the new serviceable repair part installed on the equipment and the unserviceable repair part removed from the equipment. The Army uses the standard price and credit process, and under this process, the unit is charged the standard price (full price) for the new repair part. When the unit returns the unserviceable reparable to the supply system, credit is granted to the unit's operation and maintenance budget from the Army Working Capital Fund. Figure 5-1 depicts a basic process of reparables management. With the Army's one-for-one credit policy for reparable items, units should ensure creditable returns are processed as expeditiously as possible to receive maximum credits. See ATP 4-42 for additional information on reparables management.

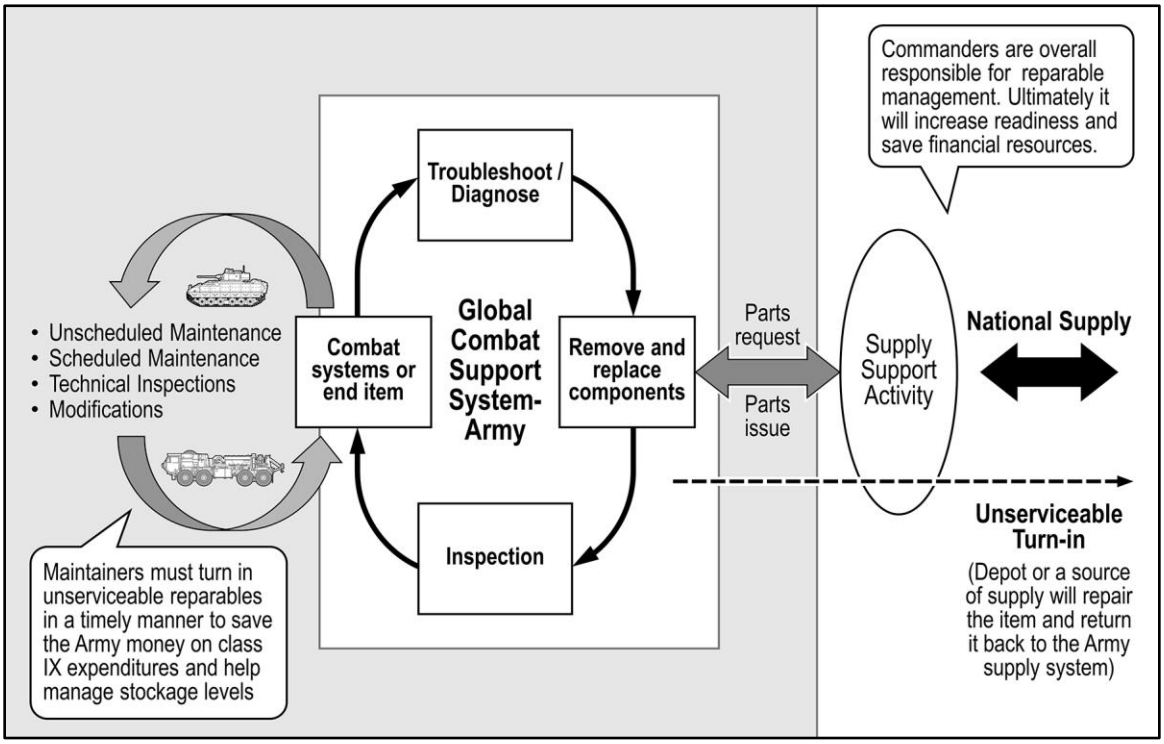

Figure 5-1. Reparable management process

Chapter 6
TMDE Calibration and Repair Support

The accuracy, sustainability, and safety of Army weapon systems and personnel throughout the world depends on accurate and reliable measurements. The calibration and repair of TMDE ensures that the measurements made are traceable to the International System of Units. 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 isolate any actual or potential malfunction. In general, TMDE refers to 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 for use in a variety of applications (for example, COTS items). Types of TMDE range from torque wrenches within sets, kits, and outfits; electronic test equipment; chemical, biological, radiological and nuclear equipment; and gages for small arms weaponry. The Army's TMDE program supports a number of technical parameters, such as infrared, electro-optics, direct current, low frequency, microwave, mechanical, hydraulics, pneumatics, and radiation detection indication and computation (known as RADIAC) equipment.

6-2. TMDE C&RS 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. The Army ensures its weapon systems operate safely and properly through routine calibration of its TMDE.

COMMANDER'S RESPONSIBILITY

6-3. Commanders at all levels are responsible for their unit's TMDE readiness and will appoint a TMDE support coordinator to interact on their behalf with their assigned C&RS activity in accordance with AR 750-43. Commanders should include TMDE as part of inspections to ensure QA and compliance of procedures being followed.

COMPANY TMDE CALIBRATION COORDINATOR

6-4. As designated by the company commander, the TMDE support coordinator must review the organization hand receipt to identify TMDE requiring support in accordance with TB 43-180. New TMDE support coordinators should contact their supporting area TMDE support team to establish a support schedule and get the latest information on where to receive TMDE support coordinator training. They should ensure each item is placed on the support TMDE activity instrument master record file, turn in supported items, and ensure that all items returned from the support activity have a DA Label 80 (*U.S. Army Calibrated Instrument*) or equivalent. The organization TMDE support coordinator, in cooperation with the supporting area TMDE support team, manages all TMDE changes that include additions and deletions against their MTOE and Instrument Master Record File (known as IMRF).

TMDE CALIBRATION PROGRAM OBJECTIVES

6-5. The objective of the Army's TMDE program is to ensure that accurate and serviceable TMDE is available for Army use, with measurement accuracies traceable to International System of Units (SI) standards. Highly technical organizations consisting of military, civilian, and contractor personnel are responsible for calibration and repair of Army TMDE.

6-6. The integrity of the Army's TMDE C&RS 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. C&RS activities are categorized by calibration laboratory, type, and measurement traceability level (MTL).

ORGANIZATIONAL STRUCTURE

6-7. The Army TMDE enterprise is comprised of military and civilian C&RS activities. The military area TMDE support teams are allocation rule based; Regular Army teams consist of six MOS 94H TMDE maintenance support specialists and one MOS 94W electronic maintenance supervisor, and ARNG teams consist of four MOS 94H TMDE Maintenance Support Specialists and one MOS 94W Electronic Maintenance Supervisor. The ARNG's TDA provides C&RS for state-specific TMDE requirements and possesses a C&RS capability within the theater aviation maintenance support group, composed of five calibration and repair maintainers. The United States Army Test, Measurement, and Diagnostic Equipment Activity (USATA) is composed of organizationally authorized civilian C&RS activities that provide transfer, secondary, and primary MTL capabilities in support of operating and generating force TMDE. USATA is assigned to USAMC.

MEASUREMENT TRACEABILITY LEVELS AND TYPES OF TMDE CALIBRATION AND REPAIR SUPPORT

6-8. The following TMDE C&RS MTLs and calibration laboratory types are key to sustaining accurate and traceable measurements. The Army TMDE enterprise C&RS MTLs include field, transfer, secondary and primary. There are various C&RS laboratories identified for TMDE support based on equipment documented in TB 43-180. Figure 6-1 depicts the hierarchy of C&RS capabilities and associated MTLs.

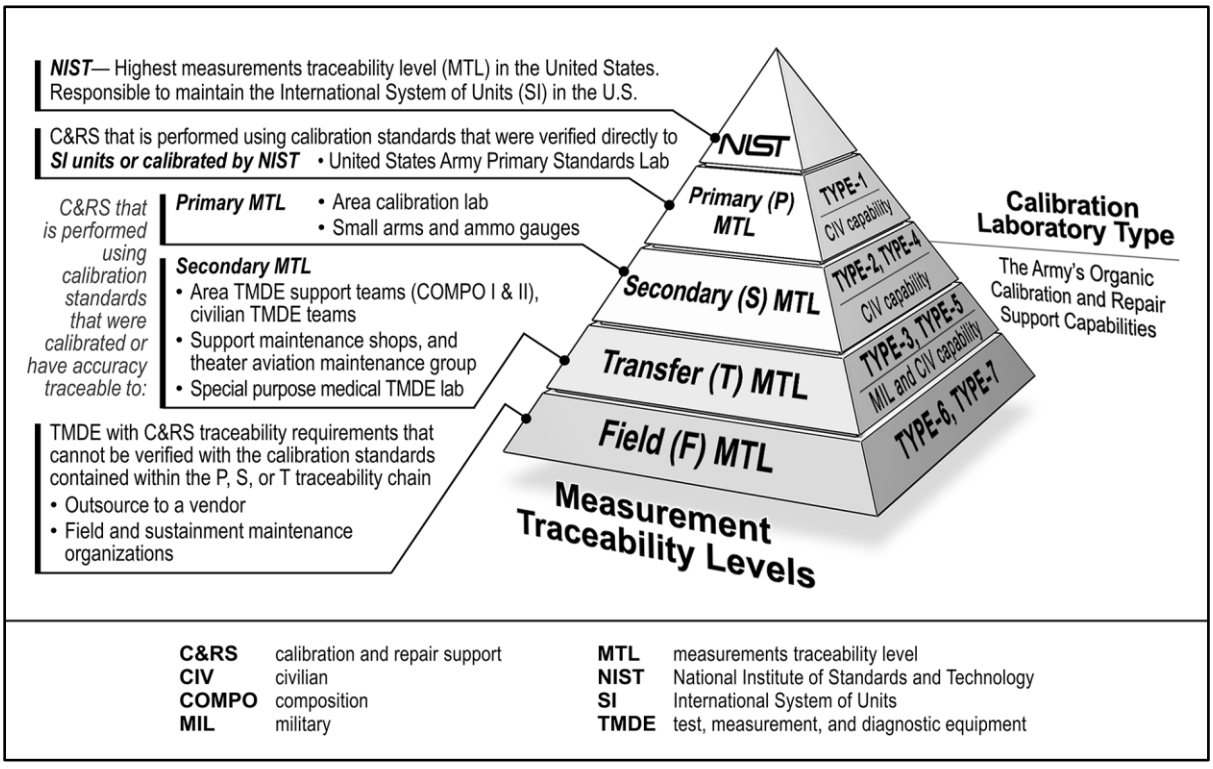

Figure 6-1. Hierarchy of calibration and repair support capabilities

Field (F) Measurement Traceability Level

6-9. This level includes TMDE with C&RS traceability requirements that cannot be verified with the calibration standards currently contained within the Primary (P), Secondary (S), or Transfer (T) traceability chain. Obtaining support for this TMDE is the owner's responsibility in coordination with USATA and is normally provided by field units, TMDE owners, medical maintenance facilities, or vendors. Measurement traceability to SI units for these items is required. All TMDE items identified as "F" MTL are documented within TB 43-180.

Transfer (T) Measurement Traceability Level

6-10. This level includes C&RS that is performed using calibration standards that were calibrated at or have accuracy traceable to the Secondary MTL. This is considered three MTLs below the National Institute of Standards and Technology (NIST). All TMDE items identified as "T" MTL are documented within TB 43-180.

Secondary (S) Measurement Traceability Level

6-11. This level includes C&RS that is performed using calibration standards that were calibrated or have accuracy traceable to the Primary MTL. This is considered two MTLs below the NIST. All TMDE items identified as "S" MTL are documented within TB 43-180.

Primary (P) Measurement Traceability Level

6-12. This level includes C&RS that is performed using calibration standards that were verified directly to SI units or calibrated by the NIST and/or intrinsic type standards. This is considered one MTL below the NIST. USATA manages the only laboratory within the Army that provides "P" MTL calibration of TMDE items documented within TB 43-180.

Calibration and Repair Support Type Locations

6-13. TMDE items documented within TB 43-180 receive a calibration laboratory type designation that identifies the C&RS facility that can provide the required calibration support based on the calibration standards configuration at each location. These location types are identified as—

- Type 1—The Army Primary Standards Laboratory. The Army Primary Standards Laboratory performs C&RS using calibration standards that were verified directly to SI units or calibrated by the NIST. This facility is a civilian capability.
- Type 2—These facilities (generally called area calibration labs) provide Secondary (S) MTL C&RS and are strategically employed both within and outside CONUS. These facilities are a civilian capability.
- Type 3—Type 3 locations perform Transfer (T) MTL C&RS which possesses the largest workload amongst the type locations. These facilities apply to civilian TMDE teams, military area TMDE support teams (Regular Army and ARNG), support maintenance shops, and theater aviation maintenance group.
- Type 4—These type locations are designated to provide C&RS capabilities for the Army's small arms and ammunition gages, known as SAAG.
- Type 5—Army Medical Logistics Command, Special Purpose Medical TMDE laboratories that provide C&RS of TMDE identified as special purpose medical equipment are designated as type 5.
- Type 6—TMDE items that cannot be supported by organic Army C&RS resources are designated as type 6. This type location outsources C&RS to a vendor.
- Type 7—Items that are not supported from a specialized facility and are performed by the TMDE owner or operator are designated as type 7.

MILITARY AREA TMDE SUPPORT

6-14. The TMDE enterprise consists of C&RS materiel, and personnel visibility and availability across all phases of operations. The coordination between unit-level TMDE support coordinators and the C&RS activity ensures that TMDE accuracy is available at the point of need. Maintenance support echelons will ensure TMDE readiness as forces prepare for large-scale combat operations.

6-15. An appropriate distribution of C&RS service workload should exist between military and civilian teams. A cyclic workload workshop should occur to ensure this balance takes place. The workload workshop, led by USAMC and headquarters, USATA, will take place with Army command G-4s and CSSB and DSSB SMCs with area military TMDE teams.

TMDE CALIBRATION AND REPAIR SUPPORT EXPEDITIONARY OPERATIONS COMMAND AND CONTROL

6-16. During expeditionary operations, under the authority of the combatant commander, the ASCC (through its TSC) exercises theater command and control over all TMDE logistics assets in the joint operations area. This concept of operations puts the C&RS capability within the combatant commander's footprint into a modular form. The C&RS provides TMDE C&RS to TMDE owners assigned to, or moving into or through, the AOR of the geographic combatant command or subordinate commands. For C&RS purposes, command G-3 or S-3 planning cells maintain coordination with headquarters, USATA and owning unit commands of military area TMDE support teams. This level of coordination should occur before and during deployment of C&RS mission assets. The TMDE enterprise consists of C&RS materiel and personnel visibility and availability across all phases of operations. Maintenance support echelons will ensure TMDE readiness as forces prepare for large-scale combat operations. Upon deployment of C&RS assets during crisis and conflict, workload coordination must take place and support agreements must be signed to ensure support of TMDE readiness of all deployed and left-behind equipment.

THEATER SUSTAINMENT COMMAND

6-17. TSCs establish a TMDE logistics area officer within the command staff. The TMDE logistics area officer maintains oversight of C&RS readiness by interfacing with Headquarters, USATA on TMDE metrics and reports from subordinate commands. The TMDE logistics area officer provides logistical assistance to subordinate brigades, which includes TMDE owners, and coordinates with USATA for technical assistance and requests for augmented C&RS. This ensures that TMDE services are appropriately work-loaded and adequate C&RS assets are on hand to sustain the force during operations.

COMBAT SUSTAINMENT SUPPORT BATTALION

6-18. Select CSSBs possess a C&RS capability. The military area TMDE support teams within these select CSSBs provide a tactical and split-based C&RS capability. CSSB S-3 planners should coordinate with higher command G-3 planners for additional C&RS requirements to support the combatant command AOR. Additional coordination with battalion and brigade SPO maintenance cells can occur for TMDE readiness support.

6-19. Leaders should be prepared to operate with alternative communication methods and networks. Alternative communication methods may mitigate short-term losses of communication. The CSSB, through its sustainment brigade, will maintain contact with the TSC to ensure the TSC commander is able to continuously monitor C&RS within the operating environment. This enables the ASCC commander to direct the calibration and repair mission according to the combatant commander's intent and mission objectives. A 948B electronic maintenance systems warrant officer assigned to the CSSB's SMC provides management and technical support to the area TMDE support team. The TSC commander can call forward the USATA C-TMDE assets to the point of need.

6-20. DSSBs possess a C&RS capability. The military area TMDE support teams within these DSSBs provide a tactical and split-based C&RS capability. DSSB S-3 planners should coordinate with higher command G-3 planners for additional C&RS requirements to support the combatant command AOR.

Additional coordination with battalion and brigade SPO maintenance cells can occur for TMDE readiness support.

AREA TMDE SUPPORT TEAM

6-21. Each military area TMDE support team can provide Transfer (T) MTL C&RS of general and select special purpose TMDE. Additionally, and upon request, the military area TMDE support team possesses the capability to provide split-based C&RS for TMDE friction points that can impact operational readiness. The military area TMDE support team and 948B electronic maintenance systems warrant officer should advise the CSSB and DSSB SPO maintenance sections on support issues, trends, metrics, and workload analysis. This information ensures that all sustainment echelons have an accurate picture of TMDE readiness and visibility and detects any friction points relating to C&RS. The area TMDE support team will utilize USATA for technical reach back on TMDE C&RS matters.

OTHER CALIBRATION AND REPAIR SUPPORT ACTIVITIES

6-22. USATA, a TDA organization, provides C&RS for operational and generating forces through all phases of operations. During large-scale combat operations, the theater commander may request a C-TMDE support team to augment the military area TMDE support teams that are deployed and operating within the combat support area. When this occurs, an operation order is sent through USAMC to USATA to provide an augmented C&RS capability that can meet the requirements. This C-TMDE support team will be attached to the theater AFSB for command and control. Defining the augmented calibration team capability will depend on coordination with the assigned AFSB to determine C&RS requirements.

6-23. The ARNG embeds TDA C&RS in state-operated combined support maintenance shops. They provide Transfer (T) MTL C&RS to TMDE owners within their state or region of responsibility.

6-24. As required by the Surgeon General, the Army Medical Logistics Command supports the calibration and repair of special purpose medical TMDE at its own special purpose medical TMDE laboratories.

TACTICAL OPERATIONS COMMAND AND CONTROL

6-25. Army commands and ASCCs with C&RS activities are responsible for providing all C&RS assets in theater. Sustainment commands with a C&RS mission will advise the operational force on TMDE requirements. These assets could also potentially include the ARNG.

6-26. Planners base the number of area TMDE support teams required to support the overall C&RS mission on the category and densities of supported TMDE and the geographic dispersion of supported units. When area TMDE support team elements are attached to another unit, that unit exercises administrative control of those elements while OPCON for TMDE workload remains with the SMC.

6-27. USATA provides a TMDE liaison officer to the AFSB and provides metrology (the science of measurement and its application) support across the TMDE enterprise. This position coordinates with division, corps, and theater G-4s on all aspects of TMDE readiness. The TMDE liaison officer is also responsible for the horizontal communication with C&RS activities along with Headquarters, USATA. This communication should encompass evacuation of TMDE assets in and out of the theater of operations.

CALIBRATION SETS

6-28. 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.

6-29. When used in a split-based mode of operations, the two-man mobile facility depends on the parent area TMDE support team's principal equipment set for repair functions and production control operations.

6-30. The TDA C&RS activities possess calibration sets (also known as CALSETs) and equipment that are typically housed in a fixed facility. USATA will possess a limited capability for expeditionary C-TMDE teams utilizing a deployable calibration set with similar capabilities as the MTOE calibration set.

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 equipment set for special or split-base requirements. Mission variables, as determined by the appropriate maintenance SPO cell, determine the mode of operations. The calibration standards allocated to the area TMDE support team provide a modular versatility for fixed facility and mobile calibration mission support.

6-32. The TDA C&RS activities located in theater operate largely in the dismounted, 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 (S) MTL C&RS. Designated regional support centers will normally provide support external to the theater. All TMDE requiring C&RS beyond the capability available in theater must be evacuated to the next appropriate MTL and calibration lab type.

Chapter 7
Other Maintenance Activities

Each maintenance activity has special requirements and should be tailored to meet the commander's intent. This chapter discusses those requirements for C&E, MI systems, missile systems, army watercraft, aviation, air traffic service, and medical device maintenance.

COMMUNICATION AND ELECTRONICS MAINTENANCE

7-1. Reliable C&E maintenance ensures that C&E 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. C&E maintainers focus on performing on or near platform maintenance tasks in accordance with the applicable TM and institutionally trained skills, assigned tools, and available TMDE. They are authorized as indicated by an "F" in the third position of the source, maintenance, and recoverability code and the "Maintainer Level" column of the MAC. C&E maintainers (career management field 94) focus on performing repair or replacement of end items, line-replaceable units, shop-replaceable units, modules, subassemblies, subcomponents, circuit card assemblies, plug-in units, and repair parts. They also perform 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 regional support centers, forward repair activities, or DLSEs.

7-2. Maintenance workflow is the same for C&E 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 (*Equipment Inspection and Maintenance Worksheet*). The crew or operator turns the form in to the appropriate maintenance section for fault verification and repair. The C&E maintenance section verifies the fault and repairs it if possible. 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 (*Maintenance Request)*, 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.

7-3. To fully understand C&E maintenance operations, 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

7-4. The U.S. Army uses two different categories of equipment: life cycle managed and nonstandard.

Life Cycle Managed Items

7-5. Program of record items, also known as life cycle managed items, are procured military equipment items that follow the life cycle from procurement through 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 C&E maintainers include:

- Single channel ground and airborne radio systems (known as 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.

7-6. Typically, units notify a signal support systems specialist (MOS 25U or career management field 25) if there is a problem with vehicle-mounted C&E equipment. The MOS 25U validates the operator or crew PMCS on the system using the appropriate TM and diagnostic tools to isolate and verify the fault. The signal support systems specialist 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.

7-7. The supporting C&E maintenance shop performs repair 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, and spares management; serial number change documentation for administrative adjustment reports; packaging and shipment tracking, maintenance work order tracking, and maintenance work order application; and coordination with other maintenance elements. The item is returned to the user upon completion of these maintenance actions.

Non-Standard Equipment

7-8. 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 based on the current threats and demands encountered in the OE. They can be purchased by unit credit card or other funds. Maintenance for these systems varies from FSR service to replacement under warranty terms.

7-9. In the case of nonstandard communication and electronic equipment, the operator or crew member will troubleshoot the equipment and identify the fault using the appropriate TM or equipment commercial maintenance manual. Maintenance workflow starts when a fault on a piece of equipment is annotated on DA Form 5988-E or DA Form 2404. The Soldier turns the form in to the appropriate maintenance section for verification and repair. The maintenance section verifies that the item is non-mission-capable and opens a maintenance request. If a spare for the faulty part is in on-board spares the crewmember will replace it. If the faulty component is not carried in on-board spares the unit will contact the supporting C&E maintenance shop to see if the component is available within their stock, if it is available, they will request the part and replace the faulty component. The electronic systems maintenance warrant officer will verify this action.

7-10. The unit will evacuate the faulty component to the supporting C&E maintenance shop for repair or processing through the appropriate repair facility. Units should 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 identify the exact means of evacuation of the equipment. The C&E maintenance shop is the centralized activity for accessing external FSR support for COTS and Army nonstandard C&E equipment maintenance actions.

7-11. Use 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 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, use COTS and parts procured through Army supply. It is imperative that C&E maintainers understand secondary-level effects of COTS because they may affect the warranties on common hardware systems as well as COMSEC equipment.

7-12. Some nonstandard 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 nonstandard item. Warranties vary by system.

7-13. 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 C&E maintenance shop. The C&E maintenance shop 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.

COMMUNICATION AND ELECTRONICS SUSTAINMENT-LEVEL MAINTENANCE

7-14. Sustainment-level maintenance for C&E equipment is the same as for any Army item. Sustainment maintenance units are USAMC assets that provide in-theater or CONUS-based support as required for repairing, rebuilding, and overhauling components and end items and returning them to the supply system. Sustainment-level maintenance support for C&E items is coordinated through the supporting maintenance organization to the supporting battalion or brigade SPO staff.

7-15. Sustainment maintenance may also be coordinated through the DLSE. The SPO staff in the BSB, after consulting with their electronic systems maintenance warrant officer, will coordinate with the division and the DLSE. It is important that the DLSE keep the supporting BSB apprised of sustainment maintenance activities to avoid duplication of effort. The AFSBn may also provide logistics assistance support to units that do not have access to DLSE support.

ECHELON COMMUNICATION AND ELECTRONICS CAPABILITY

7-16. C&E maintenance capabilities exist across all echelons of command. Some larger units have organic or attached signal units or maintenance formations with C&E capabilities. Other units rely on support from C&E maintenance shops from their higher headquarters formations or from units providing area support. For example, the SMC in a CSSB has a C&E repair section capable of providing field-level maintenance support to units on an area basis.

Expeditionary Signal Battalion

7-17. The expeditionary signal battalion has sufficient organic supply and maintenance structure to handle normal logistics requirements in garrison or during operations when subordinate elements are near one another. Companies, platoons, sections, and teams deployed separately will ordinarily receive logistics, 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.

7-18. The C&E maintenance shop performs almost all maintenance tasks on the communication and signal systems and assemblages within the expeditionary signal battalion aside from PMCS. The C&E maintenance shop also provides routine, scheduled, and emergency maintenance support and spares management on unique command and control systems such as the WIN-T and other similar signal communication platforms. 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 C&E 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 CECOM LARs, regional support center, or any form of contracted field support representatives.

Division Signal Company

7-20. The division signal company coordinates network performance and maintenance issues with the division G-6 through the division headquarters battalion staff. The electronic systems maintenance warrant officer 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 and provides oversight of maintenance work orders and maintenance support to the division signal company and 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 who perform authorized field-level maintenance on organic signal assemblages. The executive officer of the signal company maintains oversight on the status of all 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 electronic systems maintenance warrant officer located in the FMC of the BSB or ASB to facilitate network performance and maintenance issues with the brigade information officer's staff. The brigade signal company has operator-maintainers who perform maintenance on signal assemblages. The executive officer of the signal company coordinates with the electronic systems maintenance warrant officer 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 maintenance matters within the company.

Corps and Division Headquarters Communication and Electronics Maintenance

7-22. Corps and division-level formations do not have assigned Ordnance electronics maintainers or C&E maintenance shops to support communication equipment. The only Ordnance maintainers in the headquarters company are maintainers for automotive, utilities, and power generation.

7-23. The corps and division G-6 are responsible for monitoring the status of and sustaining the division networks that comprise the LandWarNet. The G-6 ensures that critical network maintenance is performed, and parts are available as needed for C&E systems to remain operational. The electronic system maintenance warrant officer is a critical integrator and liaison on the division and corps staff reporting directly to the G-6 and network operations staff. The warrant officer serves as the facilitator for all sources of maintenance support for tactical network systems within their formations. 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.

7-24. All external coordination for any signal platform or C&E 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 CECOM LAR, regional support center, and contracted field support representatives.

7-25. The corps and division G-6 senior electronic systems maintenance warrant officer oversees all C&E maintenance support. The corps senior electronic systems maintenance warrant officer coordination for C&E maintenance functions through a supporting sustainment brigade's materiel readiness branch down to the CSSB's SMC. At the division level the maintenance warrant officer helps facilitate maintenance functions with the DSB to direct C&E maintenance functions through the DSSB's SMC.

7-26. The FMC C&E maintenance shop accepts the work order and repairs the equipment if possible. If repair at the field level is not possible, the maintenance section either sends the equipment to an authorized repair facility, requests FSR 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. Unit commanders and organizational staff can receive status on the readiness of their equipment via reports from GCSS-Army. For additional information regarding GCSS-Army reporting, see Appendix B.

Brigade Combat Team Communication and Electronics Maintenance

7-27. The brigade information officer ensures that the unit performs critical network maintenance. The brigade information officer also oversees any readiness efforts that affect tactical network operations or the DOD Information Network, such as signal platform readiness reporting in GCSS-A and spares management. The brigade information officer also works closely with the BSB.

7-28. The BSB's FMC has an organic C&E maintenance section that provides support at the brigade level. The C&E maintenance section provides technical inspections, scheduled services, unscheduled maintenance, troubleshooting, and repair of communication equipment to repair and return equipment to supported units. These maintainers perform repair and replacement of the end item, line-replaceable units, shop-replaceable units, modules, subassemblies, subcomponents, circuit card assemblies, and plug-in units. They conduct fault 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 or forward repair activities). The BSB communication and maintenance section works with an FSR to manage coordination for external support.

Note: C&E maintainers should verify faults to avoid unwarranted evacuation of spares without genuine hardware faults or overlooked software or 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.

7-29. The C&E maintenance shop manages spares through GCSS-Army. Maintenance actions generates parts demand history for future spares retention on the 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. Ongoing coordination between the subordinate battalion's S-3, S-4, S-6, and the electronic systems maintenance officer identifies the proper logistics package required to support missions based on signal platform types, quantity, location remoteness, and duration. This allows for better prioritization, balanced C&E maintenance shop manpower support, and more efficient use of spares in support of communication systems.

7-30. Each maneuver battalion within a BCT has a supporting FSC. The FSC may not be able to repair or replace some C&E 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.

COMMUNICATIONS SECURITY MAINTENANCE

7-31. 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 MAC 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, AR 190-13, AR 190-51, and AR 380-40. 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.

7-32. 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.

7-33. Maintainers evacuate unserviceable classified COMSEC material through the COMSEC Material Control System by COMSEC accounts to Tobyhanna Army Depot. Unserviceable COMSEC material that is considered unclassified, including controlled cryptographic items, will be evacuated through supply channels to Tobyhanna Army Depot.

7-34. Army customers submit requirements through the U.S. Army Communication Security Logistics Activity via the information systems security program when requesting a replacement for classified COMSEC equipment and controlled cryptographic items in accordance with AR 25-2. 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. ***Direct exchange*** **is a supply method of issuing serviceable materiel in exchange for unserviceable materiel on an item-for-item basis.**

7-35. National Security Agency Commercial COMSEC Evaluation Program 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 in accordance with AR 700-139. Tobyhanna Army Depot provides support and sustainment repairs after the warranty expires.

MILITARY INTELLIGENCE SYSTEMS MAINTENANCE

7-36. The intelligence electromagnetic warfare (IEW) systems integration and maintenance and wheeled vehicle maintenance sections are organic to the MI brigade (Theater), the expeditionary MI brigade, the corps and division IEW battalions, the BCT MI company, and in the future, the standard division general support MI company. The corps and division G-2s have organic IEW systems maintenance but are dependent upon the respective corps or division headquarters for motor maintenance. The composition of each section varies at each echelon, but typically has a warrant officer (MOS 353T) performing duties as the officer in charge and an NCOIC (MOS 35T). The number of enlisted 35Ts and their grades varies by echelon.

7-37. The unique maintenance requirements of intelligence equipment and the need to maintain the intelligence enterprise network architecture with minimal downtime requires more responsive maintenance procedures. The maintainers of record for MI systems are the MOS 35T, MI systems maintainer/integrators and MOS 353T, MI systems maintenance/integration technician. Maintaining the intelligence enterprise network architecture requires continual coordination between intelligence leaders and staffs. G-2s and S-2s and the corps, division, and brigade intelligence leaders, MI company commanders, and IEW battalions work across organizational boundaries to maintain and sustain their portions of the intelligence enterprise network architecture.

7-38. The corps and division IEW battalions and the BCT MI company have MI systems maintainers/integrators to maintain intelligence equipment in their respective formations. These personnel perform maintenance the FSCs are not structured or authorized to accomplish.

7-39. The IEW systems integration section provides for the integration and maintenance of intelligence enterprise systems within its respective structure. It is also responsible for integrating sensitive compartmented information communications into the existing intelligence enterprise network architecture. Types of support provided by the section include—

- Scheduled and unscheduled maintenance of all assigned and attached intelligence systems.
- Architecture design to include power grid, systems, and network integration. This includes coordinating with organic and higher echelon intelligence and signal leaders.
- Technical inspections of intelligence systems and components of end items and limited C&E equipment.
- Estimated cost of damage requests for intelligence systems.

- Coordination with the command, control, communications, computers, cyber, intelligence, surveillance, and reconnaissance life-cycle analysis team for inspection and possible induction to depot for repair and/or overhaul.
- All coordination with external maintenance support activities, to include the LAR, field support engineer, and FSR.

7-40. The wheeled vehicle maintenance section conducts vehicle, generator, and utility equipment maintenance to meet unit missions. It provides maintenance support contact teams and maintenance personnel, tools, and equipment necessary to perform unit-level maintenance on organic vehicles and generators. It also provides limited vehicle recovery and limited refueling operations. Additionally, this section provides the unit-level maintenance support for the HHC.

MISSILE SYSTEMS MAINTENANCE

7-41. All maintenance management applications remain the same for missile maintenance as for any two-level maintenance organization. However, because these units can be employed at the theater strategic, operational, or tactical level, 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.

7-42. There are six basic types of missile units. They vary slightly in design, but all have organic maintenance capability. These units include—

- Air and missile defense battalion (Patriot).
- Integrated air and missile defense battle command system Patriot battalion.
- Air and missile defense composite battalion (Patriot/Avenger).
- Terminal high altitude area defense battery, also called THAAD.
- Maneuver air and missile defense battalion (Avenger).
- Maneuver Short Range Air Defense battalion, also called M-SHORAD.

AIR AND MISSILE BATTALION (PATRIOT) MAINTENANCE

7-43. The air and missile defense battalion (Patriot) conducts field maintenance on all assigned equipment using organic maintenance assets. Patriot fire control and launching station operators and 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 an FMC that may be employed with the battalion during any type of mission.

7-44. The Patriot crews and the FMC, when available, provide field-level maintenance support to all assigned units and equipment including automotive, ground support equipment, C&E, and missile-peculiar systems. The maintenance platoon performs most 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.

7-45. Each Patriot automotive FMT 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 BATTALION (INTEGRATED AIR AND MISSILE DEFENSE BATTLE COMMAND SYSTEM-ENABLED PATRIOT) MAINTENANCE

7-46. The Integrated Air and Missile Defense Battle Command System is a command and control system that gives commanders the ability to integrate the communications between patriot launchers, radars, and crewmembers. Its primary function is to connect to other radars, synchronize their targeting data into a single high-fidelity track, and pass that data to whichever launcher is best able to engage on an incoming target. The maintenance company will provide field-level maintenance support on all assigned equipment using organic maintenance assets in the same manner as a traditional Patriot unit.

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

7-47. This 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 FMT (which replaced the Patriot automotive FMTs). Both teams provide onsite field maintenance to the Avenger battery and platoons that are normally spread throughout the AO. It can provide radar, automotive, and generator support. For additional information on the maintenance capabilities of the Patriot battery, see ATP 3-01.85.

TERMINAL HIGH ALTITUDE AREA DEFENSE BATTERY

7-48. The terminal high altitude area defense battery has an organic field maintenance section within the battery support center. The maintenance section conducts field maintenance on all assigned equipment.

7-49. The battery consists of a headquarters, field maintenance section, and 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.

MANEUVER AIR AND MISSILE DEFENSE BATTALION (AVENGER) MAINTENANCE COMPANY

7-50. The mission of the maintenance company is to provide field-level maintenance support to the maneuver air and missile defense battalion. It provides all automotive, ground support equipment, C&E, and missile-peculiar systems maintenance. The detachment also includes specialists who support the AN/MPQ-64 Sentinel, Army Lightweight Counter Mortar Radar, and Land-Based Phalanx Weapon System also known as (LPWS). The detachment normally deploys with the headquarters and headquarters battery.

7-51. The company is comprised of headquarters, mechanical maintenance, recovery, and Avenger maintenance sections. The mechanical maintenance section provides all automotive, ground support, and C&E 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.

7-52. The avenger electronic/missile FMT can break 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.

MANEUVER SHORT RANGE AIR DEFENSE BATTALION

7-53. The maneuver short range air defense battalion provides air defense and force protection while supporting maneuver forces against unmanned aerial systems and fixed-wing and rotary-wing aircraft. The system is designed to detect, track, and identify low-altitude air targets up to 360 degrees using onboard acquisition and a tracking sensor under day and night conditions. Each battalion has a maintenance company to provide field-level maintenance support on all organic equipment within the battalion.

7-54. The maintenance company is comprised of a mechanical maintenance section to provide field-level maintenance to the battalion for all automotive, ground support, and small arms equipment. The service and recovery section provides recovery of battalion vehicles, limited welding capability, and support of maintenance evacuation. The missile and electronic section provides field maintenance support on the initial maneuver short range air defense, radar system-specific equipment, and C&E equipment. The 94T short range air defense system repairer conducts field-level maintenance repairs on the missile components and assemblies on the vehicle. The 94M radar repairer will maintain and repair essential on-the-ground surveillance radar equipment by inspecting, testing, and adjusting its components.

GROUND-BASED MISSILE SYSTEM MAINTENANCE

7-55. 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.

7-56. The Javelin portable antitank missile M98A1 Command Launch Unit 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 system 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 away as CONUS. Javelin systems sent out for sustainment-level maintenance are one of the few items returned to the using unit after sustainment-level maintenance is completed.

7-57. The TOW missile M41 Improved Target Acquisition System (also called ITAS) is a long-range multi-sensor system that provides real-time ability to detect, recognize, identify and geolocate 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. An FSR performs sustainment-level repairs. Units should coordinate with the FMC for annual system checks.

7-58. The M2/M3 Bradley Infantry Fighting Vehicle and Cavalry Fighting Vehicle's Improved Bradley Acquisition System (also called IBAS) provides forward-looking infrared, 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 support the optics system as part of the systems maintainer concept.

7-59. The M1134 Stryker Anti-Tank Guided Missile Vehicle's Modified Improved Target Acquisition System 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.

7-60. The Long-Range Advanced Scout Surveillance System (known as LRAS3) is a long-range, multi-sensor system that provides real-time ability to detect, recognize, identify, and geolocate distant targets. Cavalry squadrons and troops normally operate the system in either a ground or vehicle-mounted configuration. Maintainers for the system serving 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 system, including software updates and maintenance work orders. Maintainers draw repair parts for this 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.

7-61. 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 Land-Based Phalanx Weapon System.

7-62. The 94M radar repairers located in the FMC and field artillery FSC maintain 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 onsite maintenance.

Additional technical support is available through the FMC brigade electronic missile systems maintenance technician.

FIELD ARTILLERY MISSILE MAINTENANCE

7-63. The field artillery brigade has M270A1 Multiple Launch Rocket Systems (known as MLRS) or M142 High Mobility Artillery Rocket Systems (known as HIMARS). Those systems are designed to provide field artillery medium-range rocket and long-range missile attacks to suppress enemy forces in support of joint and Army forces. Operators and crews are charged with specific field-level maintenance procedures prior to notifying next higher maintenance. Both missile systems are maintained by the 94P multiple launch rocket system repairer. The 94Ps in the FSC MSTs perform field-level maintenance on the hydraulics, mechanical, and electrical components of the launchers. The 948D electronic missile systems maintenance warrant officer in the FSC maintenance control section provides technical and logistics support to the 94Ps and the command team. A senior 948D within the support battalion is the overall brigade maintenance technician, providing logistics readiness support to all maintenance activities within the brigade. All missile maintenance capability within the field artillery brigade resides in the FSCs. There are no missile repairers within the support battalions. Any additional maintenance beyond the FSCs capacity and capability must be repaired by FSRs.

SPECIAL OPERATIONS MAINTENANCE

7-64. Special operations forces may receive maintenance support from a wide variety of sources depending on where they are deployed. Maintenance support resident in special operations include—

- Group support battalion maintenance company (Airborne).
- Group support battalion maintenance (Mobile).
- Special operations aviation support company (Attack).
- Ranger SMC (Infantry).
- 528th Sustainment Brigade, Special Operations (Airborne).

SPECIAL OPERATIONS AVIATION MAINTENANCE COMPANY

7-65. The special operations aviation maintenance company provides continuous aviation field maintenance and limited aviation sustainment maintenance for all aircraft assigned to the special operations aviation battalion (national mission). The company is capable of providing tailored maintenance packages for up to five separate locations and no-notice worldwide deployment to provide maintenance support for up to three intermediate or forward staging bases. It also provides limited aircraft recovery for crashed/damaged aircraft and contact team maintenance to forward locations utilizing organic personnel and equipment. Maintenance capabilities include airframe, structural, component, and avionics repair on assault and attack aircraft. All field maintenance on ground equipment is provided by the HHC aviation battalion.

RANGER SUPPORT COMPANY

7-66. The field maintenance section provides field-level maintenance on Army common and special operation forces peculiar automotive, electronics, communications, ground-support, armament, construction, quartermaster, and a wide variety of commercial equipment for the battalion and attached units. It also provides reinforcing maintenance to the MST.

7-67. The company commander sets the MST's priorities in accordance with the battalion commander's guidance. When deployed in support of a Ranger company, the MST operates under the control of the company first sergeant, with the maintenance NCOIC supervising the team. The scope and level of repair is based on mission variables. The MST makes repairs as far forward as possible and returns equipment to the unit.

528TH SUSTAINMENT BRIGADE, SPECIAL OPERATIONS (AIRBORNE)

7-68. The 528th Sustainment Brigade, Special Operations (Airborne) sets operational-level logistics conditions to enable Army special operations forces and joint element missions by providing tailored

logistics, signal, medical, and intelligence support to the Global Operational Forces network. The sustainment brigade is unique compared to other Army sustainment brigades and maintains constant global situational awareness of deployed Army special operations forces logistics support structures. The brigade is multi-composition in structure and is focused at the operational level for logistics planning and synchronization.

ARMY WATERCRAFT MAINTENANCE

7-69. The purpose of Army watercraft maintenance is to ensure safe, seaworthy, and reliable watercraft. Maintenance tasks include any action that sustains materiel 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 PMCS of equipment to complex depot operations performed in fixed shops and facilities and are categorized in the Army maintenance system as either 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 subassemblies.

7-70. Army watercraft uses 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 to properly plan and execute missions. Two-level maintenance ensures the vessels are safe and seaworthy and is conducted as follows:

- Vessel crews perform watercraft field maintenance while in port and underway. Vessel crewmembers, equipment operators, and 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

7-71. The Army classifies watercraft vessels into three classes as described in the following sections.

Class A Vessels

7-72. Class A vessels are self-propelled and 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 the landing craft utility 2000 series. The Army organizes the landing craft utility 2000 series under the heavy boat company, and large oceangoing tugs under the floating craft company.

7-73. The logistics support vessel is an independent detachment and has no 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

7-74. 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. They also

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 tugs 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

7-75. Class C vessels are neither self-propelled nor self-sustaining. They accomplish their primary mission in port. They are capable of tactical and operational support of logistical and harbor operations and 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 the barge, cargo; barge, derrick; roll on/roll off discharge facility; and floating causeway.

MAINTENANCE OPERATIONS

7-76. Operations personnel should 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 vessel support office or battalion marine maintenance office daily. The vessel support office consolidates the information, provides assistance and resources within its ability, and provides the status to the harbormaster operations detachment.

7-77. The Army designed the harbormaster operations detachment to provide a battalion or transportation terminal with the ability and expertise to monitor the operations and the 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. The operations staff 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. These organizations continually communicate and cooperate to ensure vessel availability and ultimately mission accomplishment.

7-78. 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.

7-79. Maintenance management and reporting is accomplished using organic sustainment information systems and follows command SOPs. For more detail regarding Army watercraft maintenance operations, see ATP 4-15.

Watercraft Field-Level Maintenance

7-80. Watercraft field-level maintenance consists 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 and failure diagnoses, and shipboard damage control. The vessel crew, vessel support office maintenance team, and watercraft FMC normally perform field-level services using tools and test equipment found on the vessel or in the units.

***Note*:** 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 at which level the repair will be performed. Maintenance actions within watercraft legacy MACs identified in columns "H" are the responsibility of sustainment maintenance.

7-81. 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 vessel's crew is treated the same way as a ground-based MST. All regulations, policies, apportionments, and allocations that apply to an MST apply to a vessel crew. For instance, a vessel is authorized shop stock and bench stock the same as an MST.

7-82. The crew maintains all watercraft safety equipment including firefighting, dewatering, and lifesaving equipment. A combination of operators and crew for field-level and TACOM Watercraft Inspection Branch for sustainment level, maintains 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

7-83. Operator maintenance is on-system maintenance that ensures vessels are maintained in good working condition. It includes inspection, testing, and service of watercraft components, modules, subassemblies, assemblies, and systems. 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

7-84. Maintainer maintenance is on and off-system maintenance that includes inspection, testing, service, adjustment, replacement, and repair of watercraft components, modules, subassemblies, assemblies, and systems, returning them to a serviceable condition. Maintenance contractors are required to perform some maintainer-level maintenance actions in accordance with the applicable MAC.

7-85. Watercraft engineers are system specialists for Army watercraft who receive formal training on diagnosing specific system faults from the Maritime and Intermodal Training Division of the Transportation School (advanced individual training, NCO Education System, Warrant Officer Basic Course, and specialized functional courses). Watercraft engineers perform most of the 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 including welding. However, allied trades specialists perform most of the welding and fabrication repairs at the field level while assigned to vessel support offices or watercraft FMCs.

***Note*:** Not all watercraft units are supported by watercraft FMCs.

Watercraft Field-Level Maintenance – Vessel Support Office Maintainer

7-86. 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, consolidate logistics efforts across the unit's fleet, and decrease the administrative burden on the vessel crews. The vessel support offices 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—

- Conducting supply transactions with the SSA.
- Assisting the chief engineers in developing supply support solutions.

- Acting as liaison to TACOM.
- Publication management.
- Coordinating modification work orders, safety of use messages, and maintenance advisory messages.
- Controlling configuration and deviation from specification.
- Managing the repairs performed by the vessel support office maintenance section.

Watercraft Field-Level Maintenance – Watercraft Field Maintenance Company

7-87. Watercraft FMCs are comprised of marine maintenance warrant officers, watercraft engineers, an allied trades warrant officer, allied trades specialists, and automated logistics specialists. Watercraft FMC capability is focused within two FMTs and a maintenance control section. The primary responsibility of the FMTs 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 control and QC of the maintenance performed by the FMTs and acting as the liaison between supported organizations, FMTs, 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

7-88. 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.

7-89. Below-depot maintenance includes inspection, testing, service, on-condition cyclic maintenance, adjustment, replacement, repair, overhaul, and rebuilding of watercraft components, modules, subassemblies, assemblies, and systems to return them to the original user in a serviceable condition. Below-depot maintenance actions are intensive, 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 support equipment exceeding the authorizations of field-level maintenance activities. It is authorized by the TACOM Watercraft Inspection Branch and is routinely performed by contracted maintenance support, or by exception through an installation maintenance activity.

7-90. Depot maintenance includes inspection, testing, service, on-condition cyclic maintenance, adjustment, replacement, repair, overhaul and rebuilding of watercraft components, modules, subassemblies, assemblies, and systems to return them to the original user in a serviceable condition. Depot maintenance actions are intensive, typically requiring dry-dock and shipyard facilities. They are performed by a contractor using best commercial practices in accordance with the language of a specific services contract tailored to those repairs.

7-91. Sustainment-level maintenance also provides oversight of required tests, inspections, and certifications that the crew performs. Units and FMTs are responsible for initiating all regulatory required tests, inspections, and certifications and correcting deficiencies that prevent certification of systems or 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

7-92. Crews complete Army inspections 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 contracts for pier-side repairs. These repairs are performed at either 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

7-93. 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 designed to ensure that a watercraft's structure, piping, main and auxiliary engines, electrical installations, lifesaving appliances, fire detection 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.

7-94. 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 will be conducted in addition to the 180-day inspection in accordance with TB 55-1900-201-45/1.

7-95. The scope of work completed during on-condition cyclic maintenance depends 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 or underwater hull survey.
- Overhaul, replacement, and renewal of all major components identified for overhaul at depot level.
- All minimum maritime safety inspections required by the American Bureau of Shipping.

7-96. While scheduled sustainment-level maintenance actions are part of on-condition cyclic maintenance, they are routinely done at the same time as on-condition cyclic maintenance. This enables the Army to take advantage of vessel availability as well as contracted facilities.

Additional Inspections

7-97. Maintenance required for the American Bureau of Shipping's five-year load line letter, 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 and application of engineering change proposal packages or modification work orders. The American Bureau of Shipping certification provides a 90-day warranty for shipyard maintenance.

Maintenance in Port

7-98. 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.

7-99. The vessel chief engineer coordinates 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

7-100. The vessel master and chief engineer are responsible for all maintenance while a vessel is underway. The crew performs all scheduled and unscheduled field maintenance to ensure safe and seaworthy operations. The chief engineer directs the maintenance effort to critical systems. These systems are required for the safe operation of the vessel and its ability to perform its intended mission. If needed, the vessel master is authorized by AR 750-1 to perform any level of maintenance when engaged in sailing operations (underway

and deployed away from home port) when faults or deficiencies occur 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 or system must be restored to the approved configuration upon return to home station.

Maintenance in an Away Port

7-101. When a vessel reaches a port other than the home port, the maintenance effort is directed to restore 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 perform these repairs will be made at the same time.

SUPPLY SUPPORT

7-102. In addition to the on-board spares listing, the crew of class A and B vessels have an authorized stock list which is generally referred to as shop stock. Stockage of other authorized repair items is maintained by the vessel supply office. Management of loads will be in accordance with AR 710-2.

7-103. 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 need 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 accomplish needed repair or replacement.

MAINTENANCE DOCUMENTATION

7-104. Watercraft maintain specific forms, documents, and records specific to the class of vessel being maintained or 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 (also for Class B vessels). Maintainers use these documents generally for one year at a time (up to three years maximum) and maintain them for three 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 that the maintenance forms (engine department logs) record faults and deferred maintenance, shop repairs, 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 and deck department logs are required by federal regulation. The maintenance forms are used as 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.

AVIATION MAINTENANCE

7-105. Aviation maintenance uses the two-level maintenance concept. Field-level maintenance is accomplished at the brigade level and below. Sustainment-level support is provided externally through units positioned in theater and various organizations, including depots permanently located in CONUS. Aviation maintenance requirements are prescriptive and must be considered in the planning process. This will ensure

that adequate support is available and provides planners with realistic airframe numbers to support tactical operations.

7-106. Aviation maintenance tracking is transitioning to an enterprise resource planning system called Army Enterprise Systems Integration Program. Aircraft Notebook will replace the Unit Level Logistics System – Aviation (Enhanced) and the Unmanned Aircraft System – Initiative as the fully integrated maintenance management system; Aircraft Notebook will be employed by U.S. Army installation aviation maintenance activities. The Aircraft Notebook platform provides a single point access to the maintainer at the aircraft in the form of software applications necessary for completing and recording maintenance activities on U.S. Army aircraft. See FM 4-0 for more information on aviation logistics information systems.

AVIATION FIELD-LEVEL MAINTENANCE

7-107. 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 ASB provide field-level maintenance throughout the CAB. The aviation maneuver battalion's aviation maintenance company supports flight companies.

7-108. 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 scheduled and unscheduled aircraft maintenance. The aviation maintenance company also performs maintenance on aircraft components during in-depth maintenance (complex services or phase) or to repair components during unscheduled maintenance.

7-109. 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 who provide technical oversight and safety on all associated maintenance actions to ensure strict adherence to maintenance task performance and inspection.

***Note*:** 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.

7-110. 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 split-based maintenance 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 CAB.

7-111. The ASB's HSC maintenance platoon provides field maintenance support for automotive and ground support equipment for the ASB and HHC brigade in the CAB. Each battalion has an aviation maintenance company or troop and a forward support company or troop. The aviation maintenance company manages the battalion maintenance program, operates a centralized tool room, and performs field level maintenance and scheduled services on aviation equipment. The FSC performs field level maintenance for the ground equipment within the battalion. The aviation support company in the ASB has four platoons; airframe repair platoon, component repair platoon, armament repair platoon, and avionics repair platoon to provide intermediate maintenance for the CAB.

7-112. The theater aviation brigade, expeditionary CAB, and CAB 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 an HHC, a distribution company, an aviation support company, and a network support company. The CAB may have attached FSCs.

***Note*:** The HSC is not designed to operate as backup maintenance for the FSC or provide support for low-density equipment that is beyond the FSCs' capabilities.

7-113. 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, C&E, and field-level maintenance operations for organic ground equipment. Each FSC has a maintenance section to support the battalion's ground equipment.

7-114. The FSC's maintenance platoon headquarters provides 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 depend on the ASB HSC 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.

AVIATION SUSTAINMENT-LEVEL MAINTENANCE

7-115. Sustainment-level maintenance consists of tasks on airframes or components that cannot be performed by the CAB 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.

7-116. 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 can perform 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.

7-117. 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 contractors may also augment the theater aviation sustainment maintenance group. These personnel and contractors provide onsite technical assistance and engineering support for major field modifications, nonstandard repairs, or major battle damage.

7-118. 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 AMCOM.

7-119. The Corpus Christi Army Depot and the Letterkenny Army Depot facilitate depot support. The 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, including the AH-64 target acquisition designation sight/pilot night vision sensor and aviation ground power unit reset and overhaul. For additional information regarding aviation maintenance, see ATP 3-04.7 and FM 3-04.

ARMY AIR TRAFFIC SERVICE TACTICAL SYSTEM MAINTENANCE

7-120. The air traffic maintenance program is aligned with standard Army maintenance regulations and Federal Aviation Administration requirements. The alignment of repair functions for field and sustainment level maintenance is unique to the Army air traffic service (ATS) maintenance strategy. 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.

7-121. 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 from an accredited air traffic control maintenance school in accordance with AR 95-2.

7-122. 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.

7-123. There are three types of tactical units staffed with personnel certified to perform maintenance on tactical ATS equipment and certify the equipment is operating within prescribed standards:

- General support aviation battalion ATS company.
- Airfield operations battalion.
- ATS maintenance detachment.

7-124. 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 or 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 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. See ATP 3-04.6 for further information on ATS maintenance operations.

MEDICAL DEVICE MAINTENANCE

7-125. Medical planners must understand the organic medical device maintenance capabilities of medical units throughout the AO. Planners properly scale resources to ensure that they support the mission and avoid interruptions in the availability of essential medical devices.

7-126. All activities owning medical devices use GCSS-A for medical maintenance operations and management. They ensure that all scheduled and unscheduled maintenance transactions are captured accurately. Over 98 percent of Army medical devices are COTS and often require nonstandard medical device repair parts that are not part of the medical catalog. Units requiring nonstandard repair parts can obtain instructions for ordering these parts through the Army Medical Logistics Command web site.

ECHELONS ABOVE BRIGADE MEDICAL SUPPORT

7-127. The medical logistics management center provides centralized, strategic-level management of critical class VIII materiel, patient movement items, optical fabrication, contracting, and medical maintenance support. When deployed, the medical logistics management center forward support team is assigned to the medical command (deployment support) and co-locates with the DMC of the TSC or ESC. The medical maintenance management division is responsible for the theater medical 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 medical device evacuation policies. See ATP 4-02.1 for additional information on medical equipment maintenance formations and capabilities.

7-128. The theater lead agent for medical materiel and the operational medical logistics company provide theater medical logistics capabilities. These organizations have the personnel and expertise to provide field and sustainment-level medical device maintenance support to units on a direct support or area basis. These formations also maintain theater assets for medical device exchange and equipment calibration, and they manage critical medical device repair parts needed to maintain medical devices used in theater. Theater medical maintenance functions include conducting maintenance operations and providing contact repair teams to support forward units. They also include managing or coordinating contractor support provided by

theater or national-level contracting activities. The Army Medical Logistics Command must approve the use of field and sustainment contract maintenance for materiel fielded under the MTOE.

7-129. The medical logistics company assigned to the medical battalion (multifunctional) provides direct support for class VIII materiel and medical device maintenance and repair to EAB medical units operating within the supported area. The medical logistics company's maintenance platoon provides field maintenance support to units that do not have organic biomedical equipment specialists assigned or attached and are not supported by biomedical equipment specialists from other units. The medical logistics company has three medical maintenance contact repair teams.

BRIGADE COMBAT TEAM MEDICAL DEVICE MAINTENANCE SUPPORT

7-130. Medical device maintenance support for battalion aid station and ground ambulance equipment is coordinated through the brigade support medical company. The medical platoon leader prepares a medical maintenance support plan ensures that Soldiers perform operator maintenance on assigned equipment. The plan is then coordinated with the brigade support medical company. When a repair is needed, Role 1 medical activities and their supported battalions are responsible for transporting equipment to the brigade support medical company.

7-131. The brigade support medical company has an assigned 68A biomedical equipment specialist who can normally provide field-level maintenance for organic medical devices within the brigade. 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 device maintenance for the medical platoons in the BCT. For additional information on the brigade support medical company, see ATP 4-02.6. For additional information on medical maintenance capabilities and class VIII, see ATP 4-02.1.

7-132. The brigade medical supply office provides primary field maintenance for the brigade support medical company and may provide emergency medical device maintenance for the medical platoons in the BCT. It is responsible for the oversight and reporting of all medical devices within the brigade to the supporting medical logistics company. The brigade medical supply office carries minimal medical device repair parts.

7-133. Units within the BCT that do not have organic medical device repair capabilities will coordinate with the brigade medical supply office for field and sustainment maintenance from the medical logistics company.

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 70º Fahrenheit. Desert terrain varies from place to place; the common characteristic 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 for 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 should train drivers to judge terrain and 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 should train their operators 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 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.

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. Crews/operators must keep cooling hoses tight (one drip per second amounts to seven gallons in 24 hours). They should not remove hood side panels from engine compartments while the engine is running. This causes turbulence and leads to ineffective cooling.

A-9. Crews/operators 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 should 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. Crews/operators must ensure working pressure of all equipment is within safety limits and exercise caution 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. Crews/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. Crews/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.

RADIANT LIGHT

A-12. Radiant light or its heat effect may be detrimental to plastics, lubricants, pressurized gases, some chemicals, and infrared tracking and guidance systems. Crews/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-13. 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. Crews/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. Screens against flying sand are essential. They also provide shade for mechanics.

A-14. 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. Crews/operators should protect all cables before insulation becomes worn.

A-15. 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. Crews/operators should carry a brush (for example, an old toothbrush) to brush out such items before joining.

A-16. 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 and should be dusted 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 nonstandard hardware. Nonstandard hardware is often extremely sensitive to extreme environments, including excessive dust that can cause overheating.

A-17. Sand and dust accumulation may cause weapons to clog or missiles to jam on launching rails. Sand or dust-clogged barrels can lead to in-bore detonation. Keep muzzles covered by a thin cover so explosive projectiles fire through the cover without risk of explosion. Soldiers need to cover missiles on launchers until just prior to launch. Working parts of weapons should 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-18. 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 hydroscopic material. Keep those in use in places where free air can circulate around them and purge them at frequent intervals.

A-19. 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-20. 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 areas on an equipment such as optics and air tanks. Check applicable TMs and SOPS regarding condensation buildup under abnormal conditions. Crews or operators should clean optics frequently. Weapons, even if not lubricated, will accumulate sand and dirt due to condensation and should be cleaned daily.

A-21. 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-22. When using computers, the crew/operator should use special care when using nonstandard hardware to prevent heat-related damage to the logistics system hardware computer systems. Nonstandard hardware has minimum and maximum operating temperatures that should be observed at all times.

CORROSION PREVENTION

A-23. Operators, crews, and maintainers are challenged with various weather conditions that will have significant impact on equipment if not properly maintained. One way equipment could be impacted is the development of corrosion on assemblies to end items caused by factors such as humidity, moisture, and dust. During PMCS, Soldiers should identify all corrosion faults and annotate them to be corrected. Some metals like corroded battery posts and weapons rust can be corrected on the spot, but other corrosion faults may require more maintenance from an institutionally trained maintainer up to the depot level. When performing maintenance, follow TM procedures for proper lubrication, protection guidelines, surface cleaning, and repairing of metal. The TM will illustrate what can be performed in accordance with the MAC chart to repair corrosion on areas where metal is damaged due to extreme conditions from the environment (see AR 750-1 and AR 750-59 for more information on corrosion).

A-24. Commanders will appoint unit corrosion monitors to perform duties such as ensuring unit training personnel maintain training and performance records for the unit's Corrosion Prevention and Control Program and monitoring the techniques and proficiency of unit personnel accomplishing corrosion prevention program functions. This includes spot checks of chemicals used, proper dilution of cleaning

compounds, and proper application of corrosion inhibiting compounds and water displacing compounds. The unit corrosion monitor will work with maintenance supervisors, QA, supply, and maintenance technicians to determine the effectiveness of the unit's Corrosion Prevention and Control Program. The Army will ensure corrosion prevention, detection, and mitigation practices during sustainment of the five major commodity areas:

- Aircraft and missile systems, to include support equipment.
- C&E equipment.
- DOD military munitions and associated equipment.
- Tactical and combat vehicles to include armament.
- Soldier equipment and other ground equipment.

STATIC ELECTRICITY

A-25. Static electricity is common in every environment to include the desert. In the desert it is 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. Soldiers must reduce the possibility of static electricity by bonding and grounding equipment including fuelers, generators, and shelters. See TC 6-02.6 for more information on bonding and grounding equipment.

WINDS

A-26. The velocity of desert winds can be destructive to large, relatively light material such as aircraft, tents, and antenna systems. To reduce wind damage, Soldiers should use given terrain protection and firmly picket items to the ground.

DESERT MAINTENANCE

A-27. Units should 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 type, security, and limitations of field-expedient recovery techniques (for example, the distance and time that one tank is allowed to tow another may vary considering the heat buildup in transmissions in this environment).

A-28. The recovery plan should include locations of MCPs for equipment that cannot be repaired forward. These points should be located where they can be reached by heavy equipment transporters, which may require the recovery vehicle to perform a longer than normal tow. 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 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.

LOCATION

A-30. Operation of materiel in temperatures down to –10° Fahrenheit presents few problems. Conditions are similar to those in the northern portions of CONUS during the winter. Operations become more difficult in temperatures ranging from –10º to –40º Fahrenheit.

A-31. Proper maintenance and training will prevent failures of materiel and injuries to personnel. When the temperature is below –40º Fahrenheit, operations become increasingly difficult. At temperatures near –65º

Fahrenheit, the maximum efforts of well-trained personnel are required to perform even a simple task with completely winterized materiel.

A-32. 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 in extreme cold weather environments 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 periods become rigid when cold, causing flat spots. At extremely low temperatures, sidewalls become brittle and crack. Plastics expand and contract much more than metal or glass. Soldiers should 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 to avoid system failure (see TM 4-33.31).

COLD WEATHER MAINTENANCE

A-35. Maintenance of mechanical equipment is exceptionally difficult during cold weather. Maintainers cannot complete automotive and other mechanical maintenance with normal speed because they need to warm up equipment before making repairs. Routine tasks require additional time. This time lag cannot be overemphasized and 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 routine operations such as handling latches or opening engine enclosures becomes frustrating and time-consuming with gloves. At temperatures below –20º 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 in place 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, maintenance man-hours will increase from 25 to 500 percent above normal requirements. When buildings are not available, maintainers can use maintenance tents as a temporary shelter. 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 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 needs to 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 the same amount of time in moderate temperatures.

A-42. An additional supply of battery chargers needs to 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 cold weather injuries 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 cold weather injuries. Place insulating material such as fiber packing material, corrugated cardboard, rags, or tarpaulins between the repairer and the equipment.

A-45. When performing maintenance under arctic weather conditions, use a box or a pan to hold small parts. Use 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 need to adjust for 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 need to identify repair parts that deteriorate or wear out faster in the jungle environment. The shop stock or bench stock must reflect the increased turnover of these parts.

JUNGLE MAINTENANCE

A-49. In the jungle, maintenance units operate essentially the same way as in other operations. High humidity and temperatures in jungle areas may tax maintainers. PMCS on any items affected by moisture and heat is extremely important. The shop stock or bench stock needs to be increased to ensure responsive maintenance support.

TRANSPORTATION

A-50. Maintenance units should consider using 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 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. 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, the possibility of lost cargo under the jungle canopy, vulnerability to local enemy air defense, and requirements for locally 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 should 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 vulnerability; however, it may cause problems with command, control, and local security. Since support units will be high-priority targets, they should have adequate protection against ground and air attack to ensure continuous operations.

CLASS IX SUPPLY SUPPORT

A-56. In mountain operations, rugged terrain and climate extremes may cause increased consumption of repair parts. Transporters should expedite movement of repair parts into and within the combat area. Maintainers should increase the quantity of high usage rates 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. Move 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. Often, locally obtained animals or individual Soldiers will be required to 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 handling. They are good for emergency resupply and movement of high-priority supplies. 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 employment 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 communications.

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 enemy attack and theft. Refugees may seriously impede or block movement over routes required by FMTs or movement of equipment to MCPs. Maintenance units may take advantage of hard stands, overhead lift, installed communication systems, and maintenance facilities existing in their areas of operation.

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 onsite is extremely important in urban operations. Leaders need to 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 may have to 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 make 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 pre-position equipment, tools, and repair parts to allow ready access, identification, and handling at night. Procedures for night movement and relocation stress light discipline and camouflage.

PROCEDURES

A-68. Using night vision devices, maintenance elements repair and return to service those critical items within their repair capability. Maintainers use 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-69. 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-70. Maintainers conduct night recovery operations 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 should 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 use automation systems for maintenance management.

GLOBAL COMBAT SUPPORT SYSTEM-ARMY

B-1. GCSS-Army is a web-based system for sharing data, information, and information technology. GCSS-Army is utilized across tactical, operational, and strategic echelons and is the system of record for Army maintenance.

OPERATIONAL CHARACTERISTICS

B-2. 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 Soldier. 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 provides visibility and allows interaction with all levels of execution and management.

PLANT MAINTENANCE OPERATIONS

B-3. 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. This is 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 and preventive maintenance are planned to ensure equipment readiness and accurately account for labor hours. Part of the planning process is scheduling the creation of notifications for planned and preventive maintenance. Notifications are one of the primary means of tracking equipment maintenance in GCSS-Army.
- Maintenance processing. This is 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. Soldiers will use a DA Form 5990-E or DA Form 2407 to initiate work orders. Work orders are the instructions for the performance of maintenance tasks.

B-4. GCSS-Army has numerous benefits for Army maintainers. 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 and inspection requirements.

- Standardized maintenance plans for use across the Army.
- Permanent personnel qualification records available from unit to unit.
- Improved reporting for planning, execution, and readiness.

MAINTENANCE FUNCTIONS

B-5. GCSS-Army supports the following maintenance functions:

- Maintenance management.
  - Managing and maintaining equipment notifications.
  - Maintaining work orders and the work order register.
  - Managing and maintaining tasks.
  - Preserving scheduled services and maintenance data.
  - Maintaining operational and historical information.
  - Updating equipment records.
  - Managing and maintaining man-hour accounting.
- Maintenance operations.
  - Equipment management.
  - Equipment and vehicle dispatching.
  - Operational readiness float transaction.
  - Creation of work orders and work order task listings.
  - Closing work order tasks and work orders.
  - Performing corrective action and determining level of maintenance required.
  - Performing final inspections, entering notifications, correcting equipment notifications, and performing quality inspections.
- Supply management.
  - Requesting repair parts and turning in materiel, including recoverable items.
  - Managing shop stock and the open orders register.
  - Maintaining the open and closed order registers.
  - Issuing repair parts, managing storage locations, and managing materiel resource planning.
- Personnel management.
  - Creating work centers.
  - Updating personnel data.
  - Maintaining personnel qualification records.
  - Maintaining skills and qualifications data.
- Readiness reporting.
  - Army materiel status system reports.
  - Equipment projection reports.
  - Non-mission-capable reports.
  - Shop supply listings and reviews.
  - Aggregate logistics reports.
  - 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.

  - The digital logbook.
- Ad hoc queries and custom reports.
- System utilities.
  - Receiving equipment data updates, subscribing to information, and receiving safety of use messages.
  - Posting information, downloading aircraft sensor data, and managing outputs.
  - Monitoring equipment situation reports – equipment view (maintenance cockpit).

EQUIPMENT SITUATION REPORT

B-6. 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 users to perform 90% of their unit maintenance operations to include—

- Creating a fault/notification and work order.
- Requesting repair parts.
- Dispatching a vehicle and printing a DA Form 5988-E.
- Viewing a service schedule.
- Viewing equipment availability.
- Viewing equipment usage.
- Viewing shop stock on hand.
- Viewing parts available at the SSA for work orders.
- Updating service schedule.
- Viewing and changing weapon system and subsystem configuration.
- Viewing serial numbers of vehicle and equipment requiring serial number tracking.
- Installing and dismantling components (engines and transmissions).

B-7. From the equipment situation report, users can 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-8. This process facilitates managing and tracking items with a serial number or other unique identification. The remove and 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 unit supply sergeant initiate the movement of equipment that results in the dismantling and the installation of a weapon system.
- The maintainer uses the appropriate training materials for dismantling and installing components of a weapon system from the specified functional locations' structure.
- Supervisors and managers are informed when the process is complete. Maintainers should also contact the property book officer if the weapon system configuration maintenance performed was due to a property book requirement. The property book office needs to check the financial accuracy of the property book transfer and the weapon system configuration maintenance that was completed.

Dispatch Equipment

B-9. The dispatching process in GCSS-Army provides a validation check of the operator or 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 or 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 or 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-10. 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 a 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 to the operator/crew to perform the PMCS. This process also allows the user to determine if the operator/crew is qualified to operate the equipment.
- After approval (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-11. Users perform this transaction if there is a need to reactivate a deactivated maintenance plan. Users can use maintenance plans to merge the records of specific service items, intervals, task lists, and measuring points that generate a recurring maintenance schedule. Users establish parameters and system monitoring requirements in the maintenance plan with the maintenance schedule. The monitoring of this maintenance event schedule is based on the counter and date requirements.

Process Army Oil Analysis Program O1 Notification – Normal Lab Result

B-12. Users use 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 the user to locate the appropriate notification and 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.
- After the lab returns a normal result, the unit closes the oil sample notification 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 that remains open until it receives normal results (resample) or lab results indicating a problem. Problem results may indicate that an engine or transmission requires replacement.

Notification and Work Order Processing

B-13. 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

work 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:

- When creating a preventive 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 materiel availability for a work order, if the item is not in stock, materiel requirements planning uses the reservation to create a purchase requisition to order it.
- 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-14. Use this transaction to display the inbound deliveries ready for pickup at the SSA. The inbound delivery process begins with staging the goods for the unit at the SSA in the unit customer bin or initiating 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 putting away of the materiel at the unit. When it is ready for pickup, the user posts a goods receipt with the automatic identification technology device or a desktop application. The posting of the materiel goods receipt increases the unit's inventory.

Physical Inventory – Shop Stock

B-15. This transaction inventories all items assigned to a unit's storage location and creates physical inventory documents. Generate documents based on the 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—This includes creating and printing a physical inventory document, which is the count sheet for counting inventory. Soldiers use the physical inventory document throughout the entire process, and it assigns materiel to a physical inventory within a storage location.
- Perform physical inventory—This includes 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—This includes posting a physical inventory document and explains why the document must be posted and what the posting does.

Manage Bench Stock

B-16. Bench stock refers to low-cost, high-use consumable class II-IV and IX items used by maintenance personnel at an unpredictable rate (for example, common hardware and repair kits). Units should maintain bench stock to ensure availability. Use this transaction to change bench stock materiel requirements planning type and safety stock requirements. Safety stock is the quantity of stock maintained to fulfill demand and prevent materiel shortages. The maintainer can verify the current on-hand balance of bench stock in GCSS-Army and effectively consume it. Users should verify the current bench stock level in GCSS-Army prior to consumption. This value determines the amount of the bench stock materiel that is to be consumed.

Users must post a goods issue to consume the materiel inventory. The next materiel requirements planning run replenishes bench stock if the inventory falls below the safety stock level requirements.

Forms and Reports

B-17. 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 and closed notification/work orders (faults).
- Equipment status reports.
- Open and closed document control registers.
- Usage reports.
- Service schedules.
- List of parts received and not installed.
- Equipment maintenance and inspection worksheets, DA Form 5988-E. Used to document faults or shortcomings discovered during PMCS or other maintenance activity inspections and record 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.
- Alert dispatch DA Form 5987-1-E. The alert dispatch DA Form 5987-1-E can capture multiple equipment operators and equipment usage events when a piece of equipment is alert dispatched.
- 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 deadlined, including status, work order, and deadline aging information. Maintainers can identify the notifications and work orders for equipment undergoing repairs and monitor materiel requirements, quantity ordered, received, on hand, and issued to the work order.

Record Man-Hours

B-18. This process accounts for direct man-hours performed at the work order level in GCSS-Army. A supervisor or manager can account for indirect man-hours against a work center using the cross-application time sheet transaction codes.

Maintain Preventive Maintenance Schedule and Record

B-19. The service schedule process in GCSS-Army provides the ability to create and assign a service schedule to equipment or a vehicle. Services performed and entered into GCSS-Army become a permanent record on the equipment master record.

General Task List

B-20. General task lists are required when a new major assembly or subassembly is delivered into inventory or when 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, operators can drill down to change a general task list. A general task list can be modified to meet the specific maintenance requirements of the associated materiel or national item identification number.

Equipment Task List

B-21. 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, search and display

a list of equipment task lists. From the resulting list, 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-22. Functional location task lists identify the unique maintenance tasks performed on a particular piece of equipment installed in a functional location. This functions the same way as the equipment task list. Maintainers use 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-23. The process is explained in the example below:

- The operator/crew conducts PMCS at the platform.
- The operator/crew identifies two NMC faults at the platform and annotates the faults on the DA Form 5988-E.
- The DA Form 5988-E is turned into the section, and the maintenance section NCO in charge reviews the inspection work sheet for completeness.
- The operator supervisor reviews the DA Form 5988-E before the form is digitally updated in GCSS-Army, creating a notification for each fault identified on the maintenance inspection work sheet. Prior to the 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 and notifications identified by the operator or crew on the DA Form 5988-E and to identify the action required to correct the fault or notification.
- Maintainers verify faults and notifications and correct the faults if the required parts are on hand. Maintainers account for the man-hours required to conduct the repair on the DA Form 5988-E.
- The maintainer verifying the faults and notifications identifies those requiring repair parts. The maintainer adds the national item identification number, also known as (NIIN), to the DA Form 5988-E. The motor sergeant, shop foreman, or equipment record parts specialist enters the information from the DA Form 5988-E into GCSS-Army.
- Man-hours must be accounted for by creating a work order for any fault or notification or for requesting repair parts.
- 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 unit's shop stock, GCSS-Army notifies the user that the materiel 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 materiel and places it in the requesting unit's bin or ships the part to the unit, the requesting unit can see the class IX parts placed in their bin or shipped.
- The requesting unit receives the repair parts from the supporting SSA and processes the materiel by receiving the item and issuing it to the work order.
- After the unit receives the materiel, the maintenance shop issues it to the mechanic for installation onto the vehicle or equipment. After the installation has been completed, the mechanic turns in the DA Form 5988-E to the motor sergeant, shop foreman, or equipment record parts specialist.
- The motor sergeant, shop foreman, or equipment record parts specialist updates the notification or fault in GCSS-Army. The notification/fault and work orders are then cleared and closed in GCSS-Army.

Dispatching

B-24. The dispatch process is explained in the example below:

- The motor sergeant, shop foreman, or equipment record parts specialist can create a dispatch for the vehicle or equipment in the location.

- After the operator or crew has completed a 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 FMT NCOIC reviews the platform inspection work sheet and assigns the inspection work sheet to the FMT to verify or repair the notification.
  - The FMT verifies repair parts required for platform, annotates them on the inspection work sheet, and turns them in to the FMT's NCOIC.
  - The FMT NCOIC reviews information on the inspection work sheet before giving the inspection work sheet to the FMT's equipment record parts specialist.
  - The motor sergeant, shop foreman, or equipment record parts specialist selects the vehicle or equipment from the maintenance cockpit; selects the dispatch button; enters the return date and time, reason for the dispatch, the operator's name or identification number; and saves the data.
  - GCSS-Army verifies if the individual is qualified to dispatch the vehicle or equipment by confirming that the individual meets all the training requirements identified in AR 600-55. 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 or equipment, an automated notification is generated in GCSS-Army and forwarded to the commander only, allowing the commander to approve the vehicle or equipment for limited operations.
  - If local SOP requires a commander's or executive officer's approval, GCSS-Army can send an automated notification within 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-25. GCSS-Army produces equipment readiness reports for ground, missile and aviation, and watercraft required for the monthly equipment readiness report. Every day, GCSS-Army produces near-real-time reportable equipment readiness data that is available at logistics support activities. 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.

B-26. Reports are available 24 hours following the end of the report period. The report begins on the 16th of each month and ends on the 15th of the following month. Commanders can enter commander's comments throughout the reporting period and up to 24 hours following the end of the reporting period. The commander cannot change the reported data. GCSS-Army provides the capability to rollup reporting battalion equipment status and process to the unit readiness officer for inclusion in the monthly unit status report.

OPERATIONAL LOGISTICS PLANNER

B-27. The Operational Logistics Planner, also called OPLOG planner, is a web-based interactive tool that assists commanders and staffs from theater strategic through operational levels to develop logistics estimates. It is designed to support operations typically associated with multiphase operations, plans, and orders. It enables maintenance planners and staffs to develop estimated mission requirements for supply classes II, VII, and 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-28. Planners can use predefined default planning rates or customize rates based on what a unit is experiencing. Operational Logistics Planner generates the 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.

TMDE MANAGEMENT INFORMATION SYSTEMS

B-29. USATA has two TMDE maintenance management systems to maintain visibility and accuracy of all TMDE performance transactions. The Test, Measurement, and Diagnostic Equipment Management Information System (known as TEMIS) and Test, Measurement, and Diagnostic Equipment Integrated Materiel Management System (known as TIMMS) are USATA's automated systems of record used to manage all TMDE activity across the Army.

TMDE MANAGEMENT INFORMATION SYSTEM

B-30. The Test, Measurement, and Diagnostic Equipment Management Information System is designed, managed, and maintained by USATA and dedicated to the total TMDE C&RS data collection, storage, and analysis. The system also provides the software programming needs for production control processes, financial management, and management data information requirements in support of the TMDE C&RS program.

TMDE INTEGRATED MATERIEL MANAGEMENT SYSTEM

B-31. As an integral part of the Test, Measurement, and Diagnostic Equipment Management Information System, the USATA-managed Test, Measurement, and Diagnostic Equipment Integrated Materiel Management System provides the C&RS activities with site-specific software to identify TMDE for recall, provide customer notification of equipment readiness, process equipment through the C&RS shops, account for customer equipment while in the shop, and identify repair parts and associated cost.

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Appendix C

Maintenance Allocation Charts and Parts Codes

This appendix discusses both current and legacy MAC charts. It also describes uniform source, maintenance, and recoverability codes.

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. The MAC designates overall authority and responsibility for the performance of maintenance functions on an item.

C-2. As of the date of this publication, the MACs in some TMs do not reflect the change to two-level maintenance (refer to AR 700-82). Figure C-1 on page C-2 displays a MAC from a two-level maintenance-compliant TM. Figure C-2 on page C-3 gives an example of a MAC found in legacy TMs.

C-3. Maintainers perform tasks in accordance with the MACs. Field maintenance organizations are authorized to perform all maintenance tasks coded C, O, and F as outlined in equipment TM MACs when skilled maintainers; required sets, kits, and outfits; tools; TMDE; 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 MACs when skilled maintainers; required sets, kits, and outfits; tools; TMDE; 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 MACs.

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
		Repair		1.8			1, 2	F
		Repair			2.0		1, 2, 3, 4, 5	G, J
		Repair				2.0	1, 2, 3, 4, 5, 6, 7, 8	H
0101	Print Circuit Board, TP-34							
010101	E-EB01	Inspect		0.1				A
		Replace		0.5			1, 3	A
		Test				1.0	1, 2, 3, 6, 7, 8	I
		Repair		0.5			1	
		Replace				2.0	1, 2, 3, 4, 6, 7, 8	G
010102	Switching Assembly	Inspect	0.1	0.1			1	A
		Replace	0.5	0.5			1	
		Test				1.0	1, 2, 3, 6, 7, 8	
		Repair				2.0	1, 2, 3, 4, 6, 7, 8	H
02	Logic Unit, STB-34	Inspect	-					A
		Test	-					E
		Repair		1.0			1, 2	F
		Repair			2.0		1, 2, 3, 4, 5	

SAMPLE

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

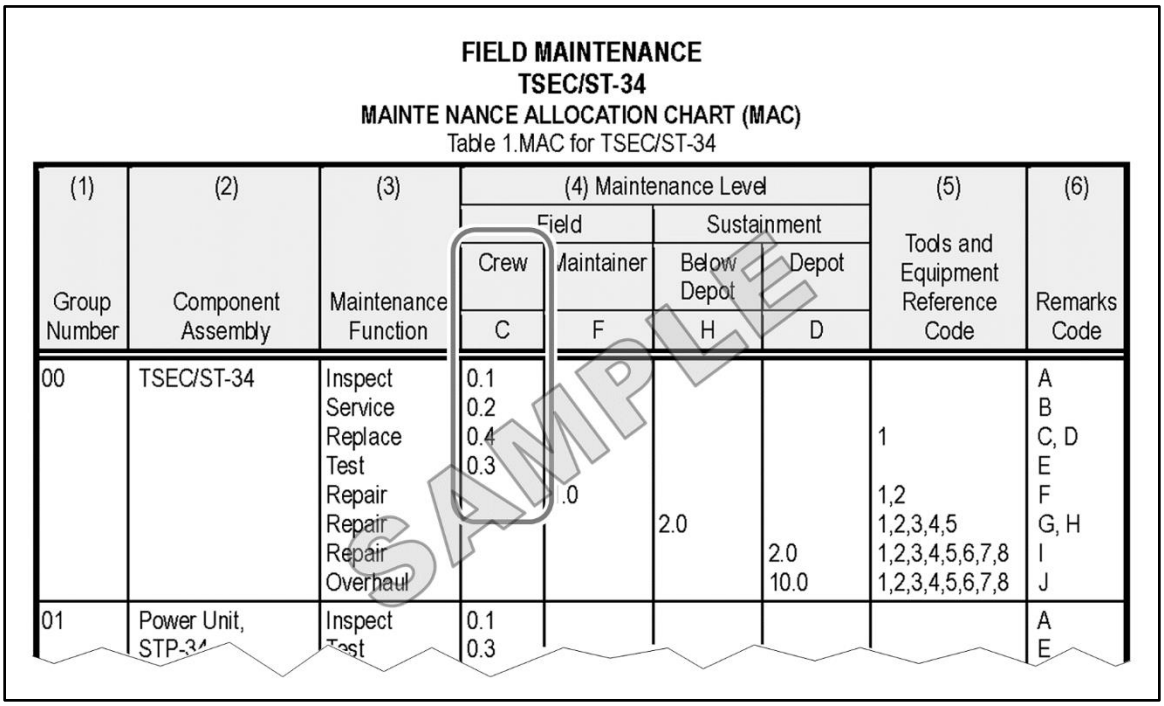
SAMPLE

Figure C-2. Example of legacy MAC

C-5. Each column of the MAC gives pertinent information to all users. Each column is explained below:

- Column 1—Group Number: Lists 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 all functions listed as H and D. If no time is present, maintenance at that level is not authorized.
- Column 5—Tools and Equipment: Names, common tool sets, special tools, and test or support equipment required to perform the designated function.
- Column 6—Remarks: Lists references to the page at the end of the MAC.

C-6. Figure C-3 on page C-4 depicts a MAC 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 subdivided 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 MACs.



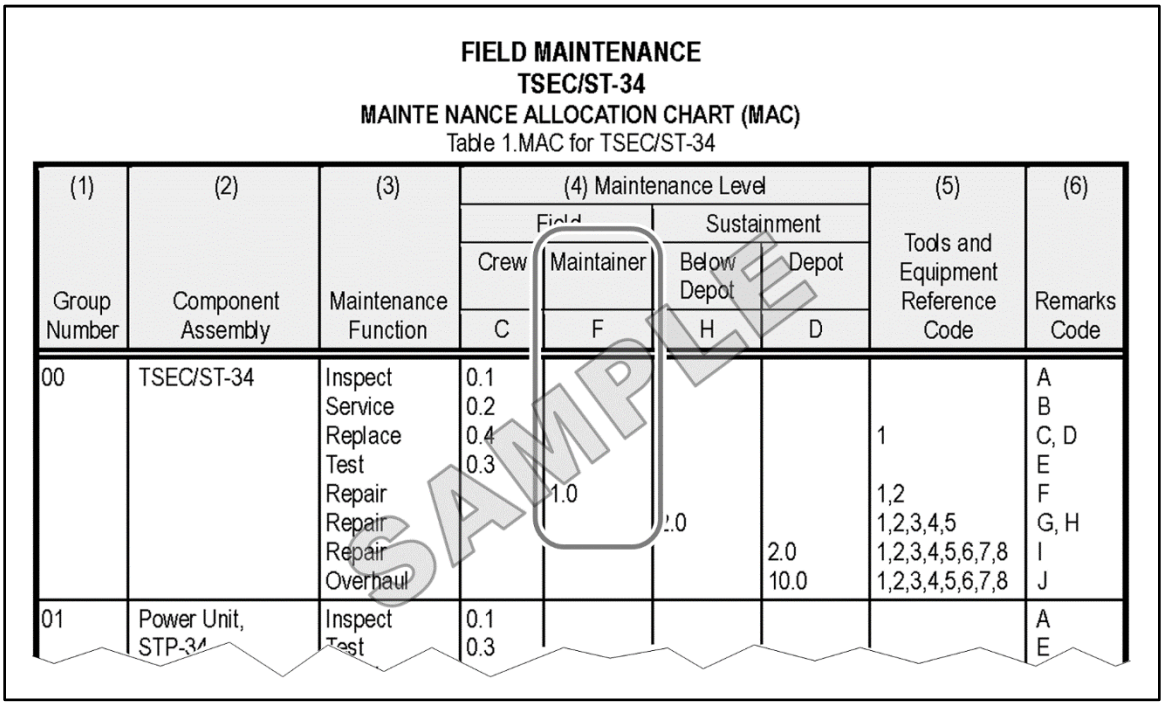
FIELD MAINTENANCE
TSEC/ST-34
MAINTE NANCE ALLOCATION CHART (MAC)
Table 1.MAC for TSEC/ST-34

(1)	(2)	(3)	(4) Maintenance Level				(5)	(6)
			Field		Sustainment			
Group Number	Component Assembly	Maintenance Function	Crew C	Maintainer F	Below Depot H	Depot D	Tools and Equipment Reference Code	Remarks Code
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

SAMPLE

Figure C-3. MAC with system operator or crew member field-level maintenance tasks circled

C-7. Figure C-4 depicts a MAC showing field maintenance performed by institutionally 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 subdivided by “Field” and “Sustainment”, each of which are further subdivided. Field maintenance tasks performed by maintainers are aligned with the “Field/Maintainer/F” sub-column.



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

(1)	(2)	(3)	(4) Maintenance Level				(5)	(6)
			Field		Sustainment			
Group Number	Component Assembly	Maintenance Function	Crew C	Maintainer F	Below Depot H	Depot D	Tools and Equipment Reference Code	Remarks Code
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

SAMPLE

Figure C-4. MAC with field-level maintenance performed by a maintainer circled

Note: Legacy MACs 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 C-5 depicts a legacy MAC with the "O" sub-column.

MAINTENANCE ALLOCATION CHART

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

SAMPLE

Figure C-5. Legacy MAC with tasks associated with organizational level maintenance circled

C-8. Figure C-6 depicts a MAC showing sustainment maintenance performed below 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 subdivided by "Field" and "Sustainment", each of which are further subdivided. Sustainment maintenance tasks performed by DOD Civilians or contractors are aligned with the "Sustainment/Below Depot/H" sub-column. Items are returned to the supply system after maintenance is performed at this level.

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

(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Level Field Crew C	Field Maintaine F	Sustainment Below Depot H	Sustainment Depot D	(5) Tools and Equipment Reference Code	(6) Remarks Code
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

SAMPLE

Figure C-6. MAC with sustainment-level maintenance below depot-level tasks circled

C-9. Figure C-7 on page C-6 shows a MAC 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 subdivided 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.

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

(1)	(2)	(3)	(4) Maintenance Level				(5)	(6)
			Field		Sustainment			
			Crew	Maintainer	Below Depot	Depot	Tools and Equipment Reference Code	Remarks Code
Group Number	Component Assembly	Maintenance Function	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			,2	F
		Repair			2.0		,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-34	Inspect	0.1					A
		Test	0.3					E

SAMPLE

Figure C-7. MAC with sustainment-level maintenance tasks at the depot level circled

TIME

C-10. All maintenance functions (Column 3) have an associated maintenance level with an estimated amount of time allotted to complete the task. (Column 4). This time estimate is found under the sub-columns and indicates the level of the work. The projected time is broken out in 6-minute increments. For example, .1 = 6 minutes, .5 = 30 minutes, and 1 = 60 minutes.

C-11. For example, in Figure C-8, an operator or crew field maintenance-level inspection of the TSEC/ST 34 should take 6 minutes. The task requires no tools or equipment, and the maintainer can find the applicable reference on page A after the MAC.

***Note*:** Tasks without a specified time listed under a maintenance level indicate that the maintenance level is not authorized to conduct the task. For example, in Figure C-8, the repair task for the TSEC/ST-34 is not authorized for crew and operators. A maintainer conducts this task.

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

(1)	(2)	(3)	(4) Maintenance Level				(5)	(6)
			Field		Sustainment			
Group Number	Component Assembly	Maintenance Function	Crew C	Maintainer F	Below Depot H	Depot D	Tools and Equipment Reference Code	Remarks Code
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

SAMPLE

Figure C-8. Example of two-level MAC with the operator/crew inspection circled

LOCATION

C-12. MACs are found in equipment TMs that contain field-level (-12, -13, -14, -20, -23, and -24) maintenance procedures. Some recently fielded complex weapon systems have separate manuals for the MAC. In those instances, the TM has the same first eight digits as other series manuals, followed by "MAC".

FUNCTIONS

C-13. Many functions are essential to ensure that equipment sustains its service life. Maintenance functions are defined as follows:

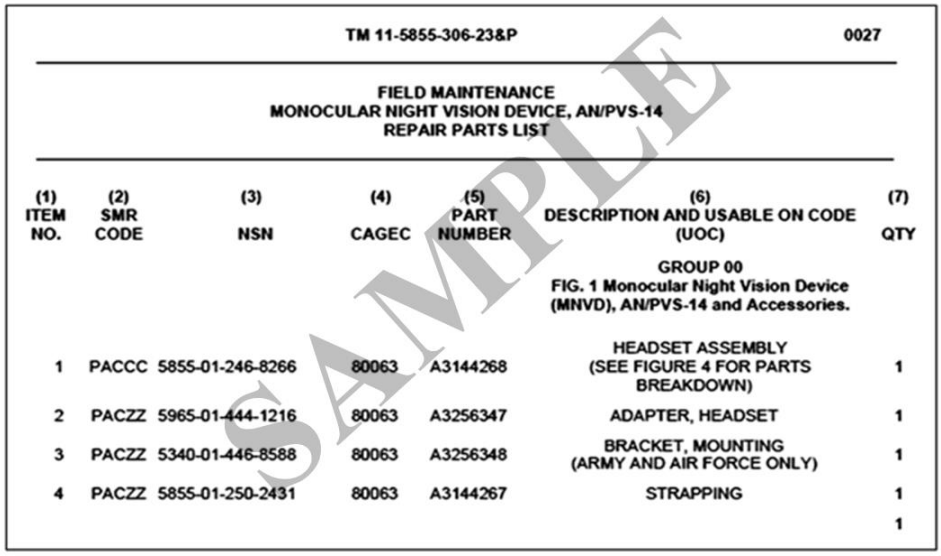
- Inspect—To determine the serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards through examination. This includes scheduled inspections, gauging, and evaluation of cannon tubes.
- Test—To verify serviceability by measuring the mechanical, 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. This consists of comparisons of two instruments, one of which is in a 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. Installing 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 MAC 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 and troubleshooting, removal and installation, disassembly and assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item. This is done 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 and operational condition as required by maintenance standards in appropriate technical publications. Overhaul does not normally return an item to like-new condition.
- Rebuild—Those services or actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing tolerances.

UNIFORM SOURCE, MAINTENANCE, AND RECOVERABILITY CODES

C-14. The Army uses source, maintenance, and recoverability codes to communicate maintenance and supply instructions to the various support levels and using commands for the logistics support of systems, equipment, and end items. These codes are found in 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 are based on the logistics support planned for the end item and its components. Figure C-9 provides an example of where the source, maintenance, and recoverability codes are located within a TM.



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
						1

SAMPLE

Figure C-9. Example of source, maintenance, and recoverability codes

C-15. The source, maintenance, and recoverability code is a five-character code. The first two characters explain the acquisition of the repair part for replacement purposes. The third character identifies the level of maintenance authorized to use, remove, and replace the item. The fourth character identifies the level of maintenance or maintenance activity with the capability to repair the item. The fifth character identifies the method of disposition (turn-in or dispose) for the item. Table C-1 provides a breakdown of source, maintenance, and recoverability codes. Source maintenance and recoverability codes are also used by the U.S. Air Force, U.S. Navy, and U.S. Marine Corps. See AR 700-82 for guidance on the use of each code.

Table C-1. Uniform source, maintenance, and recoverability code format

Source Code	*Maintenance Code*		*Recoverability Code*	*Service Option Code*
Positions (1) and (2)	**Position (3) Use Code**	**Position (4) Repair Code**	**Position (5)**	**Position (6)**
Indicates the manner of acquisition for support items.	Indicates the level of maintenance or maintenance activity authorized to use, remove, and replace the item.	Indicates whether the item is to be repaired and identifies the level of maintenance or maintenance activity that can complete a repair action.	Indicates the level of maintenance and/or maintenance activity authorized to dispose of the item. If the item is repairable, it also indicates repair as applicable under the progressive maintenance concept.	Reserved; Service unique. Modifies or clarifies the source, maintenance, and recoverability code as required by the individual Service. Used to convey Service-specific information to the logistics community and the operating forces.

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Glossary

The glossary lists acronyms and terms with Army or joint definitions. For terms where Army and joint definitions differ, (Army) precedes the definition. Terms for which ATP 4-33 is the proponent are marked with an asterisk (*). For other terms, the proponent publication is listed in parentheses after the definition

SECTION I – ACRONYMS AND ABBREVIATIONS

ADA	air defense artillery
ADP	Army doctrine publication
AFSB	Army field support brigade
AFSBn	Army field support battalion
AMCOM	United States Army Aviation and Missile Command
AO	area of operations
AOR	area of responsibility
APS	Army pre-positioned stocks
AR	Army regulation
ARNG	Army National Guard
ASA(ALT)	Assistant Secretary of the Army for Acquisition, Logistics, and Technology
ASB	aviation support battalion
ASC	Army Sustainment Command
ASCC	Army Service component command
ATP	Army techniques publication
ATS	air traffic service
BCT	brigade combat team
BDAR	battle damage assessment and repair
BSA	brigade support area
BSB	brigade support battalion
C&E	communication and electronics
C&RS	calibration and repair support
CAB	combat aviation brigade
CECOM	United States Army Communications-Electronics Command
CICO	classification and inspection company
CLSE	corps logistics support element
COMSEC	communications security
CONUS	continental United States
COTS	commercial off-the-shelf
CSSB	combat sustainment support battalion
C-TMDE	civilian test, measurement, and diagnostic equipment

DA	Department of the Army
DA Pam	Department of the Army pamphlet
DIVARTY	division artillery
DLA	Defense Logistics Agency
DLSE	division logistics support element
DMC	distribution management center
DOD	Department of Defense
DSB	division sustainment brigade
DSSB	division sustainment support battalion
EAB	echelons above brigade
ESC	expeditionary sustainment command
FM	field manual
FMC	field maintenance company
FMT	field maintenance team
FSC	forward support company
FSR	field service representative
G-2	assistant chief of staff, intelligence
G-3	assistant chief of staff, operations
G-4	assistant chief of staff, logistics
G-6	assistant chief of staff, signal
GCSS-Army	Global Combat Support System-Army
GTA	graphic training aid
HHC	headquarters and headquarters company
HSC	headquarters and support company
IEW	intelligence electromagnetic warfare
JP	joint publication
LAR	logistics assistance representative
LCMC	life cycle management command
LOGCAP	Logistics Civil Augmentation Program
LOGSTAT	logistics status
LRC	logistics readiness center
MAC	maintenance allocation chart
MCP	maintenance collection point
MDMP	military decision-making process
MDTF	multi-domain task force
MI	military intelligence
MOS	military occupational specialty
MST	maintenance support team
MTL	measurement traceability level
MTOE	modified table of organization and equipment
NCO	noncommissioned officer

NCOIC	noncommissioned officer in charge
NIST	National Institute of Standards and Technology
OE	operational environment
OPCON	operational control
PMCS	preventive maintenance checks and services
QA	quality assurance
QC	quality control
S-1	battalion or brigade personnel staff officer
S-2	battalion or brigade intelligence staff officer
S-3	battalion or brigade operations staff officer
S-4	battalion or brigade logistics staff officer
S-6	battalion or brigade signal staff officer
SFAB	security force assistance brigade
SI	International System of Units
SMC	support maintenance company
SOP	standard operating procedure
SPO	support operations
SSA	supply support activity
TACOM	United States Army Tank-Automotive and Armaments Command
TB	technical bulletin
TC	training circular
TDA	table of distribution and allowances
TM	technical manual
TMDE	test, measurement, and diagnostic equipment
TSC	theater sustainment command
U.S.	United States
USAMC	United States Army Materiel Command
USATA	United States Army Test, Measurement, and Diagnostic Equipment Activity
WIN-T	Warfighter Information Network-Tactical

SECTION II – TERMS

cannibalization

The authorized removal of components from materiel designated for disposal. Cannibalization supplements supply operations by providing assets not immediately available through the Army supply system. Costs to cannibalize, urgency of need, and degradation to resale value of the end item should be considered in the determination to cannibalize. (AR 750-1)

controlled exchange

Removal of serviceable parts, components, and assemblies from unserviceable, but economically repairable, equipment and their immediate reuse in restoring a like item of equipment to a combat mission capable condition. (AR 750-1)

crisis

An emerging incident or situation involving a possible threat to the United States, its citizens, military forces, or vital interests that develops rapidly and creates a condition of such diplomatic, economic, or military importance that commitment of military forces and resources is contemplated to achieve national and/or strategic objectives. (JP 3-0)

***direct exchange**

A supply method of issuing serviceable materiel in exchange for unserviceable materiel on an item-for-item basis.

***field maintenance**

On-system maintenance, repair and return to the user including maintenance actions performed by operators.

***maintenance collection point**

A temporary location established within the battalion echelon for the collection of equipment needing or undergoing field maintenance.

readiness

The ability of military forces to fight and meet the demands of assigned missions. (JP 1, Vol 2)

role

The broad and enduring purpose for which the organization or branch was established. (ADP 1-01)

***sustainment maintenance**

Off-system component repair and/or end item repair and return to the supply system or by exception to the owning unit, performed by national level maintenance providers.

***two-level maintenance**

Tiered maintenance system comprised of field and sustainment maintenance.

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Defense Logistics Agency: https://www.dla.mil/

Global Combat Support System-Army: https://www.gcss.army.mil/
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RANDY A. GEORGE
General, United States Army
Chief of Staff

Official:

MARK F. AVERILL
Administrative Assistant
to the Secretary of the Army
2400511

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