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Maintenance Operations

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Army Tactics, Techniques, and Procedures
No. 4-33 (FM 4-30.3)

Headquarters
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Maintenance Operations

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PREFACE

Army Tactics, Techniques, and Procedures (ATTP) 4-33 describes Operating Force Maintenance Operations, and includes detailed information on how maintenance operations have changed with the transformation from a four-level maintenance system to two-level maintenance. It focuses on how maintenance operations are conducted at the operational and tactical-level. Its primary focus is on maintenance organizations and their missions, but also addresses the roles and functions of strategic level maintenance organizations that provide logistics and individual Soldier support services.

The intended audience for this manual includes the following:

- Commanders at all levels - to give them a better understanding of how maintenance support operations are organized and provided.
- Commanders and Staff of sustainment organizations-to inform them of the integration of transforming maintenance support operations into Army missions.
- Soldiers of all grades - to give them a broad knowledge of the Army's tactical maintenance support operations structure and how it works.

This manual applies to Active Army, the Army National Guard (ARNG)/Army National Guard of the United States (ARNGUS), and the United States Army Reserve (USAR) unless otherwise stated.

The proponent for this manual is the Unites States Army Combined Arms Support Command (USACASCOM). Send comments and recommendations on Department of the Army (DA) Form 2028 (Recommended Changes to Publications and Blank Forms) to Commanding General, USACASCOM, ATTN: ATCL-FC-DA, 3901 A Avenue, Fort Lee, Virginia 23801-1809.

Chapter 1

Maintenance Fundamentals

In a Modular Army, maintenance elements are increasingly required to anticipate, analyze, and tailor available resources for effective and timely support of complex weapons systems. Adaptive planning requires maintenance managers to embrace change, innovation, and flexibility. Success will continue to be based on the bottom-line measurement of how quickly equipment can be returned to service when it becomes inoperable (maintainability), how long the user can anticipate failure-free performance (reliability), and ensuring equipment remains operational (availability). This chapter provides an overview of maintenance fundamentals and sets the foundation for the rest of this publication.

SECTION I – MAINTENANCE SYSTEM OVERVIEW

1-1. The purpose of the Army maintenance system is to generate/regenerate combat power, and to preserve the capital investment of weapons systems and equipment to enable mission accomplishment. Maintenance actions are divided into field and sustainment level tasks. Both of these maintenance levels will be discussed in further detail later in this chapter.

1-2. Maintenance is a combat multiplier central to operational success across full spectrum operations. The maintenance system is designed to be fast, agile, and responsive to the needs of the Soldier as far forward as possible. Maintenance managers anticipate maintenance requirements by utilizing robust communications networks, tracking and analyzing maintenance reporting, and soon, by being enabled by equipment sensor data to monitor and evaluate equipment performance. The commander that combines skillful use of assigned equipment with effective maintenance management processes has a decided advantage.

PRINCIPALS OF MAINTENANCE

1-3. 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, parameters, and maintained in accordance with its designed or engineered specifications. Army maintenance processes and procedures are based on the following principles:

- Commanders are responsible for establishing a command climate that ensures all assigned equipment is maintained in accordance with appropriate TMs and AR 750-1.
- Preventive Maintenance Checks and Services (PMCS) are the foundation of materiel readiness.
- Commanders are responsible for providing resources, assigning responsibility, and training their Soldiers to achieve maintenance standards.
- Expeditious return of non-mission capable equipment back to operational status.
- Field level maintenance forward/sustainment level maintenance at echelons above Brigade.

- Commanders are responsible for the readiness and safety of equipment.

MAINTENANCE PROCESSES

The Army relies on four core maintenance processes to manage equipment during the course of its useful service life to achieve a high state of readiness. They are performance observation, equipment services, fault repair, and single-standard repair. Each of these processes is discussed in greater detail in AR 750-1.

1-4. **Performance observation and reporting** is the foundation of the Army maintenance program and is the basis of the preventive maintenance checks and services (PMCS), required by all equipment operator Technical Manuals (TMs) before, during and after operations.

1-5. **Equipment services** are specified maintenance actions performed according to a schedule where equipment, components, and systems are routinely checked, adjusted, changed, analyzed, and lubricated in accordance with design specifications.

1-6. **Fault repair** is the process used by operators and maintenance personnel to restore equipment to full functionality as originally designed or engineered.

1-7. **Single** repair standard is applied to all end items, secondary items, and components repaired and returned to supply. This process assures high quality and establishes a predictable service life by repairing to a specific technical standard. Maintenance management policies and procedures are contained in the 750 series Army Regulations (AR) and Department of the Army Pamphlets (DA PAM). Supply policy and procedures are found in the 710 series ARs and DA PAMs.

1-8. Maintenance Managers at all levels use Standard Army Management Information Systems (STAMIS) to collect, store, and analyze maintenance information. An example of a STAMIS system is the Standard Army Maintenance System-Enhanced (SAMS-E).

SECTION II – TWO LEVEL MAINTENANCE

1-9. Army units are full spectrum forces organized, manned, equipped, and trained to be strategically responsive, deployable, agile, versatile, lethal, survivable, and sustainable across full spectrum operations. The current operating environment is characterized by non-contiguous Areas of Operations (AO), with long, and often unsecured, lines of communication. This requires that the logistics footprint be minimized as much as possible.

1-10. In supporting the modular force, the goal of our 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. There are no fixed repair time guidelines for performing field or sustainment tasks.

FIELD MAINTENANCE

1-11. Field level maintenance is generally characterized by on-(near) system maintenance, often utilizing line replaceable units (LRU's) and component replacement, in the owning unit, using tools and test equipment found in the unit. Field Level maintenance is not limited to simply "remove and replace" actions but also allows for repair of components or end items on-(near) system. Field maintenance also includes adjustment, alignment, service, applying approved field-level modification work orders (MWO), fault/failure diagnoses, battle damage

assessment, repair, and recovery. Field level maintenance is always repair and return to the user, and includes maintenance actions able to be performed by operators.

1-12. Crew maintenance is the responsibility of a using organization's operators/crews to perform maintenance on its assigned equipment. These operators/crews receive formal training from their proponent (normally advanced individual training, new equipment training etc.) on a specific system. Tasks normally consist of inspecting, servicing, lubricating, adjusting, replacing minor components/assemblies as authorized by the Maintenance Allocation Chart (MAC) using Basic Issue Items and onboard spares. The remove and replace authority for this level of maintenance is indicated by the letter "C" in the third position of the Source, Maintenance, and Recoverability (SMR) code. A "C" appearing in the fourth position of the SMR code, though rare, would indicate complete repair is possible at the crew maintenance level.

1-13. Operator/maintainers are System specialists in those military occupational specialties (e.g. signal, military intelligence, or a maneuver unit's Master Gunner) that receive formal training from their proponent (normally advanced individual training, specialized functional courses, etc.) on diagnosing specific system faults. Their primary focus is on a system's performance and integrity. These personnel troubleshoot the entire system using simplified (or embedded) diagnostic equipment to identify, isolate, and trace problems to a faulty LRU, LRU replacement (utilizing on-board spares), and identifying/correcting crew training deficiencies.

1-14. Maintainer maintenance is maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed by a trained maintainer in CMF 91 or 94. The remove and replace authority for this level of maintenance is indicated by the letter "F" appearing in the third position of the SMR code. An "F" appearing in the fourth position of the SMR code indicates complete repair is possible at the field maintenance level. Items are returned to the user after maintenance is performed at this level.

SUSTAINMENT MAINTENANCE

1-15. Sustainment-level maintenance is generally characterized by "off system" component repair and/or end item repair and return to the supply system, or by exception, back to the owning unit. It is performed by national-level maintenance providers (including the Army Materiel Command and Installation DOL Maintenance Activities). The sustainment maintenance function can be employed at any point in the integrated logistics chain. The intent of this level is to perform commodity-oriented repairs on all supported items to return them to a national standard, providing a consistent and measureable level of reliability, and to execute maintenance actions not able to be performed at the field level of maintenance.

1-16. Sustainment maintenance supports both operational forces and the Army supply system. There are exceptions when sustainment level maintenance activities may conduct maintenance and return items to the using unit. Sustainment maintenance will normally be performed by industrial-type activities operated by the Army; it may also be performed by contract and interdepartmental or interagency agreement. Sustainment maintenance is comprised of below depot sustainment and depot sustainment.

1-17. **Below depot sustainment level maintenance.** This level of maintenance is maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion generally after it is removed from the system. The remove and replace authority for this level of maintenance is indicated by the letter "H" appearing in the third position of the SMR code. An "H" appearing in the fourth position of the SMR code indicates complete repair is possible at the below depot sustainment maintenance level. Items are returned to the supply system after maintenance is performed at this level. Below depot sustainment level maintenance can also apply to end item repair and return to the supply system.

1-18. **Depot maintenance.** Depot maintenance is maintenance accomplished on end items or on a component, accessory, assembly, subassembly, plug-in unit, either on the system or after it is removed. The remove and replace authority for this level of maintenance is indicated by the letter "D" or "K" appearing in the third position of the SMR code. Depot sustainment maintenance can be performed by either depot personnel or contractor personnel when authorized by the Army Materiel Command. A "D" or "K" appearing in the fourth position of the SMR code indicates complete repair is possible at the depot maintenance level. Items are returned to the supply system, or by exception directly to a using unit after maintenance is performed at this level.

SECTION III – COMMON LOGISITCS OPERATING ENVIRONMENT

1-19. The "Common Logistics Operating Environment (CLOE)" is the Army Campaign Plan initiative to synchronize logistics concepts, organizational approaches, information, and a new generation of technologies into a single operational and technical architecture for current and future force structures. The ultimate goal is to enable Soldiers, at all levels, to have total situational awareness within a common operating picture (COP) for all aspects of logistics, from factory to foxhole. At the same time, logisticians will have a single set of interfaces for "business" processes such as calls for support to include maintenance, requisitions of supplies, in-transit visibility, and domain-wide total asset visibility—all supporting a unity of effort and enabling rapid, precise response across a wide spectrum of conflict. CLOE is a collaborative initiative to synchronize multiple systems enabling processes to work seamlessly. The technologies that constitute CLOE mark a steep change in sustainment processes. These enablers have the potential to substantially improve agility and effectiveness, and provide major increases in the Commander's situational awareness and the unit's combat power. Conditioned based maintenance, conditioned based maintenance plus, and reliability centered maintenance are significant key aspects in CLOE.

CONDITION BASED MAINTENANCE

1-20. Condition Based Maintenance (CBM) is a proactive equipment maintenance capability that uses system health monitoring to predict functional failure ahead of the event, allowing the maintainer to take appropriate preemptive action. Potential actions range from "stop-now" to scheduling a repair at a time convenient to the mission profile. CBM is based on diagnostics, predictive maintenance, and prognostics.

1-21. **Diagnostics.** Are failure indication capabilities provided by the system to the operator/crew or maintenance personnel by sensors or built-in test (BIT) capabilities. The sensor or BIT indicates when something has failed. A simple manifestation of this capability might be an advisory caution light, such as the "Check Engine" light. Diagnostic capabilities identify functional failures that have already occurred.

1-22. **Predictive Maintenance.** Maintenance that is based on trend analysis of historically collected data that, in the case of current force equipment, uses sensors that were originally designed for diagnostic indications. Trend analysis is typically accomplished on-board in near real-time circumstances, or off-board, not real-time, by portable test equipment or by engineers accessing a data warehouse that archives sensor data. Predictive capabilities identify impending functional failures without estimating remaining useful life or time to failure.

1-23. **Prognostics.** Are performed principally on-board as a real-time process, and are capable of analyzing component conditions and the prediction of failure based on the equipment's real-time operating time-stress environment. Prognostic analysis is capable of estimating remaining useful life, including accounting for the stress of operations on systems or components that can significantly diminish calculated mean time between failure.

CONDITIONED BASED MAINTENANCE PLUS

1-24. Condition Based Maintenance Plus (CBM+) is a Department of Defense initiative that includes many components of the CBM concept. CBM+ is aimed at enhancing the efficiency and effectiveness of CBM implementation through the application of enabling technologies, knowledge management, learning/training technologies, and life-cycle management processes. Beyond the CBM tasks themselves, CBM+ includes the additional infrastructures to make use of platform-generated information. This information provides operating commanders with unprecedented visibility into their fleet operating condition, enhancing force planning, and combat power. The information also feeds multiple business processes and provides performance information for problem analysis and performance optimization. Results include improved platform availability and reduced deployment footprint.

RELIABILITY CENTERED MAINTENANCE

1-25. Reliability Centered Maintenance (RCM) defines what must be done for a system to achieve the desired levels of safety, operational readiness, and environmental soundness at best cost. It is a structured process used to determine the best method to manage system failures based upon system reliability characteristics and the intended operating context.

SUMMARY

1-26. With the advent of field and sustainment levels of maintenance, maintenance on the battlefield has been streamlined, and redundancy has been eliminated, with no loss to capabilities; in fact, two-level maintenance provides the operating unit with more capabilities forward and able to rapidly respond than ever before -- it is an ideal capability for the Army's modular designed formations. Commanders at all levels must understand the Army Maintenance System, and the role of operators, crews and maintainers, to have the right capabilities in the right place at the right time.

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Chapter 2

Maintenance Organizations

The foundation for Army operations is contained in its operational concept—full spectrum operations. Current forces are organized to enable force tailoring and rapid deployment to meet combat commander requirements with properly sized, trained, and organized forces. A logistics structure that provides unity of command from the strategic to the tactical level is the starting point from which the system was built. This chapter discusses the different types of maintenance organizations, their makeup, and their basic responsibilities.

SECTION I – ECHELONS ABOVE BRIGADE (EAB)

THEATER ARMY

2-1. The Theater Army (TA) is normally the Army service component command in a unified command. As the service component, the TA has both operational and support responsibilities. Its exact tasks are assigned by the geographical combatant commander; these tasks may be exclusively operational missions, solely logistics tasks, or a combination of both types of responsibility. The TA commander is responsible to the unified commander for recommending how assigned US Army forces should be allocated and employed. The TA commander's support responsibilities include the requirements to organize, equip, train, and maintain Army forces in theater.

UNITED STATES ARMY MATERIEL COMMAND

2-2. The United States Army Materiel Command (USAMC) is the Department of Army's sustainment maintenance process owner. USAMC equips, Resets and sustains the Army by leveraging its capabilities, to include the Directorates of Materiel (DOM) on all major Army installations. In addition to Sustainment level maintenance and materiel management, the USAMC provides logistics technology, acquisition support, and selected other logistics support to Army forces as well as USAMC related common support to other Services, multinational and interagency partners. The capabilities of the USAMC are diverse and are accomplished through national-level maintenance and supply programs managed and executed by its subordinate Life Cycle Management Commands (LCMCs), listed in paragraphs 2-5, 2-6 and 2-7 below.

2-3. Other USAMC Major Subordinate Commands (MSC) perform specialized functions in support of the operating force. These MSCs include:

- US Army Sustainment Command (ASC).
- Military Surface Distribution and Deployment Command (SDDC).
- The US Army Research, Development and Engineering Command (RDECOM).
- The US Army Security Assistance Command (USASAC).

- The US Army Chemical Materials Agency (USACMA).
- US Army Contracting Command (USACC).

LIFE CYCLE MANAGEMENT COMMANDS

2-4. The USAMC Life Cycle Management Commands (LCMC), together with the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)) Program Executive Officers and Product/Project Managers ensure support for fielded weapon systems and equipment throughout their entire life cycle. The LCMCs support to deploying and deployed forces is coordinated through the Army Sustainment Command (ASC) and is executed under the control of the supporting ASC Army Field Support Brigade (AFSB). The exact organizational make up of each LCMC varies.

2-5. **Aviation and Missile Life Cycle Management Command (AM-LCMC):** The AM-LCMC, together with the related ASA (ALT) PEOs and PMs, integrates functions across their commodities and sustains aviation, missile and unmanned vehicle systems, ensuring weapon systems readiness with seamless transition to combat operations. It supports materiel developers with the development, acquisition, and fielding of aviation and missile systems and other related equipment. The AM-LCMC performs applied research, integrated logistics support, materiel readiness management, and maintenance support for Army aviation and missile systems, subsystems, and associated equipment.

2-6. **Communications-Electronics Life Cycle Management Command (CE-LCMC):** The CE-LCMC, together with the related ASA (ALT) PEOs and PMs, integrates functions across their commodities and sustains Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) information systems. It supports materiel developers with the development, acquisition, and fielding of communications-electronics systems (including software/information systems). The CE-LCMC performs applied research, integrated logistics support, materiel readiness management, maintenance support, and provides technical support capabilities to deploying and deployed Army forces.

2-7. **Tank-Automotive and Armaments Life Cycle Management Command (TA-LCMC):** The TA-LCMC, together with the related ASA (ALT) PEOs and PMs, integrates functions across their commodities and sustains Soldier and ground support systems for the operating force through the integration of effective and timely acquisition, logistics, and technology. It provides acquisition support of tank-automotive, armaments and Soldier end items, repair parts, and supplies for U.S. and Allied weapon systems and overhauls, modernizes, and repairs TA-LCMC commodity equipment.

2-8. **Joint Munitions and Lethality Life Cycle Management Command (JM&L LCMC):** The JM&L-LCMC provides the conventional ammunition life-cycle functions of logistics sustainment, readiness and acquisition support for all U.S. military services, other government agencies, and allied nations as directed. It is the logistics integrator for life-cycle management of ammunition providing a global presence of technical support to frontline units.

ARMY CONTRACTING COMMAND

2-9. The US Army Contracting Command (USACC) works closely with deployed sustainment units to provide contracting support through its Expeditionary Contracting Command (ECC). In CONUS, USACC provides this support for installations/garrison operations through its Mission and Installation Contracting Command (MICC). The MICC also provides LCMC Acquisition Centers in support of the AMC and ASAALT elements of each LCMC (i.e., TACOM Acquisition CETNEWR, CECOM Acquisition Center, etc..).

Contract Maintenance Support

2-10. Contract maintenance support can come in the form of system support, external support, and theater support contracts. Contract support is used when there is a valid operational need to augment deployed military maintenance support capabilities and to reduce the operational burden on military maintenance forces. All contract maintenance support requirements and issues should be coordinated with the supporting Army Field Support Brigade (AFSB) or subordinate AFSB element.

System Support Contract Capabilities

2-11. System support contracts are pre-arranged by the USAMC LCMCs and separate Army program management offices. Supported systems include, but are not limited to, newly fielded weapons, C2, and communication systems. System contractors provide support in garrison and may deploy with the force to both training and contingency operations. System support contract maintenance can include both technical assistance/support via field service representatives as well as complete field and sustainment level support capabilities.

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

2-12. External support contract maintenance is provided via a contract that is issued by contract authorities outside of the operational area. The largest and most commonly used external support contract is the Logistics Augmentation Program (LOGCAP). LOGCAP is an Army program executed by US Army Materiel Command (USAMC) that provides the operational commander an alternative source for rapidly filling sustainment and field maintenance shortfalls from commercial sources. The supported ASCC, in coordination with the supporting Contracting Support Brigade (CSB) and AFSB, will utilize LOGCAP related maintenance support when this commercial support augmentation option is determined to be the most effective, expeditious, and cost effective means to augment deployed Army force maintenance capabilities. Other external support and/or theater support maintenance contract support options, other than LOGCAP, should also be considered by the operational commander, especially for long-term, sustained operations and/or for operations with sufficient lead time to plan and coordinate other types of contracted support. For more detailed information on LOGCAP see Army Regulation 700-137 LOGCAP.

Theater Support Contract Capabilities

2-13. Theater support contracts support deployed Army forces under prearranged contracts, or contracts awarded from the mission area, by contracting officers under the C2 and contracting authority of the supporting CSB or designated joint theater support contracting command (JTSCC). Theater support contracts can provide limited maintenance related services based on the regionally available commercial support capabilities**.** Requiring activities should consult with their supporting AFSB to ensure that other contract venues are not already in place before submitting their maintenance support contract requirement to their supporting CSB or JTSCC.

ARMY SUSTAINMENT COMMAND

2-14. The Army Sustainment Command (ASC) provides sustainment level logistics (less medical) by synchronizing Acquisition, Logistics and Technology support from the strategic through the operational to the tactical level. ASC serves as AMC's single face to the field for sustainment maintenance and facilitates reach back across AMC to enhance mission support. ASC supports Army, Joint and Coalition forces across the full spectrum of operations, manages Army Prepositioned Stocks, and provides materiel management capabilities not provided by supporting Sustainment Brigades. The ASC has Army Field Support Brigades (AFSB) forward deployed at overseas locations regionally aligned to an ASCC and focused to serve as the ASC's bridge between

the generating force and the operational force. A network of more than 125 Army Field Support Battalions (AFSBn), Corps level Logistics Support Elements (LSE), Brigade Logistics Support Teams (BLST) and Logistics Support Teams (LST) accomplish this mission.

2-15. Major ASC responsibilities are:

Field Support – The ASC Field Support network of Army Field Support Brigades, battalions, and teams identify and resolve equipment and maintenance problems, as well as materiel readiness issues for their supported commands.

Materiel Management – The ASC matches materiel to mission and assures logistics readiness in the Army Force Generation (ARFORGEN) process. This includes issuing, maintaining and managing Theater-Provided Equipment (TPE) in combat theaters, storing and maintaining Left-Behind Equipment (LBE) , and maintaining and issuing Pre-deployment Training Equipment (PDTE) that can be made available to non-deployed units for training.

Army Pre-positioned Stocks (APS) – The ASC maintains, accounts for, and manages combat equipment, supplies, and humanitarian mission stocks owned by HQDA, at land- and sea-based positions strategically located around the globe.

ARMY FIELD SUPPORT BRIGADE

2-16. The AFSB supports the mission by providing integrated and synchronized acquisition, logistics and technology (ALT) (less theater support contracting, LOGCAP, and medical ALT) in direct support to the TSC/ESC. The AFSBs are the ASC's ALT field integrator for the USAMC and ASA(ALT). AFSBs provide the first stop for coordinating Army ALT capabilities in support of Army forces. This includes working with the CSB for contingency contracting and reach-back to ASC/AMC for technology support teams to the ARFOR commander at the point of need.

2-17. As it pertains to maintenance activities, the AFSB administers the Logistics Assistance Program (LAP) to include command and control (C2) of their subordinate the AFSBn, LSE, BLST, and LST commands supporting the tactical commander. The AFSB plans for and provides C2 over USAMC sustainment maintenance, and synchronizes and coordinates Army acquisition and materiel fielding support. The AFSBs also plans for and coordinates special ALT related support missions such as Army Oil Analysis Program (AOAP), and ammunition support. The AFSB maintains APS and theater provided equipment packages, property books, and manages AFSB and subordinate command personnel rotation as required, in coordination with the TSC/ESC, ASC, LCMCs and other ALT organizations. AFSBs manage ALT related sustainment, redeployment, retrograde, and reset operations in theater in coordination with the TSC/ESC and ASCC.

Army Field Support Battalion

2-18. Army Field Support Battalions (AFSBn) are organizations with tailored capabilities to provide sustainment support to maintain Army operational readiness for all units in an AOR. They support active, reserve, and national guard units through prioritization, integration, and synchronization of the Army's ALT capabilities in support of the Army Modular force.

2-19. AFSBns are modular teams of ASC personnel with technical support from the JM&L-LCMC, AM-LCMC, CE-LCMC and TA-LCMC. AFSBns provide area support that is tailored to their assigned missions, command and control. Subordinate commanders might also serve as the senior AMC logistics support advisor to a Division or Corps Commander. AFSBn commanders are multi-tasked as deployable AFSBn commanders and are also responsible for home station field and sustainment maintenance support to include, reset

management and DOM work-loading. AFSBns can provide integrated support by reaching back to the AFSB and/or national sustainment base when required. Additionally, AFSBns can provide additional maintenance support to deployed units by performing modification work orders on selected items of equipment and assisting with in theater reset, and left behind equipment sustainment. Distribution Management Teams (DMTs) may be utilized by AFSBns to perform materiel management functions as required.

2-20. When the AFSBn is ordered to forward deploy, an AFSBn(-) remains at home station to handle ARFORGEN-related functions, such as below depot sustainment level maintenance management and accountability of Left Behind Equipment (LBE). This AFSBn(-) ensures continuous and uninterrupted support. When deployed forward in support of Army contingency missions, AFSBns are attached to the AFSB upon arrival at the A/SPOD and might be further attached/TACON to a designated unit for logistics support and incorporation into the local security plan.

2-21. The AFSBn mission areas and capabilities in garrison include re-equipping redeployed units (reset) management, LBE management and accountability, ASL management, Directorate of Materiel (DOM) workload coordination, operational control of the DOM maintenance, supply and ammunition activities, representing USAMC as logistics advisors to Division and/or Corps commanders and their staffs, and providing Logistics Assistance Representative (LAR) support to active, USAR and ARNG units within an assigned area.

Brigade Logistics Support Team

2-22. The Brigade Logistics Support Teams (BLST) are organized under a specific TDA based on the type of unit they support. The BLST team chief has direct interface with the Brigade Support Battalion (BSB) support operations office (SPO) and is responsible for the BLST operations and personnel. There are two types of BLSTs: (1) BCT/CABs and (2) multi-functional Brigades and echelon above brigade (EAB) units.

- **BLST (BCT/CAB)** - A small modular team consisting of the ASC BLST Chief and LARs. They are aligned with each of the AC BCTs (Infantry, Stryker, Heavy) and Combat Aviation Brigades (CAB) and are comprised of 8-11 LARs from ASC, AM-LCMC, CE-LCMC, and TA-LCMC that report to the BLST Chief. The BLST (BCT/CAB) provides support to the BCT/CAB and limited area support to other units in their geographical area.

- **BLST (EAB**) - A small modular team headed by the ASC BLST Chief, aligned with the Maneuver Enhancement, ADA, Signal, Theater Aviation Brigades and SOF units, comprised of 8-11 LARs from ASC, AM-LCMC, CE-LCMC, and TA-LCMC that report to the BLST Chief. They provide support to these units and limited area support to other units in their geographic area.

2-23. The skill sets that make up the BLST depend on equipment and technology densities being supported. When deployed, BLSTs are normally attached to an AFSB in accordance with Mission Enemy Terrain and weather, Troops and Support available, time available, and Civil Considerations (METT-TC). BLSTs, with augmentation, can perform limited and short-term split-based operations while the BLST displaces in support of their supported unit.. The BLST mission areas and capabilities include but are not limited to:

- Providing LAR technical expertise from the appropriate USAMC organization.

- Assisting in coordinating ALT assistance called forward to support their supported unit.

- Providing technical support and reach capability from their supported unit to the appropriate USAMC command.

- Assisting the AFSB RSOI cell, and supervising AFSB in the accounting of and deployment assistance of personnel.

THEATER SUSTAINMENT COMMAND/EXPEDITIONARY SUSTAINMENT COMMAND

2-24. Full spectrum operations are conducted in a complex, interconnected, and increasingly global environment encompassing air, land, maritime, and space domains and the information environment. It is within this setting that the Theater Sustainment Command (TSC) commands and controls Army operational-level logistics (less medical) in support of a joint or multinational force; providing centralized command and control and decentralized execution of logistics operations throughout the theater. The TSC and its subordinate units are assigned to an ASCC.

2-25. The mission of the TSC is to plan, prepare, rapidly deploy (as necessary), and execute operational-level sustainment (less medical) within an assigned theater. The TSC is capable of planning, controlling, and synchronizing all operational-level sustainment operations for the ASCC or JFC. It provides centralized logistics command and control in theater; simultaneously supporting deployment, movement, sustainment, redeployment, reconstitution.

2-26. The role of the Expeditionary Sustainment Command (ESC) is to provide forward-based command and control of TSC logistic forces. The ESC does not represent another echelon of command but rather an extension of the TSC command and control capabilities, such as an operational command post (OCP) does for the Army headquarters. It normally deploys to the AO/JOA and provides command and control when multiple sustainment brigades are employed or when the TSC determines that a forward command presence is required. This capability provides the TSC commander with the regional focus necessary to provide effective operational-level support to Army or JTF missions. The TSC may employ multiple ESCs within the theater.

2-27. The TSC DMC receives requisitions from across the theater through the CTASC. It determines if the requested item is available from within the theater and directs a materiel release order to the sustainment brigade capable of satisfying the requirement. If the item is not available, the DMC passes the requisition to the appropriate national inventory control point (NICP) for fill. In most instances, the actions described above are performed by the CTASC automatically in accordance with TSC-controlled parameter settings that include referral tables. This application of centralized control and decentralized execution enables responsive and agile support throughout the theater, effectively minimizing customer wait time.

SUSTAINMENT BRIGADE

2-28. The major missions performed by the sustainment brigades are: theater opening (TO), theater distribution (TD), and sustainment. Each of these functions is interrelated and throughout the course of an operation a sustainment brigade will likely perform more than one of these functions simultaneously.

2-29. The sustainment brigade materiel management effort is focused on the management of its supply support activities (SSA) in accordance with TSC plans, programs, policies, and directives. The sustainment brigade coordinates and controls supply functions, including the redistribution of intra-theater excess, to meet the operational requirements of the TSC and its supported units, employing near real-time situational awareness of stock records and asset visibility to provide responsive and agile support. Analysis of stock status and mission requirements enables the sustainment brigade to effectively manage its workload and control potential backlogs or bottlenecks generated by competing requirements or priorities. The sustainment brigade supply mission is determined by the actions of the TSC, specifically, the TSC distribution management center (DMC).

2-30. Functional units within the Sustainment Brigade include a Brigade Troops Battalion (BTB) and Combat Sustainment Support Battalion (CSSB).

COMBAT SUSTAINMENT SUPPORT BATTALION

2-31. The Combat Sustainment Support Battalion (CSSB) is the building block upon which TSC sustainment capabilities are developed. Typically attached to a sustainment brigade, the CSSB is tailored to meet specific mission requirements. Attached capabilities, drawn from the force pool, may include transportation, maintenance, ammunition, supply, mortuary affairs, airdrop, field services, water, petroleum, financial management and human resource support.

SUPPORT MAINTENANCE COMPANY

2-32. The Support Maintenance Company (SMC) is a modular organization tailored to bring multiple types of field maintenance support not organic to units. Depending on what modular components are assigned, the capabilities and capacity of the SMC could include maintenance control, welding, machinist, recovery and contact maintenance teams. In addition, they could have the ability to repair armament, fire control, power generation, utilities, construction, quartermaster, chemical, radio/COMSEC, radar, computer, and detector equipment. The SMC also provides low density consolidated field level repairs for items such as Night Vision Goggles and other special electronic devices.

COMPONENT REPAIR COMPANY

2-33. The mission the Component Repair Company (CRC) is to perform sustainment maintenance (off-system repair and return to the supply system) repair on components.

2-34. The CRC repairs components based on a directed workload from the National Maintenance Program (NMP) to a national standard. The CRC is a modular organization that might be augmented with Department of Army civilians or contractors, and provides primary repair focus on electronic, armament, automotive, and ground support equipment components, modules or assemblies.

2-35. This unit is designed to perform maintenance operations within the two-level maintenance system at theater level. Under the oversight of an AFSB, CRC work loading is performed by the appropriate USAMC LCMC.

SECTION II – BRIGADE AND BELOW MAINTENANCE ORGANIZATIONS

BRIGADE SUPPORT BATTALION

2-36. Brigade Support Battalions (BSB) are organic units of the Brigade Combat Teams (BCT) and support brigades. The BSB plans, coordinates, synchronizes, and executes logistics operations in support of brigade operations.

2-37. The BSB typically plans and executes replenishment operations in support of maneuver forces. It distributes supply classes I, II, III, IV, V, VII, VIII, and IX; provides food service and Army health system (AHS) support, as well as field maintenance and recovery. It relies on the theater distribution system to synchronize the flow of throughput into the brigade's operational area. These deliberate, time-sensitive operations are conducted to replenish the Forward Support Companies (FSC), also organic to the brigade.

2-38. Although capabilities differ somewhat depending upon the type of brigade (e.g. Heavy, Infantry, Stryker) the core capabilities include maintenance, medical, supply, and distribution. In most instances, support brigades

such as the Fires Brigade, Battlefield Surveillance Brigade (BFSB), Maneuver Enhancement Brigade (MEB), Combat Aviation Brigade, etc. are supported by maintenance capabilities similar to those found in the BCTs with support tailored to the appropriate brigade structure. Figures 2-1 and 2-2 shows units normally assigned to a BSB.

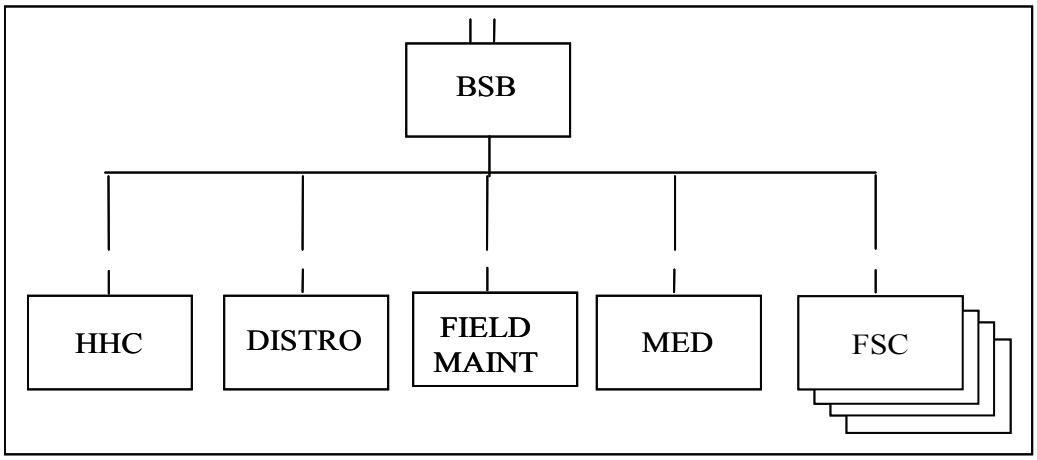

Figure 2-1. Brigade Support Battalion (Non-SBCT)

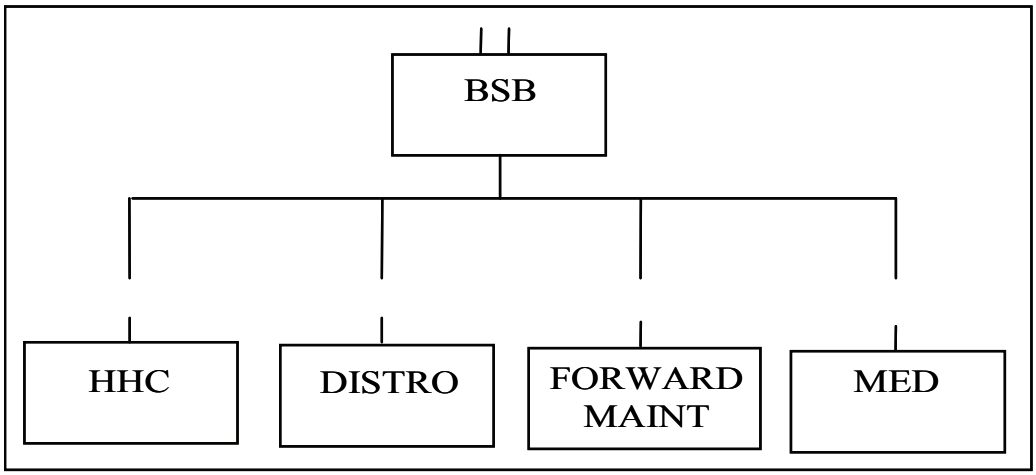

Figure 2-2. Brigade Support Battalion (SBCT)

FIELD MAINTENANCE COMPANY

2-39. The mission of the Field Maintenance Company is to provide field level maintenance support for units in the brigade not supported by a Forward Support Company (FSC) and specialized low density field maintenance support to the entire brigade. It provides automotive, armament, ground support, electronic maintenance, recovery, and maintenance management to brigade base elements (HQ, BSB, and STB). It also provides maintenance advice and support to the brigade and serves as the central entry and exit point into the brigade for low density equipment. For low density communications repair capabilities, the Field Maintenance Company might rely upon CL VII Operational Readiness Float (ORF) . It possesses limited back-up capabilities and relies on the Sustainment Brigade's SMC for augmentation when required. During peacetime, the FSC Field Maintenance Team (FMT) low density MOSs should be consolidated in the Field Maintenance Company for efficiency, ease of training, and mentoring by the senior NCOs and warrant officers.

SBCT FIELD MAINTENANCE COMPANY

2-40. The SBCT Field Maintenance Company provides maintenance support for the SBCT. Scheduled maintenance support is provided by contracted logistics support (CLS). The SBCT Field Maintenance Company has the maintenance capabilities to perform automotive, armament, missile, communications, special devices, and ground support equipment repair. The SBCT Field Maintenance Company has a limited automation maintenance capability. See Figure 2-3 for a diagram of the SBCT Field Maintenance Company.

COMBAT REPAIR TEAMS

2-41. The forward maintenance company's have Combat Repair Teams (CRT) that are dispatched as needed to the forward locations of the maneuver task forces to conduct maintenance. The CRTs are controlled by the Maintenance Control Officer (MCO) who coordinates with the supported battalion S-4 and XO to establish work priorities, control movements, and integrate CRT operations into the supported battalion OPLANs.

2-42. A principal task of the CRT is to assess, repair and report maintenance requirements to the Maintenance Control Section (MCS). The CRT repairs those systems within their capability by using LRUs, shop replaceable units (SRUs), and on board spares for repairs. When standard maintenance repairs are not practical, based on urgent situations, approved battle damage repairs may be applied following the battle damage assessment and repair process.

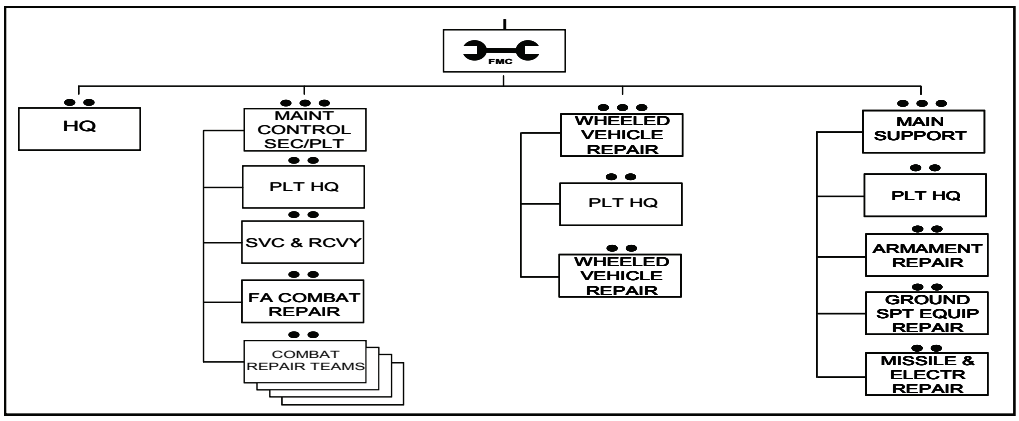

Figure 2-3. Field Maintenance Company (SBCT)

FORWARD SUPPORT COMPANY

2-43. Forward Support Companies (FSC) typically provide field feeding, fuel, ammunition, field maintenance, and distribution support for their respective battalions. While normally under the command of the BSB, an FSC may be placed in either a command or support relationship with its supported battalion IAW METT-TC. Command relationships, like OPCON or TACON, are generally limited in duration and focused on the completion of a particular task or mission (e.g. the movement phase of an operation). The differences between the various types of FSCs (infantry, field artillery, and RSTA) are found in FM 4-90, Brigade Support Battallion. During peacetime, the FSCs low density MOSs should be consolidated in the FMC for efficiency and ease of training and mentoring by the senior NCOs and warrant officers.

2-44. The FSC commander is responsible for executing the sustainment plan in accordance with the supported battalion commander's guidance. The BSB provides technical oversight to each FSC. The FSC has a distribution platoon that supports all classes of supply in addition to a maintenance platoon that support field maintenance and recovery.

BRIGADE SUPPORT MEDICAL COMPANY

2-45. The brigade support medical company's (BSMC) brigade medical supply office (BMSO) provides primary field level medical equipment maintenance for the company and may provide emergency medical equipment maintenance for the medical platoons in the BCT. Field and limited sustainment medical equipment maintenance support including Class VIII repair parts, is provided by the medical logistics company (MLC) under the C2 of the medical battalion (multifunctional) external to the BCT. See FM 4-02.1 Combat Health Logistics, for additional information on medical equipment maintenance support.

SUMMARY

2-46. Modularity has created a logistics organizational structure capable of providing centralized command and control of maintenance functions from the strategic level to the tactical level. With the forward support and field maintenance companies executing maintenance operations to the TSC providing oversight, each level works together to provide two-level maintenance for the force. Under this new concept, each organization has more capabilities than before to rapidly respond to changes and effectively maintain the force. Capabilities that were once held at higher echelons are now in organizations far forward at the tactical level. Modularity has also eliminated layering of command, and creating inter-dependencies among the Services to achieve greater efficiencies.

Chapter 3

Maintenance Support Operations

Full spectrum operations require continuous, simultaneous combinations of **Offense, Defense,** and **Stability** or **Civil Support** tasks**.** Planning for maintenance support during these operations require thorough mission analysis, careful identification of the force supported, and an understanding of the commander's intent. This chapter discusses the nature and conduct of maintenance-related activities that depend on the operational environment associated with either contiguous or non-contiguous battle space.

SECTION I – SUPPORT CONSIDERATIONS

3-1. Maintenance is one of the logistics functions that support Soldiers and their systems in the field. It sustains materiel in an operational status, restores it to serviceable condition, or upgrades its functional utility through modification or product improvement. The Army maintenance system designates the scope of tasks performed by maintenance activities. It provides support planning requirements for maintenance of materiel systems when fielded and after fielding. It also establishes requirements for managing activities that physically perform maintenance.

OFFENSE

3-2. The maneuver brigade conducts, or participates in, movements to contact (MTC), attacks, exploitations, and pursuits. If offensive momentum is not maintained, the enemy may recover from the shock of the first assault, gain the initiative, and mount a successful counterattack. The change from one type of operation to another, such as from a hasty attack to a pursuit, does not require a major shift in logistics plans and procedures. However, the priorities and requirements for support may change.

3-3. The maneuver brigade provides information to the Sustainment Brigade on the locations of all maintenance elements operating in their area of operations. The brigade S-4 along with the BSB Commander provide the link between the Sustainment Brigade and the supported brigade. It is crucial to know what, when, and where supplies are needed. Because of the fast pace of offensive operations and communications limitations it requires extended effort to make it work effectively.

PLANNING FOR MAINTENANCE OPERATIONS-OFFENSE

3-4. Planners ensure maintenance operations support momentum and massing at critical points. 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.

ANTICIPATE REQUIREMENTS

3-5. Anticipate increased consumption of Class III(B) and Class IX due to substantial maneuver. Offensive operations place a heavy requirement on BCT transportation assets. Offensive operations also increase equipment maintenance requirements and impact STAMIS connectivity.

3-6. **Class IX and Maintenance Support**. The commander establishes his maintenance priorities based on what systems and units are critical to the success of the operation. The FSC and/or FMC sends maintenance teams forward to support combat units as close to the battle as possible. The maintenance teams must have the necessary transportation, communications assets, tools, and repair parts to ensure rapid return of non-mission capable equipment to support the operation. When necessary and feasible, use air transportation to bring critical repair parts forward. Reliable STAMIS connectivity must be maintained in order to rapidly replenish supplies and share maintenance information. When standard maintenance repairs are not practical, based on urgent situations, approved battle damage repairs may be applied following the battle damage assessment and repair (BDAR) process.

3-7. **Anticipate Requirements.** The SPO along with the brigade S-4 are responsible for integrating resupply operations, locations, and routes into the scheme of maneuver to ensure proper timing to avoid interfering with likely or planned maneuver actions.

MOVEMENT TO CONTACT

3-8. During the preparation phase of movement to contact, there is a major logistics effort. Maintenance personnel place maximum effort on preparing equipment for combat. The maintenance assets' move closely behind the combat unit's main body to insure rapid recovery, repair, and return of damaged and/or disabled equipment. The maintenance assets position in the march column is selected to support the combat units while being protected from enemy fire.

ATTACK

3-9. The attack is quick and violent. The FSC commander monitors the tactical situation to support the attack. The FSC commander informs the S-3 and S-4 of specific field maintenance point locations.

3-10. During the attack, the maintenance teams are forward with the maneuver companies. On-site maintenance support and recovery operations are accomplished with high risk 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 Battalion XO and S-4. They discuss the current situation, priority of effort, and plans for the next operation.

EXPLOITATION AND PURSUIT

3-11. The maneuver brigade covers a large area during the Exploitation and Pursuit phase. Combat units strike at objectives deep in the enemy rear while keeping pressure on retreating enemy forces. Command, control, and communications are extremely difficult. Maintenance teams will perform on-site repairs. Equipment that cannot be repaired on-site is recovered to the combat trains or BSA (whichever location can best complete the required maintenance).

DEFENSE

3-12. Brigade defensive operations break the momentum of the enemy's attack while posturing to shift to the offense with little notice. The brigade conducts a static defense or varying degrees of a more mobile dynamic defense against a variety of threats and in differing terrain. The tactical mobility of the BCT makes it well suited for the dynamic defense.

3-13. During the preparation of the defense, priority of protection goes to those units preparing positions and obstacles. Once the positions are prepared, priority shifts to protection of the reserve, BSA/trains and command post locations. Maintenance considerations for defensive operations include: planning to reorganize to replace lost maintenance capability, use maintenance teams well forward at collection points, plan to displace often, and emphasize recovery and retrograde of equipment that require extended repair time.

3-14. The FSC's Field Maintenance Platoon (FMP) takes all required steps to place as many weapon systems as possible in serviceable condition. Operators, crews, and Field Maintenance Teams (FMT) perform any necessary repairs authorized at their level of repair. Once defensive operations begin the principles are the same as for the offense.

STABILITY OPERATIONS

3-15. Sustainment for stability operations involves supporting U.S. and multi-national forces in a wide range of missions. Stability operations range from sustainment-focused operations in humanitarian and civilian assistance missions to major peace enforcement missions. Because the logistic requirements in stability operations vary widely, mission analysis determines the proper maintenance capabilities required. Maintenance assets are allocated based on those requirements.

3-16. The key to success with stability operations is interagency coordination. Only in the most extreme situations will the U.S. military be providing relief directly to those in need. In most support operations, the U.S. military will be assisting non-governmental organizations (NGOs) in providing the required level of support to the affected population. Multi-national support, host nation support (HNS), and support from NGOs may increase the demands on transportation, medical, food, water, and housing.

3-17. Host-nation support, contracting, and local purchase are force multipliers in many of these operations. Situations that lack optimal sustaining capabilities may require using other methods that augment or replace existing logistic capability. Contracting personnel should support or travel with the lead elements of Army forces if feasible. Nonstandard logistics may be employed for supply classes (such as I, II, III, IV, and IX), maintenance, repair, forklift support, fixed facilities, and mobile communications.

PEACEKEEPING

3-18. When planning maintenance support during peace operations, logisticians must take into consideration factors such as hostile environment, joint or multi-national chain of command, support to multi-national forces, risk assessment, security of maintenance operations, and environmental impact.

3-19. Peacekeeping operations are most often conducted as part of a multi-national coalition. This presents new challenges for all commanders who could potentially support HN military, coalition force and commercial equipment. Beyond some of the special considerations noted here, much of the maintenance support for peacekeeping will not differ substantially from normal maintenance operations.

NOTE: *FM 3-07.31 covers the full range of peace operations (including peacemaking, peacekeeping, peace enforcement, preventive diplomacy, and peace building).*

HOSTILE ENVIRONMENT

3-20. National policy may require the Army, either singularly or as part of a joint or multi-national Task Force, to conduct peace operations in politically sensitive areas of the world. At such times, regional combatants may disregard the peace initiative and continue sporadic or repeated armed struggle. Commanders must anticipate this and be prepared to provide maintenance support in hostile, potentially life-threatening situations.

LACK OF HOST NATION SUPPORT

3-21. Since friendly forces must operate in hazardous and politically sensitive areas, commanders should never assume availability of dedicated HNS during peace operations. Instead, they must plan for maintenance support using organic resources.

MULTI-NATIONAL SUPPORT

3-22. Since the Army frequently conducts peace operations with other nations, maintenance managers may encounter a multi-national chain of command. In such cases, they must quickly establish communications channels to confirm or clarify mission requirements. Commanders must also determine how and from where they can expect timely resupply to perform their critical maintenance mission. Prompt coordination of mission and support requirements with higher HQ ensures logistics planners deliver timely maintenance support to customer units.

3-23. Maintenance Managers must anticipate support to all friendly forces. To accomplish that task, they must contact higher HQ as well as known supported units to coordinate support requirements. At times, support to multi-national forces may present unique logistical challenges. In such cases, logistics planners must take the initiative to determine customer equipment type and density.

CIVIL SUPPORT OPERATIONS

3-24. Civil support operations address the consequences of manmade or natural accidents and incidents beyond the capabilities of civilian authorities within the United States and its territories. Army forces conduct civil support operations to support homeland security. The overall purpose of civil support operations is to meet the immediate needs of the citizens of the United States in time of emergency until civil authorities can accomplish these tasks without assistance. Although not the norm, Army forces may be deployed into an area to support civilian agencies. Army forces provide essential services, assets, or specialized resources to help civil authorities deal with situations beyond their capabilities. In civil support operations, the adversary is often disease, hunger, or the consequences of disaster. Army units can expect to participate in civil support operations with or without other units from time to time.

HUMANITARIAN RELIEF

3-25. As in peace operations, maintenance doctrine does not change during humanitarian operations. However, humanitarian operations do introduce unique challenges to logisticians. Depending on the regional political situation, the Army may conduct humanitarian missions in either friendly or hostile environments.

3-26. Since humanitarian missions are conducted in either friendly or hostile environments, logistics planners must consider the situation and locate maintenance operations away from dense population centers, identify maintenance sites that units can easily secure and defend, establish and secure lines of communication, coordinate with engineer support, enclose maintenance operations areas, establish entrance and exit control points, maintain responsive 24-hour perimeter security, and consider the impact on the environment.

DISASTER RELIEF

3-27. 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.

3-28. Planners must evaluate and prioritize repair of equipment for infrastructure, firefighting, law enforcement, medical, construction, power generation, organic, and equipment belonging to other military elements involved in the operation.

SECTION II – CONCEPT OF SUPPORT FOR ECHELONS ABOVE BRIGADE MAINTENANCE OPERATIONS

3-29. Echelons above brigade (EAB) maintenance support is provided through a combination of modular support units (sustainment BDEs, CSSBs, SMCs, and CRCs), as well as forward repair activities of the USAMC. These units are dependent upon the size and scope of overall TSC logistics operations.

3-30. The TSC provides centralized control and management of maintenance operations through the Support Operations Section (SPO). The TSC maintenance operations provide the following:

- Field maintenance support to units on an area basis.
- Sustainment maintenance support to the theater by repairing end items, modules, assemblies, and components retrograded for repair and return to the supply system, under the direction of USAMC's National Maintenance Manager.
- The Distribution Management Center and Materiel Readiness Branch of the TSC SPO section plans and manages maintenance support for the TSC. They establish policy, plans, and procedures for all theater maintenance support programs.

3-31. Maintenance information management at the TSC is accomplished through the retrieval of data from the SAMS-2E, Battle Command Sustainment Support System (BCS3), and Logistics Information Warehouse (LIW). This provides a theater maintenance database for the commander.

3-32. Sustainment Brigades are the operational arm for the TSC composed of functional and multifunctional units. Sustainment Brigades provide maintenance support to units in its area through the SMCs of the Combat Sustainment Support Battalions (CSSB).

3-33. The Sustainment Brigade Support Operations Materiel Management Section provides management of maintenance operations within the AOR. The SPO retrieves data from their logistics information systems. Maintenance operations provide field maintenance to units and troops in its assigned area and backup support to the BCTs and other brigades.

COMBAT SUSTAINMENT SUPPORT BATTALION

LOCATION

3-34. The CSSB normally operates from multiple locations within its assigned AO. The HHC is located where it can best conduct command and control of its subordinate units. Subordinate companies can be located in various parts of the battalion AOR. Factors affecting the position of units include the tactical situation, road network, availability of suitable terrain for force sustainment, security requirements, and location of other support activities.

Battalion Headquarters

3-35. The support operations section of the battalion HQ keeps track of logistics issues of supported units through reports, visits, liaison, and briefings. The battalion HQ must stay alert to potential mission changes and inform subordinate units of changes to instructions governing operations. It also performs maintenance management and staff supervision to ensure adherence to established policies.

SUPPORT MAINTENANCE COMPANY

On-site Maintenance

3-36. The company can provide on-site maintenance to supported units upon request. This service is provided with the dispatch of properly manned and equipped MSTs to a supported field maintenance collection point or to the site of equipment failure. All company elements provide personnel for on-site maintenance as directed by the Maintenance Control Section (MCS), coordinated through the CSSB.

3-37. MST NCOICs serve as Technical Inspectors to inspect and diagnose faults. They schedule equipment for repair, depending on workload, parts availability, the priority of the requesting unit, and the priority of the specific equipment to support current operations.

Records and Reports

3-38. The company operates the SAMS-1E to manage maintenance and transmit data to the CSSB SPO. The CSSB SPO transmits SAMS-2E data to the Sustainment Brigade SPO.

Workload

3-39. Items repaired by the SMC are returned to the supported units or the supported maintenance unit.

Liaison Visits

3-40. The CSSB SPO, accompanied by one or more key personnel, makes initial contact. Supported units are informed of the supporting unit's location, services to be provided, and procedures for obtaining these services. Maintenance and repair parts issues and requirements are discussed. After initial contact, liaison is maintained on a frequent basis. The SMC commander makes additional visits to supported units to maintain good working relationships.

Technical Assistance

3-41. Technical assistance is providing technical instruction and guidance to enable supported units to perform their mission more efficiently. Technical assistance may be provided formally by the USAMC Logistics Assistance Program (LAP) or ACOM/ASCC/DRU-level Maintenance Assistance and Instruction Teams

(MAITs). The SMC commander may also provide assistance informally. Technical assistance includes visits by Technical Assistance Teams made up of subject matter experts.

3-42. The assistance team's functions include determining the nature and scope of maintenance support required so that a properly manned and equipped MST can be sent to provide on-site maintenance. It discusses and resolves mutual maintenance support issues regarding personnel, equipment, or operational procedures and policies. They also provide assistance to the Unit Commander with the evaluation of equipment condition, the effectiveness of the maintenance program, and develop remedial action to correct deficiencies.

Maintenance Check Points

3-43. Field-level maintenance support can be set up at refuel points, rest stops, or attached to a convoy support center along heavily traveled routes. This is a practical method of providing efficient, roadside maintenance service. This element may consist of four to six mechanics equipped with a vehicle and cargo trailer carrying small, easily replaceable repair parts and BDAR kits.

3-44. While vehicles are being refueled, the maintenance element can assist the operator/crew in verifying PMCS of their vehicles. Minor deficiencies can be corrected on the spot with available tools, repair parts, and BDAR techniques. Deficiencies that do not deadline the vehicle will be annotated on DA Form 5988-E (Equipment Inspection Maintenance Worksheet (EGA))/DA Form 2404 (Equipment Inspection Maintenance Worksheet). This form is given to the vehicle driver for action on return to the unit.

COMPONENT REPAIR COMPANY

3-45. The Component Repair Company (CRC) is a uniformed component repair capability that is aligned with the USAMC. CRC units may be employed in any location along the distribution pipeline beginning at the national source of repair down to the CSSB in a Sustainment Brigade. These units are pushed forward into the area of operations at the direction of the National Maintenance Office only as needed. These units provide repair and return to the supply system, operate in conjunction with a Supply Support Activity (SSA), may co-locate with a CSSB for the purpose of mission coordination, and are work loaded by the LCMCs via the AFSB.

3-46. The CRC may accept field modules platoons/sections/teams from the SMC. Field maintenance assets are added to the CRC when there is not enough workload in a given area to support a SMC HQ.

SECTION III – CONCEPT OF SUPPORT FOR BRIGADE AND BELOW MAINTENANCE OPERATIONS (NON-SBCT)

BRIGADE SUPPORT BATTALION

3-47. The BSB commander is the senior logistician, logistics operator, and advisor for support to the BCT. The BSB may function in a highly dispersed manner, with some BSB elements close to the maneuver units they support and others near or within the BSA. The BSB staff monitors and manages logistic operations through on-site supervision, recurring reports, and an array of digital information systems and other technological innovations.

3-48. The logistics structure of the BCT links to the TSC. The direct linkage between the BSB and the TSC remains in effect, even when the BCT is attached to a different division. When the brigade is attached to a division, the G-4 coordinates logistics priorities for the entire division. The BSB sends status reports to the brigade S-4 to keep the G-4 informed of the logistics situation. Because the attachment of BCTs to divisions is not permanent, logistics arrangements do not hinder the eventual detachment of the BCT from the division.

Logistics augmentation required by the BCT is requested from the BSB in coordination with the BCT S-4 to the Sustainment Brigade.

SUPPORT OPERATIONS SECTION

3-49. The SPO section, under the direction of the support operations officer, provides centralized, integrated, control, and planning for all distribution management operations within the battalion. It coordinates with logistics operators in the fields of supply, maintenance, mortuary affairs, field services and movement management for the support of all units assigned or attached in the brigade area. It provides all maintenance management for the brigade.

3-50. The SPO possesses the situational ability to view combat power in the maneuver units. This allows the section to identify problems quicker, anticipate requirements, and allocate resources more efficiently. BCS3 provides the section the visibility of the logistics status from the BSB to EAB. This staff section serves as the POC for supported units. The duties and responsibilities of the SPO include the following:

- Conduct continuous logistics preparation of the battlefield.
- Submit logistics forecasts to external SPO/distribution elements.
- Coordinate and provide technical supervision for the BSB logistics mission including: supply activities, maintenance support and coordination of transportation assets.
- Coordinate logistics for units passing through the BCT AO.
- Develop maintenance support SOPs.
- Monitor daily battle loss reports to anticipate future requirements.
- Recommend maintenance priorities to the BCT S4.

3-51. Maintenance Management: The maintenance management personnel provide maintenance oversight of the FMC and FSC maintenance sections. They ensure integrated, automated maintenance management for combat vehicles, automotive, ground support equipment, communications electronics equipment and missile equipment. The maintenance management personnel also plan and forecast maintenance and related material requirements based on future operational plans and coordinate the disposal of enemy equipment.

3-52. The support operations officer must collaborate with the S1, S2/3, S4, and S6 to establish and manage the BCS3 network and database. The SPO must maintain supply point and maintenance data entered into the system. Specific BCS3 tasks for the SPO are:

- Set message handling tables to correctly route supply logistics messages.
- Set status thresholds for supply point items.
- Establish reporting times for subordinate field support units.
- Set support relationships to reflect which supply points support which units.
- Establish and set continuity operations pairing IAW guidance from the supporting G4.

Maintenance Operations

3-53. The FMC provides field maintenance to units and equipment of the brigade not supported by an FSC. The FSC provides field maintenance and supply to its supported battalion or task force. The maintenance platoon can function consolidated or split based depending on METT-TC. The FMT from the FSC provides dedicated field maintenance and recovery capability to the supported companies.

Lateral Support Request

3-54. The brigade combat team was designed to be lethal, mobile, and agile thus it was given all necessary capabilities for self-sustainment during operations. At the BCT level, field maintenance organizations can access each other capabilities through the use of a lateral support request. The BCT has all the necessary field maintenance capabilities to support every commodity it employs. These field maintenance capabilities are found within the field maintenance platoon of the FSC and the FMC. By force design structure, the FMC has some additional capabilities that the FSC does not. These additional capabilities are aimed at supporting low density and specialized equipment maintenance within the BCT. This consolidation and management of capabilities in a central location enables the leveraging of low density resources.

SECTION IV – CONCEPT OF SUPPORT FOR BRIGADE AND BELOW MAINTENANCE OPERATIONS (SBCT)

3-55. Unlike conventional BCTs (HBCT, IBCT) the SBCT BSB does not have FSCs, instead all field level maintenance is provided by the field maintenance company. The field maintenance company has combat repair teams (CRT) that are dispatched by the MCS to the forward locations of the Stryker battalions, RSTA squadron, and FA battalion to provide field maintenance. The CRTs are controlled by the maintenance control officer who coordinates with the supported battalion S-4, XO, or the battalion maintenance officer (if assigned) to establish work priorities, control movements, and integrate CRT operations into the supported battalion OPLANs. The field maintenance company has the maintenance capabilities to perform automotive, armament, missile, communications, special devices, and ground support equipment repair. The field maintenance company has a limited automation maintenance capability which is integrated into the CSSAMO.

3-56. The MCS operates the SAMS-E and provides maintenance management and materiel readiness data to the commanders and materiel readiness managers. The section consists of the Maintenance Control Officer, Maintenance Control Sergeant, and the Equipment Records/Parts Specialists. The Equipment Records/Parts Specialists have oversight responsibility for all TAMMS operations in the brigade and manage the shop stocks. CRTs are equipped with a SAMS-E which provides near real-time maintenance data. Using available systems, the CRTs perform as much of the repair operations as far forward as possible. Contact maintenance teams, such as the Missile Repair Teams, are teams operating from the BSA that are designed to move forward to provide support. Contact Maintenance Teams are task organized as the situation warrants and are not formally organized.

3-57. The field maintenance company retains maintenance capability in the BSA due to limited resources and mobility of certain pieces of test equipment. The base maintenance sections provide dedicated field maintenance on an area basis to brigade troops, as well as backup support to the CRTs and maneuver battalions. The MCS maintains automated maintenance systems to support separate companies and the BSB. Base Repair sections can perform contact maintenance missions as required depending on the criticality of the NMC system and METT-TC. The MCS assesses all vehicles requiring recovery to determine if they can be returned to a mission-capable status. Maneuver units will employ like-vehicle recovery to the greatest extent possible. When this is not a reasonable alternative, the inoperable vehicle may be recovered to the CRT or the BSA location either by the CRT or the forward maintenance company recovery assets.

3-58. Requests for Class IX resupply will be near real-time and originate at a maintenance node (CRT or base shop) and travel through maintenance LIS' to the supporting Class IX activity. Requests may also be sent via the FBCB2 or voice communication as an alternative. This alternative requires additional time and effort to input the necessary fields in the system so that a part can be ordered. Unserviceable repairable Class IX items will be turned in to the supply system and subsequently retrograded via normal supply operations by EAB.

3-59. Maintenance management in the BSB SPO will require close coordination and collaboration between the Battalion/Brigade S-4s, the support operations staff, CRTs, and the MCO.

LOGISTICS SUPPORT TO THE BCT

3-60. Accurately reporting the logistics status is essential to keeping units combat ready. SOPs should establish report formats, reporting times, and FM voice brevity codes to keep logistics nets manageable. The FBCB2 system helps gather sustainment data. It does this through logistics situation reports (LOGSITREP), personnel situation reports (PERSITREP), logistical call for support, and logistics task order messaging, SA, and task management capabilities. This functionality affects the synchronization of all logistics support on the battlefield between the supported and the supporting. At the BSB and BCT levels, BCS3 collects logistics data from LIS throughout the BCT to provide actionable logistics information to support logistics related decisions. BCS3 has a running estimate of combat power readiness tools that gives the commander and planners the latest available status of critical weapons systems, fuel, ammunition, and personnel. BCS3 also provides a map-centric view of inbound vehicles and/or cargo that are equipped with movement tracking devices.

3-61. Although logistics planners may have data available from BCS3, FBCB2 logistics, and personnel status messages, it might need to use nonstandard text messages to identify equipment and personnel issues. The logistics staff must be proactive in identifying and solving maintenance issues by:

- Using FBCB2, BCS3 and other ABCS to maintain maintenance SA.
- Working closely with higher headquarters' staff to resolve maintenance problems.
- Recommending maintenance priorities that conform to mission requirements.
- Recommending maintenance-related CCIR.

SECTION V – CL IX REPLINISHMENT OPERATIONS AND TECHNIQUES

3-62. CL IX Replenishment Operations (ROs) are preplanned sustaining operations that allow combat forces to replenish routinely. An RO is a deliberate, time sensitive logistics operation. It can be conducted by the BSB to replenish its FSCs and by the FSC to replenish the combat loads of individual Soldiers and weapons platforms. These operations, which may be augmented with assets from the Sustainment Brigade, are quick and in-stride with the supported commander's battle rhythm. The purpose of RO is to replace stocks within a BCT or support brigade. This replacement may be either deliberate or hasty depending on circumstances. Typical logistic activities that take place include rearming, refueling, and fixing to meet immediate needs.

3-63. The most efficient re-supply of CL IX for tactical units is accomplished by logistics packages (LOGPACs). LOGPACs are organized by the company supply sergeant under the supervision of the FSC commander and the distribution platoon leader; the HHC XO may be directed to assist with this supervision based on METT-TC decisions by the battalion XO or commander. LOGPACs are organized for each company/separate element in the battalion on a replenishment cycle as determined by the needs of the units. LOGPACs' are organized and dispatched as required by the tactical situation and logistical demands. The S-4

must plan and coordinate logistics operations to ensure they fully support the commander's tactical plans. The battalion SOP establishes the standard LOGPAC and how the logistics mission is executed. Battalion Support Areas.

3-64. A combined arms battalion, fires battalion, reconnaissance squadron, or infantry battalion may echelon trains by locating the field trains with the BSB in the BSA and positioning the combat trains centrally within the maneuver/fires battalion assembly areas. However, when METT-TC conditions dictate such a minimal risk and the desire is to have the FSC closer to its supported unit, the brigade does not form a BSA with unit field trains. In this case, the maneuver battalion establishes unit trains in the center of its assembly area. This technique is more efficient and extends the supported battalion's reach, since the modular BSB is designed to push replenishment to the supported battalion's FSC with distribution company assets.

COMBAT TRAINS

3-65. The company combat trains provide logistics for a company during combat operations. Company combat trains usually include the 1SG, medical support, supply sergeant, and the armorer. Generally, the FSC provides a FMT with capabilities for maintenance, recovery, and limited class IX. The unit supply sergeant may co-locate in the battalion combat trains, if it facilitates LOGPAC operations. The 1SG usually directs movement and employment of the company trains; although the company commander may assign the responsibility to the company XO.

Field Maintenance Point

3-66. The field maintenance point is located on the battlefield in the combat trains area. The FSC Commander must coordinate with the battalion S-4 for site selection. Locate the field maintenance point in an area that facilitates effective radio communication with the FMTs. Consider METT-TC in the overall determination. Generally locate as far to the rear as communications allows during defensive operations and locate as far forward as possible during offensive operations.

FIELD SITE SELECTION AND LAYOUT

3-67. In a maintenance operation, the objective of a good layout is to facilitate the flow of work through the shop and to reduce movement of repair parts, tools, equipment, and personnel. Field environments seldom permit a unit to operate under ideal conditions. The layout must be defendable and consider METT-TC. Figure 3-1 shows an example of a typical maintenance company field site layout.

SITE SELECTION

3-68. When selecting a field site for maintenance operations consider an area that is reasonably flat with good drainage, firm enough to permit parking and movement of heavy vehicles and equipment, and easily accessible to supported units.

3-69. Any terrain features in the area that facilitate unit defense must be considered in planning. Streams or marshes can provide flanking security. Hills can provide observation and facilitate fire on avenues of approach. Built-up areas inherently enhance mission support capabilities but may present a challenge for defending.

LAYOUT

3-70. The following are the principles to consider when laying out an area: location, work sections within ready access to the external road network, supply storage areas close to a road to permit easy access for trucks, easy

access of all maintenance shops, and recovery elements in the vicinity to facilitate support and movement of vehicles.

3-71. The Maintenance Control Section and Shop Supply should be near the entrance to the company area. Insure maintenance areas provide vehicle dispersion and that the area is capable of being defended, using the terrain's natural defense characteristics to augment the defense plan and unit capabilities.

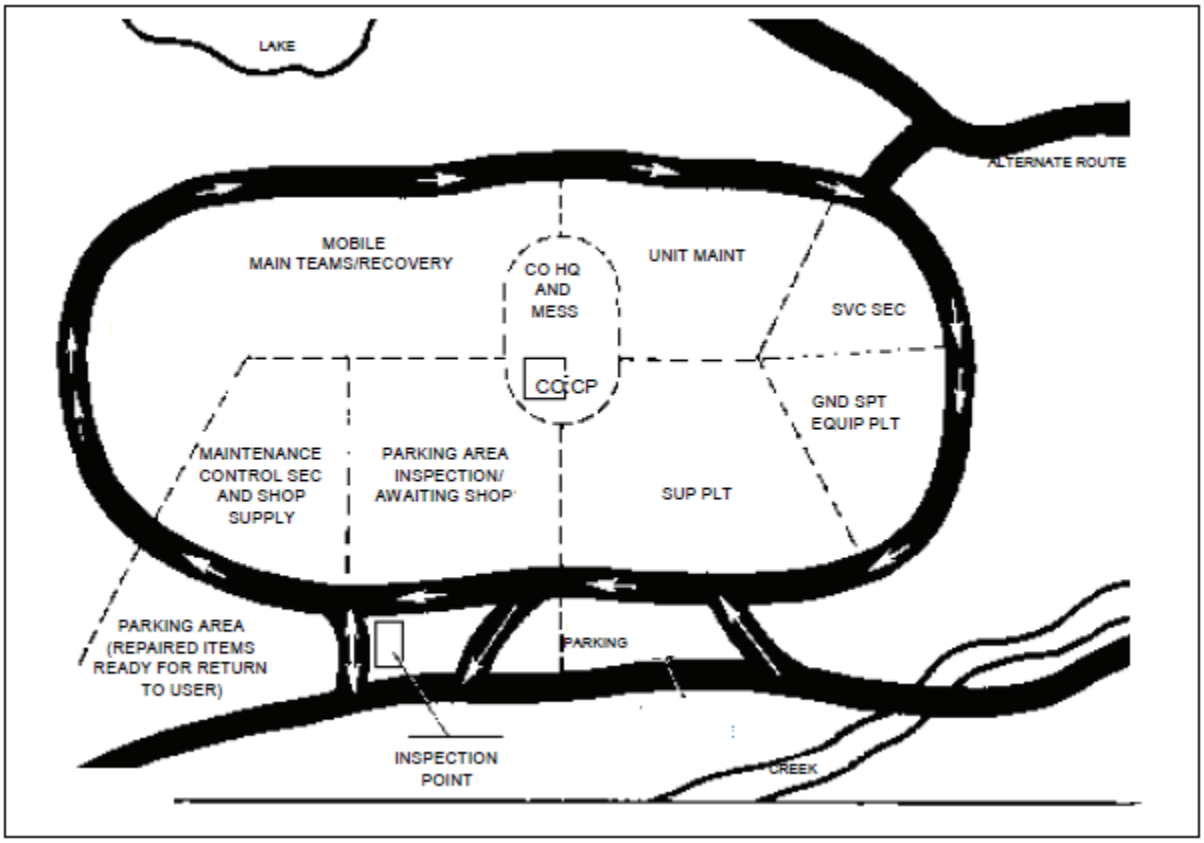

Figure 3-1. Maintenance Company Field Site Layout

SECTION VI – RECOVERY OPERATIONS

3-72. Recovery is the process of repairing, retrieving/freeing immobile, inoperative, materiel from the point where it was disabled or abandoned. Recovery prevents enemy capture of equipment and uses enemy equipment to support the United States and friendly forces intelligence collection.

RESPONSIBILITY

3-73. The FSC has recovery assets located in the Field Maintenance Platoon and the FMTs forward with the company. The FSC commander along with the battalion S-4 track and manage recovery operations.

3-74. Maintenance units are responsible for recovering their own organic equipment and provide limited backup support with wreckers or tracked recovery vehicles when requirements exceed a supported unit's capability. They may also be tasked to provide recovery support on an area basis to units without a recovery capability.

MANAGEMENT

3-75. The FSC Commander and supported BN S-4 coordinate recovery operations supporting 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. The general principles that apply to the management of recovery operations are: manage, coordinate, equipment, location, and prioritize.

3-76. **Manage.** Centralized management and synchronization of recovery operations at the battalion level whenever possible. This does not preclude delegation of recovery authority for specific operations to the BSB.

3-77. **Coordinate.** Recovery operations should be coordinated with the maintenance effort and commander's priorities. Maintenance personnel repair equipment as far forward as possible within the limits of the tactical situation based on the amount of damage and available resources. Use maintenance time guidelines established by the commander to make repair-or-recovery decisions.

3-78. **Equipment.** Use the right recovery equipment for the recovery mission. Tracked recovery vehicles normally recover tracked equipment while wheeled wreckers normally recover wheeled vehicles. When a unit has only limited assets, it is very critical to select the right recovery vehicle for the mission.

3-79. **Location.** Keep recovery vehicles as far forward as the tactical situation permits. This keeps them available for immediate response as needed. The FSC Commander and the S-4 coordinate recovery and retrograde requirements and may request additional support from the BSB SPO.

3-80. **Prioritize.** Establish recovery priorities when recovery assets are limited. These depend on the commander's need for an item and the tactical situation. The type of maintenance or repair required affects the priority when two or more like items must be recovered. As a general rule, always recover weapons systems before tactical vehicles.

PROCEDURES

3-81. There are four steps in equipment recovery procedures. Table 3-1 outlines the procedural steps for equipment recovery.

Table 3-1. Equipment Recovery Procedures

Action
When the equipment operator and crew detect an inoperable condition, they should: • Assess the damage and cause of the inoperable status. • Initiate action based on their analysis and the tactical situation.
Operator/crew/field maintenance personnel use organic repair and recovery capability, including: • BDAR techniques. • Self-/like-vehicle recovery. • Assistance from other unit's on-site when unit-level recovery resources are insufficient or unavailable.
Unit requests assistance from the FSC located in the BSA. Requests must provide the following information: • Unit identification. • Equipment identification. • Location (map coordinates, when possible). • Equipment Fault. • Evaluation of on-site repair capability. • Repair parts required. • Organic recovery capability. • Tactical situation and security requirements. • Recommended route of approach. • Until equipment is recovered, the operator/crew must remain with the equipment and follow unit SOPs.

Action
Once the operator and crew initiate recovery procedures, they should: • Take cover. • Provide local security. • Wait for assistance. • Assist maintenance/recovery personnel on their arrival with the recovery action.

REPAIR AND RECOVERY CONSIDERATIONS

3-82. The key unit personnel responsible for developing the units repair and recovery plan are the BN S-4 and FSC Commander. They develop a plan of action for repair and recovery of the disabled equipment based on the request for assistance.

3-83. **Action Plan.** The BN S-4 and FSC Commander develop an action plan that includes battle damage assessment (BDA), establish priority for support, tactical situation, workload, and availability of maintenance and recovery personnel.

3-84. **Checklist.** The FSC Commander assigns the repair/recovery mission to the FMP. The FMP is provided a unit checklist containing the following information: breakdown location/grid coordinates, cause of the breakdown, specific designation of required support (such as personnel by rank, MOS, equipment and quantity), and supply requirements (Class I, III, V and IX).

3-85. The tactical situation should address movement restrictions, primary and alternate routes of march, individual clothing, equipment and CBRNE defense items, equipment and supplies to decontaminate the disabled vehicle, communications equipment availability (including applicable call signs, primary and alternate frequencies, and required reports), security/safety requirements, special instructions regarding the disposition of contaminated equipment, contingency plans, and any special tactical considerations.

3-86. **Special Considerations.** Recovery personnel require special training of the following when recovering abandoned or unmanned equipment:

- Should be trained to identify contamination and search for improvised explosive devices (IED).
- Must wear MOPP when chemical contamination is suspected.
- Must be trained to clear or disarm the weapons systems to prevent accidental discharge.

3-87. **Abandoned Equipment.** Once the recovery team makes the equipment safe, it proceeds with the recovery operation. The equipment is inspected to assess the damage and determine repair or recovery requirements. The recovery team submits a situation report (SITREP) to the FSC Commander. The FSC Commander may direct repair/recovery of equipment or it may send additional parts or personnel. The recovery team proceeds with repair/recovery as directed.

3-88. If the FSC Commander cannot be contacted, the recovery team proceeds with the original plan or they modify it based on judgment, the commander's priorities, and the unit SOP.

3-89. During defensive operations, recovery teams recover equipment to a coordinated location. From there they coordinate its removal to the field maintenance point as the situation permits.

3-90. During offensive operations, recovery teams recover to the MSR/ASR. From that point, the BSB's SPO is notified of the location of the equipment. In turn the BSB SPO informs the Sustainment Brigade. The Sustainment Brigade devises a recovery plan based on the guidance from the TSC/ESC.

3-91. **Recovery Destination.** There are many items that may influence the recovery team's ability to recover equipment to a destination such as the tactical situation, recovery vehicle requirements, workload, available resources at the field maintenance point, and the extent of repairs required.

3-92. **Night and Limited Visibility.** Sometimes the tactical situation prevents access to disabled equipment. When that occurs, the FSC Commander 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.

3-93. Recovery operations at night or during limited visibility are generally the same as during daylight. Recovery elements may require night vision devices and additional personnel assistance for ground guides. In some cases, the mission may require the tactical commander to compromise light and noise discipline. When tactical elements are conducting night or limited-visibility operations, maintenance units must anticipate a potential increase in workload.

3-94. **Foreign Materiel.** 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.

3-95. The capturing unit may be directed to retrograde the item to a maintenance activity or the supporting technical intelligence unit. The unit may be instructed to guard the item and leave it in place for on-site preliminary examination by technical intelligence personnel. When materiel does not need to remain in place for intelligence evaluation and the discovering unit is incapable of retrograding it, the unit may request recovery and retrograde assistance from the Sustainment Brigade, CSSB, or BSB.

3-96. **Explosive Items.** The presence of ammunition and explosives often complicates recovery. Personnel must remain constantly alert and should presume abandoned items are rigged with IEDs. Exercise caution to prevent explosion, fire, or accidental weapon discharge. When unexploded ammunition is found or suspected, request assistance from an Explosive Ordnance Disposal (EOD) team.

3-97. If quantities of abandoned ammunition are found during recovery operations, leave the ammunition in place and notify the nearest EOD unit immediately. Do not, **under any circumstances,** attempt to touch or move abandoned ammunition.

SECTION VII – BATTLE DAMAGE ASSESSMENT AND REPAIR

3-98. Battle Damage Assessment and Repair (BDAR) is the procedure used to rapidly return disabled equipment to the operational commander by field-expedient repair of components. BDAR restores the minimum essential combat capabilities necessary to support a specific combat mission or to enable the equipment to self-recover. BDAR is accomplished by bypassing components or safety devices, fabricating repair parts, or implementing a temporary repair, using substitute fluids, materials or components.

3-99. Battle damage assessment is used to appraise systems status. This effort shows the number of items destroyed or damaged beyond repair in the forward area and the number that can be repaired forward. 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 and procedures refer to FM 4-30.31, Recovery and Battle Damage Assessment and Repair.

COLLECTION AND CLASSIFICATION OPERATIONS

3-100. Maintenance units can operate collection activities, which salvage useable components from damaged or nonreparable Class VII items. The maintenance units can attach teams forward in the AO, at the direction of the DMC, to expedite component and end item collection, classification and disposition.

CONTROLLED EXCHANGE AND CANNIBALIZATION

3-101. Controlled exchange is the removal of serviceable components from unserviceable but economically reparable equipment for immediate reuse in restoring another like item of equipment to combat serviceable condition. The unserviceable component must be used to replace the serviceable component or retained with the end item that provided the serviceable component. Refer to AR 750-1 for more information on, and regulatory guidelines for, controlled exchange.

3-102. Cannibalization is the authorized removal of components from materiel designated for disposal. It supplements supply operations by providing assets not readily available through normal supply channels. During combat, commanders may authorize the cannibalization of disabled equipment only to facilitate repair of other equipment for return to combat, no parts will be cannibalized for stockage. Costs to cannibalize and urgency of need should be considered in the determination to cannibalize. Cannibalization of depot maintenance candidate items, controlled exchange, or component parts by field organizations is prohibited. Exceptions will be made only in urgent cases supporting field operational readiness requirements and then only with the written concurrence of the USAMC major subordinate command. Cannibalization is not authorized during peacetime without approval from the appropriate USAMC LCMC. Refer to AR 750-1 and AR 710-2 for more information on cannibalization.

SECTION VIII – RETROGRADE AND RECONSTITUTION OPERATIONS

RETROGRADE OPERATIONS

3-103. Overseas commands retrograde materiel to support/staging bases within theater or CONUS. Retrograde cargo normally consists of unserviceable, economically reparable items and weapon systems destined for sustainment level repair. However, reclamation operations involve the removal of serviceable or economically reparable components, assemblies, and repair parts from end-items or large components classified as uneconomically reparable. Reclamation operations significantly reduce demands on the supply system.

RESPONSIBILITY

3-104. The various areas of responsibility for retrograde operations are listed below:

- The TSC, in coordination with commodity commands, establishes the type, quantity, and condition of equipment for retrograde.
- The TSC develops and publishes criteria for maintenance units. Materiel managers identify retrograde items as far forward as practical to prevent unnecessary handling and shipment. The TSC coordinates and directs all retrograde shipments.
- When required, the TSC publishes updated lists of items to be retrograded with the quantity and destination of each. They also coordinate transportation requirements for retrograde cargo.

PROCEDURES

3-105. Table 3-2 gives an example of how materiel is reclaimed, based on the assignment of a serviceable, reparable, or uneconomically reparable condition code.

Table 3-2. Material Reclamation Procedures

Serviceable Item	Reparable Item	Uneconomically Reparable Item
The serviceable engine of an otherwise destroyed tank is placed back into the supply system.	The unserviceable yet reparable transmission of the destroyed tank is directed to the proper maintenance activity for repair and eventual return to the supply system.	The totally destroyed hull of the tank is designated as scrap through the Property Reutilization Office.

SUPPORT PRIORITY

3-106. Maintenance is concentrated on those weapons systems and materiel directly required to support the retrograde operation. Priority of support should be given to units that have completed the movement to the next location and are preparing a new position. Emphasis must be placed on items that can be repaired most readily. Other equipment should be moved directly to future planned support areas.

EQUIPMENT RECOVERY

3-107. Recovery is of the utmost importance to prevent enemy capture of destroyed equipment that cannot be repaired. The first method of choice is self- and like-vehicle recovery and should be conducted IAW published safety standards. Wheeled and tracked recovery vehicles are used at critical points to keep the route of march open.

3-108. Recovery equipment is critical to the support of retrograde operations. Its use must be controlled and coordinated. Recovery equipment should be marshaled at critical locations to keep routes open and to recover all materiel possible. Specific instructions must be provided for destruction of supplies and equipment.

PLANNING

3-109. Maintenance managers at all levels continuously plan maintenance support throughout the retrograde operation to keep the maximum number of weapon systems operational. Maintenance efforts should concentrate on "quick fix" items, using assemblies brought forward to facilitate rapid turnaround of weapon systems. Maintainers should seek commander's authorization to use, controlled exchange and cannibalization.

RECONSTITUTION OPERATIONS

3-110. Maintenance is an essential element of reconstitution. Reconstitution is an extraordinary action used to restore units to a desired level of combat effectiveness commensurate with mission requirements and available resources. No resources exist solely to perform reconstitution. It is a total process whose major elements are reorganization, assessment, and regeneration. FM 100-9 contains more information on reconstitution.

ASSESSMENT AND REGENERATION

3-111. Assessment and regeneration is done as far forward as possible so units may return to combat with minimum delay. It occurs normally in the support area two levels higher than the unit being reconstituted. It measures a unit's capability to perform its mission and evaluates regeneration needs. Maintenance support of these operations initially consists of assessing the damage. It then shifts to repairing as many weapon systems as possible to meet the commander's priorities.

SUMMARY

3-112. Maintenance support is a flexible, decentralized operation (maintenance execution) capable of keeping up with shifts in the operational pace. Centralized control (maintenance management) provides maximum resources used to accomplish the mission. The maintenance support concept focuses on sustaining operations by maximizing equipment availability. It strives to create a seamless system operating across strategic, operational, and tactical levels, interweaving and mutually supporting all levels of maintenance for maximum effectiveness.

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Chapter 4

Maintenance Management

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

SECTION I – MAINTENANCE MANAGEMENT PROCESSES

MANAGING BATTLEFIELD MAINTENANCE

4-1. When a shift or change in priorities could provide a greater overall return, 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. When requirements have been identified, the maintenance manager must identify the resources on-hand and those already committed. Available resources are then managed within the established support framework to return the maximum number of items to a fully mission-capable status.

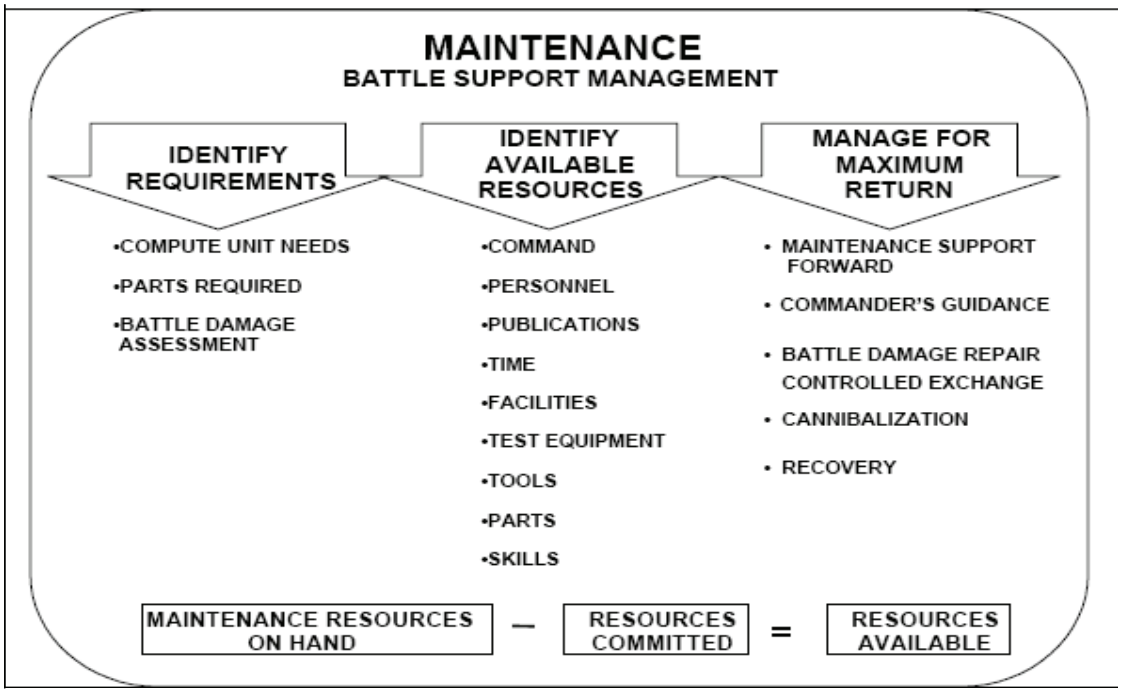

Figure 4-1. Managing Battlefield Maintenance Support

MAINTENANCE MANAGEMENT PROCESSES

4-2. The maintenance management functions include forecasting, scheduling, production control, quality assurance, technical assistance, resourcing repair parts, work loading/cross-leveling regional workload, and developing reparable programs to meet local, regional, and national needs.

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. Safety concerns must be addressed in the SOP and Operation Orders (OPORDs).

SUSTAINMENT MAINTENANCE

4-4. Sustainment maintenance structures and operations are based on requirements generated by the ASCC and TSC, in coordination with the USAMC. Sustainment maintenance leadership will perform the following:

- Provide sustainment functional training to TSC Maintenance/Supply Directorates.
- Assist ASCC/TSC managers concerning sustainment maintenance issues in order to optimize capabilities.
- Assist in planning and updating theater-focused maintenance support plans to capitalize on fixed-base and mobile maintenance capabilities, including review of maintenance MOS proficiencies to support assigned missions.

4-5. The sustainment maintenance information management systems include connectivity with current maintenance and supply STAMIS. They also recommend pre-assigned maintenance support routing identifier code (RIC) instruction to TSC/ESC for in-theater and strategic base (CONUS/OCONUS) integrated sustainment maintenance operations.

Sustainment Maintenance Managers

4-6. The various maintenance management functions are classified as readiness and sustainment. 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 are assigned to support battalions supporting brigade-sized units.

4-7. The USAMC Sustainment Maintenance office integrates sustainment maintenance for the total Army. The office recommends support structure to the Combatant Commander and implement policies and procedures that provide optimal sustainment maintenance support to full spectrum operations creating a seamless process, transparent to the user.

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

4-9. Regional and theater sustainment maintenance management offices manage the execution of sustainment maintenance requirements in a designated region or theater. They oversee local sustainment maintenance operations and evaluate their performance. Within CONUS there are two operational Regional Sustainment Maintenance Manager offices; one in the East Region and one in the West Region. There are also OCONUS offices in Europe, the Pacific, and Korea.

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 collocated with and support the materiel maintenance officer within an installation, staff, or for the National Guard, 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 (DOMs, ARNG maintenance facilities) perform regional integrated sustainment maintenance and national work as assigned. Associate maintenance activities report work they laterally transfer and receive to other integrated sustainment maintenance sites and other installations to their designated offices for control and tracking. ACOM's designate which installations function as associate maintenance activities. These work centers are maintenance activities within the ACOM's existing installation infrastructure.

4-12. Sustainment maintenance managers at corps and above focus on materiel management. They focus on fixing by repair, sustaining units, and supporting joint/multi-national equipment and standard Army systems. Sustainment maintenance managers are assigned to Theater and support commands. Managers use their maintenance knowledge, experience, and management interfaces to determine potential problems and to facilitate resolution of those problems.

SECTION II – LEVELS OF MANAGEMENT

4-13. Maintenance operations must have careful direction, supervision, and management. These functions are accomplished at the company and higher HQ levels. The higher HQ element concerned with maintenance operations are the TSC Distribution Management Center Materiel Readiness Branch, the Sustainment Brigade Maintenance Branch and the BSB Support Operations Readiness Section. The chain of command and other supporting units provide technical assistance on request. Close coordination with the readiness branch, maintenance branch, and the battalion’s support operations office is essential.

4-14. Un-programmed requirements have a significant impact on the maintenance mission. The materiel readiness branch, maintenance branch, and the support operations office must identify known requirements in advance. Commanders and supervisors seek out information, predict future requirements, and assess requirements for their impact.

TSC/ESC DISTRIBUTION MANAGEMENT CENTER

4-15. The Distribution Management Center (DMC) acts as the distribution management support element for the assistant chief of staff for support operations. It provides staff supervision to the TSC materiel readiness branch and Movement Control Agency. It synchronizes operations within the distribution system to maximize throughput and follow-on sustainment, and executes priorities in accordance with ARFOR Commander directives.

4-16. The DMCs combine materiel management and support operations into one robust distribution center. The DMCs use total asset visibility (TAV) and in-transit visibility (ITV) to track shipments, establish priorities, and coordinate transportation. The DMC is the logistics execution control center in the TSC and sets sustainment priorities.

4-17. The SPO is the link between planning and execution of strategic-to-operational level logistics. The SPO, by exercising staff supervision over the DMC, maintains visibility, capacity, and control of the distribution pipeline. Through the coordinated efforts of its internal branches, the DMC, exercises control over logistic operations into, within, and out of the theater.

MATERIEL READINESS BRANCH

4-18. The materiel readiness branch within the DMC is the maintenance manager for deployed Army forces. It is the link between the deployed forces and the support base. The materiel readiness branch maintains a close working relationship with the AFSB to synchronize sustainment maintenance units for work loading. The materiel readiness branch may also support equipment of other services or multi-national forces. The materiel readiness branch performs integrated materiel management for automotive equipment, tactical wheeled vehicles, general-purpose vehicles, construction equipment, material handling equipment, power generation equipment, signal equipment, and aviation maintenance. It also coordinates the development of maintenance policy and programs: exercises staff supervision of sustainment maintenance operations; enforces priorities established by ASCC; assists in determining appropriate positioning of maintenance assets; conducts analysis of maintenance capabilities and requirements; makes recommendations to the commander; provides maintenance data reports; and supervises equipment modernization plan execution.

BRIGADE/BATTALION LEVEL MAINTENANCE MANAGEMENT

SUPPORT OPERATIONS OFFICE

4-19. The Brigade/Battalion Support Operations Office (SPO) coordinates all maintenance operations. It provides guidance on maintenance priorities, and sets objectives for production. The SPO coordinates and integrates the brigade's field maintenance mission and is a key element in maintenance data collection ensuring its units provide automated data and generate appropriate maintenance reports.

4-20. At the battalion level, the SPO manages supported customer units. They supervise, control, and direct the operation of battalion units for field maintenance, recovery, repair parts supply, and technical assistance. The relationship between the Support Operations Office and Shop Officers is vital to mission success.

4-21. The CSSB/BSB SPO advises the Sustainment Brigade on maintenance and repair parts supply matters. These include recommendations concerning personnel, facilities and equipment requirements, maintenance performance, repair parts supply status in addition to reporting the state of materiel readiness, deployment, and employment of battalion units.

COMPANY LEVEL MANAGEMENT

4-22. Maintenance management at company level is focused on each job. The maintenance mission is resourced and accomplished at company level. It is here that the assets of personnel, time, and repair parts must be managed most effectively to provide the best support possible with the resources available.

4-23. 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, quality assurance, and motivation.

4-24. **Production Control.** Production control involves production planning, scheduling, proper routing/rerouting of work, attaining maximum production by keeping all shop elements working at or near capacity, and proper shop layout.

4-25. **Workload Analysis.** Workload analysis is part of the overall production control process. It requires a continuous review of work in process as well as new work and it is a prime responsibility of the Maintenance Control Section (MCS). It helps prevent over commitment of resources with unrealistic priorities and deadlines. Analysis is continuous and is aided by the use of automated SAMS-E outputs.

4-26. **Estimating Maintenance Requirements.** In order to forecast maintenance workload, the MCS of each maintenance unit maintains a current operations map and equipment density list. The operations maps show personnel the location of adjacent units, supply distribution points, aircraft landing areas, and denote field maintenance point locations. Equipment density lists keep personnel up-to-date on how much equipment is supported and where it is.

4-27. **Work Simplification and Measurement.** Work simplification and measurement is applied in every unit. Work measurement standards are developed and applied to measure and compare work of repairers. Maintenance units engaged in similar types of operations. Units keep records that show production results on a week-by-week basis.

4-28. The most efficient repairers can be compared 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/BSB has information obtained from production reports of other units to permit comparison of production among units or individuals performing the same type of work. Work simplification techniques may, in themselves, uncover ways to improve unit layout to eliminate wasted effort and movement.

4-29. **Total Army Quality Management.** Total Army quality management is a management technique used to supplement quality control 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 quality control problems. Total quality management should be applied in all units, at all times, in all functions. For more information on total Army quality management refer to AR 5-1.

4-30. **Quality Assurance and Quality Control (QA/QC).** The objective of QA is to produce high-quality work the first time. A valuable QA program is essential for proper, effective, and efficient performance of any level maintenance mission. It covers all actions necessary to provide adequate confidence that materiel, data, supplies, and services conform to established technical and performance requirements. QA as a function must be separated from production control (PC). This separation of QA and PC 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. Additional QA measures are provided in the form of technical and process-oriented assistance visits and inspections from higher HQ. Regardless of the source, QA focuses an independent set of eyes on products and processes to ensure standards are met.

4-31. Quality control is a separate and distinct function. It is a leadership function and must be applied to all aspects of unit operations, including initial, in-process, and final inspections. Persons performing QC functions must be trained and motivated to balance quality concerns with production concerns.

4-32. **Technically-Oriented QA/QC.** As equipment, requiring repair, works its way through a maintenance organization, it is subjected to a series of inspections, which demonstrate the interplay between QA and QC. Initial, in-process, and final inspections all represent opportunities for QA to overlay QC. This happens most frequently as the repair work nears completion. Repairmen/repair teams accomplish the tasks necessary to complete the job, subject to in-process QC inspections at both random and critical points in the work. Upon completion, a supervisor conducts a final QC inspection before sending the equipment for a final QA inspection. At each inspection point, QC directs corrections of the repairer's errors and positively reinforces the repairer's adherence to proper procedures. Similarly, QA personnel direct correction of QC shortfalls and positively reinforce adherence to standards by QC and production personnel. TMs appropriate to various items of equipment are the basic tools of QA and QC. Thorough familiarity with DA Pamphlet 750-8, AR 710-2, and AR 750-1 is required.

4-33. How QA/QC Pays Off. 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/QC results in Soldiers, supervisors, and leaders knowing proper procedures, correct standards, and most importantly, applying them in all processes. It is reinforced by an independent set of eyes assuring quality by validating achievement of the applicable standards. QA/QC pays off in the form of a high quality, more effective and efficient maintenance operation.

4-34. **Motivation.** Supervisors must continually motivate personnel to perform to Army maintenance standards. Commanders and shop officers must develop incentive programs that reward superior performance.

REPORTING SYSTEMS

4-35. Accurate reporting is the link between decentralized operations and centralized management. The measure of success of a maintenance manager is based on the ability to manage maintenance operations and maintain operational readiness standards. The Standard Army Maintenance System–Enhanced (SAMS-E) performs The Army Maintenance Management System (TAMMS) functions at the field maintenance level, and in most locations within the sustainment maintenance level.

SECTION III – MAINTENANCE CONTROL

4-36. 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.

4-37. A primary function of maintenance control is to reduce, and when necessary, correct overload conditions. While a maintenance section should always work at or near capacity, backlogs must be kept manageable. Overloads can be caused by poor management (at any level), lack of personnel, or continuous operations.

PROCEDURES

4-38. 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 MCS, commonly referred to as the "shop office," to accomplish production control functions.

4-39. The MCS normally contains a Maintenance Control Officer (MCO or "Shop Officer"), Senior Maintenance Warrant Officer, Maintenance Control Sergeant and Automated Logistics Specialists (specific numbers vary depending on the type of unit).

4-40. For operational purposes, the MCS 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

4-41. Maintenance control operations involve directing and controlling work flow. Maintenance control requires common sense, effective planning, close supervision, and prompt remedial action. It also requires the managerial tools to direct and control workflow through a maintenance shop in a manner that results in the maximum production of quality work.

COORDINATION

4-42. The MCS must effectively coordinate with the supporting Supply Support Activity (SSA) to ensure prompt availability of required repair parts and other maintenance supplies. The coordination steps include: schedule shop input, assign work to various shop sections to keep all shops working at capacity, carefully screening maintenance requests and inspection reports to ensure maximum repair. This may also involve shifting assets based on the availability of resources, capability of personnel, and shop capacity. The MCS must keep abreast of the status and quantity of work in each section and minimize overloads, take corrective action when necessary, and aggressively pursue repair parts that are not available within the unit.

OVERLOADS

4-43. A prime function of the MCS is to take action to reduce backlog conditions in any of the sections. Supported units expect prompt repair and return of items taken into maintenance. Backlog conditions in any of the shop sections can seriously delay repair operations to the detriment of the supported unit's mission. Backlog conditions can result from: required workloads temporarily exceeding the available capacity of one or more maintenance sections; temporary loss of maintenance capability in the maintenance section; competing priorities due to tactical operations; and reactive instead of proactive maintenance management.

4-44. To avoid backlogs, adhere to the following:

- Distribute work among the various shop sections to keep all sections working at or near capacity. Routing is the sequence of repair operations that ensures complete repair of each item in the shortest time possible. Any interruption in the normal flow of work needs immediate attention.
- Quick identification of hard to procure items or items with long lead times. The MCS should work with the available resources (Materiel Management Section, AFSB, SPO) to assist.
- Resolve the problem by rerouting work or supplementing the capacity of the backlogged section with personnel from other sections working below capacity. The battalion may also take action to realign missions, reduce workloads, or provide additional personnel.
- Analyze workloads during field operations. Available man-hours may be severely reduced by guard duty, defense operations, enemy attacks, weather, unit movement, set up, details, and so forth.

- Work with the chain of command to ensure necessary details are properly apportioned. Therefore, an overloaded section provides a few personnel for special requirements while another section that is not overburdened picks up the majority of the special duty.

MAINTENANCE CONTROL OFFICER

4-45. For an effective maintenance control operation, the MCO must have a thorough knowledge of the mission of the entire company, be thoroughly familiar with capabilities/capacities of the individual sections, keep informed of priorities assigned to supported units, expected workloads, shop progress, and maintenance supply status.

MANAGEMENT TOOLS

4-46. 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

4-47. Production methods used include bay shop, job/bench shop, on-site maintenance, and production line operations. The method used depends on the type of materiel to be repaired and the personnel, facilities, and time available.

Bay Shop

4-48. 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, personnel or equipment performing the same or similar jobs are grouped together in sections. The equipment to be repaired moves from one section to another at irregular intervals until the work is complete.

Job/Bench Shop

4-49. Job/bench shops are used to repair small items, items requiring a high degree of technical skill, or items requiring repair with equipment mounted in a shop vehicle. Work performed at stands or benches under maintenance shelters or in shop vehicles is considered job shop repair. Items repaired by this method include components, assemblies, small arms, fire-control instruments, fuel/electrical system components, electric motors, leather/textile items, communication/electronic equipment, and missile electronic items.

On Site Maintenance

4-50. On-site maintenance is usually performed by FMTs, CRTs, recovery teams or contact teams 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. Whenever standard maintenance is not possible, expedient BDAR procedures should be applied to restore minimum system function.

4-51. All of the teams providing on-site maintenance are organized based on known requirements. Therefore, before being dispatched, they should be fully informed on the problem (including type of equipment, malfunction symptoms, and anticipated repair), location (route, and link-up point), and requesting unit, point of contact, frequency, call sign, enemy situation and current threat.

Production Line

4-52. The production line is a production method primarily used by sustainment-level maintenance activities. The method is used to repair or overhaul several similar items when the repair sequence can be divided into a series of independent operations. Production lines provide the most efficient method for repairing a large volume of similar items when individual operations are not too complicated or time-consuming, and the item can be easily moved. The production line is a series of workstations through which similar equipment is passed. Work is performed in sequential order until the final product is repaired.

Technical Inspection

4-53. 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 its equipment to capture faults missed by operators and identify training deficiencies of both operator and mechanic. Accurate initial, in-process, and final inspections are vital in maintaining efficient maintenance operations and ensuring quality repairs. In addition, material classification inspections are performed to determine the overall serviceability and reparability of equipment.

Materiel Classification Inspections

4-54. 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 (if repairs can be accomplished) and whether the item is worth repairing. The objective is the efficient, rapid return of the greatest amount of materiel.

4-55. Qualified maintainers inspect materiel in accordance with instructions and specifications in technical manuals, technical bulletins, and sustainment brigade directives. The inspection results establish the materiel's condition code (classification). A complete listing of condition codes are provided in AR 725-50.

INITIAL INSPECTIONS

4-56. All equipment that comes in for maintenance action requires an initial inspection. This initial inspection or preliminary diagnosis is useful in determining if the operator/crew has been fulfilling their maintenance responsibilities. The inspection provides a basis to validate equipment faults, extent of work required, determine economical reparability, parts requirements, recommending further disposition, identify *ORF candidates, recommending financial-liability-investigation-of-property-loss action (when it appears that equipment damage or unserviceable condition is the result of misconduct or negligence, rather than fair wear and tear or battle damage), determining necessary maintenance tasks, and estimating required maintenance man-hours.

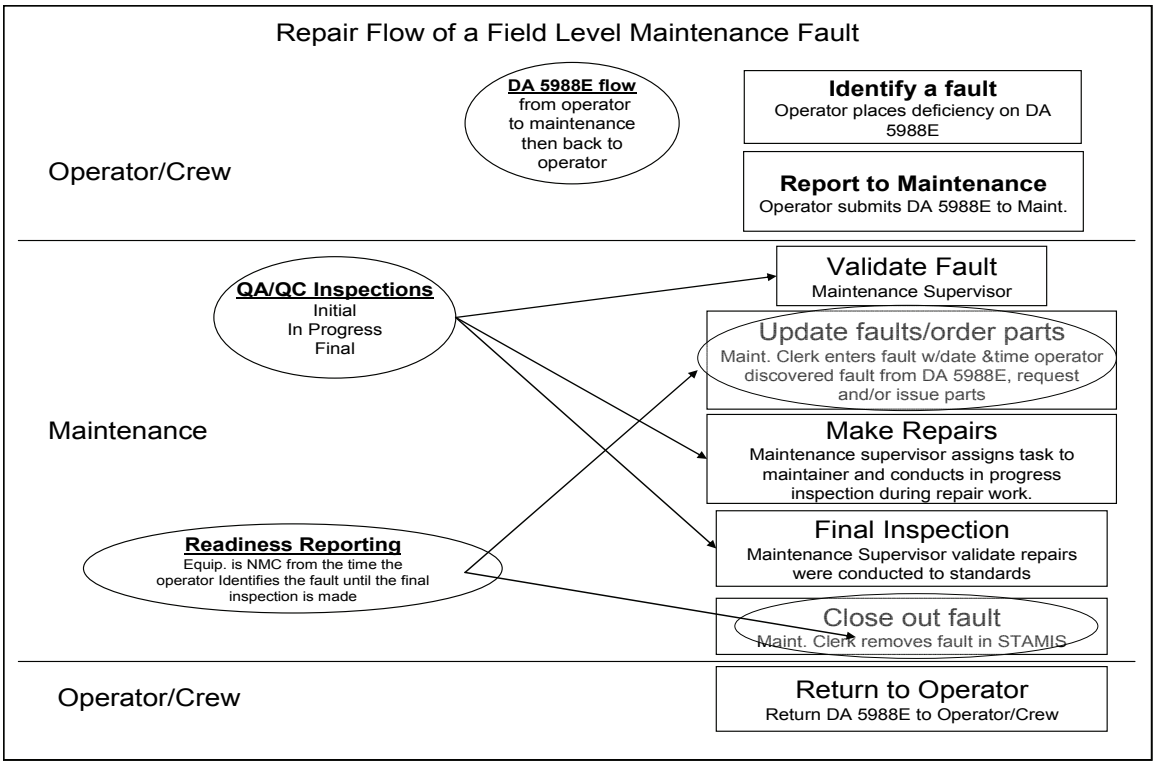

Figure 4-2. Field Level Maintenance Repair Flow Procedures

IN-PROCESS INSPECTIONS

4-57. 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

4-58. A final inspection is performed after the work is completed. This inspection determines the adequacy of repairs and requires an operability test to determine serviceability and safety.

WORK FLOW

4-59. Figure 4-2 illustrates a typical maintenance workflow for an item requiring field level maintenance repair. This workflow applies to all commodities. However, with slight modification it can be tailored for specific shop needs. It is important to note that the modified work flow retains the following key elements:

- Three QA/QC inspections, initial, in-process, and final.
- DA 5988E should be routed back to the operator/crew.
- Readiness reporting at the point of fault identification until fault correction.

SUMMARY

4-60. Maintenance management takes on a different personality at each level. The common denominator remains the ability to forecast, plan, and employ maintenance assets. By utilizing the proper maintenance management techniques the unit will be able to fulfill its maintenance requirements.

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Chapter 5

Repair Parts Supply Operations

This chapter discusses supply support operations and repair parts supply. Repair parts supply support is a crucial part of all maintenance operations. Maintenance organizations require repair parts as well as tools and test equipment to execute their field and sustainment maintenance missions. Army supply policy governing supply support operations is found in AR 710-2. Repair parts used by units are found in the following two areas:

- Supply Support Activity (SSA).
- Maintenance Shop Supply.

The SSA performs all functions related to receipt, storage, and issue of supplies for the BCT/BDE, or within an assigned support AO.

Maintenance shop supply is the primary focus of this chapter. Shop supply obtains, accounts for, stores and replenishes supplies required for maintenance operations.

SECTION I – MAINTENANCE RELATED STOCKS

5-1. Shop supply receives, stores, and issues class IX supplies required to support the maintenance mission. These stocks are governed by AR 710-2 and DA Pam 710-2-1.

5-2. Shop supplies in deployable maintenance organizations will always be operated and maintained separately from the supporting SSA or stock record account. Typically, these stocks will be stored and issued from vans, trailers, or other conveyances and will be managed for short notice deployments.

5-3. Shop stocks and bench stocks in non-deployable organizations should be stored separately from the supporting SSA and positioned for immediate access by maintenance personnel to achieve maintenance process efficiency in support of the organization, system readiness, and critical Army programs.

5-4. These maintenance related stocks for both field and sustainment levels of maintenance are found in the four following categories: shop stock, bench stock, combat repair team/field maintenance team stocks, and on-board spares.

SHOP STOCK

5-5. 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. Approval authority for shop stock is the unit commander, the approval authority for bench stock is the maintenance control officer, in accordance with AR 710-2.

5-6. Shop stock is managed by the maintenance activity MCS office. Shop stocks are demand-supported repair parts and consumable items that are stocked by an MTOE, TDA, or JTA maintenance organization. These maintenance organizations provide services in response to requests from supported organizations in field commands to meet their commander's mission requirements, or in response to USAMC inventory managers to support Army sustainment programs.

5-7. Maintenance personnel request shop stock, repair parts and supplies from their supporting supply activity. These supplies are issued to the unit and are not part of an Authorized Stockage List (ASL).

5-8. Shop stock is used only by maintenance organizations 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.

BENCH STOCK

5-9. Bench stocks are managed by the using maintenance activities/sections. Bench stock consists of low-cost consumables, repair parts, and supplies used by maintenance shop personnel at an unpredictable rate. The MCO determines stockage requirements based on the essentiality of the items that the unit is to repair.

5-10. Bench stocks typically consist of common hardware, resistors, transistors, capacitors, wire, tubing, hose, ropes, webbing, thread, welding rods, sandpaper, gasket materiel, sheet metal, seals, oils, grease and repair kits. The repair parts authorized for inclusion in bench stock are small arms repair parts controlled inventory items code (CIIC) "U."

COMBAT REPAIR TEAM/FIELD MAINTENANCE TEAM STOCK

5-11. CRT/FMT stocks are those shop and bench stock items in a field maintenance activity that are selectively positioned with a CRT/FMT in accordance with priorities and requirements to effect readiness of a specific supported unit. The CRT/FMT stock is a subset of the parent maintenance activity's shop supply (shop and bench stock) and is replenished based on maintenance actions executed in the CRT/FMT.

ON BOARD SPARES

5-12. On board spares are repair parts carried on a platform or unit organic equipment authorized by the Technical Manual (TM) or the commander. On board spares are managed by the operator/crew. On board spares are considered consumed for accountability purposes and are not required to be accounted for within a STAMIS. The intended use for these items is to support the equipment on which they are mounted.

SECTION II – REPAIR PARTS MANAGEMENT

5-13. Units are authorized to stock repair parts to support their maintenance mission IAW AR 710-2. One of the most serious maintenance management issues is the inability to immediately obtain required repair parts. To help reduce delays and prevent a zero balances, maintenance managers should check to ensure requests are filled out correctly with a focus on priorities and advice codes. Supervisors must perform regular follow-ups on all requests and ensure the correct part is ordered the first time, and that stock numbers/part numbers are validated in the current catalog (FEDLOG) prior to submitting requisitions.

5-14. Consider alternate sources of supply to fill high priority requisitions such as controlled exchange, cannibalization points, and local purchase, and if obtained, cancel or redirect open requisitions for what has been obtained, and also capture demands.

GENERAL REQUISITION FLOW

5-15. Below are the key steps maintenance managers should be aware of in the requisition process for CL IX and other classes of supply.

- The mechanic or clerk enters the fault in SAMS-E. If the part is a stocked item in shop stock or CRT/FMT stocks, the part is issued against the vehicle fault and automatically a replacement part is requisitioned.
- If the part is not stocked, the parts requisition will be sent to the supporting Supply Support Activity. If the item is on hand, a materiel release order is issued to the unit and the item is placed into their parts bin. If the item is not on hand, the requisition is forwarded to the SARSS-2A/C located at the supporting materiel management team or TSC.

SUMMARY

5-16. Repair parts supply operations are the cornerstone to maintenance operations. Without the proper parts, an item can remain non-mission capable for an extended period of time. With a complete understanding of which stocks are authorized a unit can significantly reduce repair time and increase their readiness rates.

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Chapter 6

Test, Measurement and Diagnostic Equipment Calibration and Repair Support

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

SECTION I – GENERAL OVERVIEW

6-1. Test, Measurement and Diagnostic Equipment (TMDE) is defined as any system or device used to evaluate the operational condition of an end item or subsystem thereof to identify and/or isolate any actual or potential malfunction.

6-2. In general, TMDE refers to both general purpose (GP) and special purpose (SP) TMDE. TMDE-SP is developmental in nature for a specific weapon or support system. TMDE-GP can be used in a variety of applications and is normally procured as commercial off-the-shelf items. Types of TMDE range from torque wrenches in a toolbox to complex equipment supporting sophisticated weapon systems. The Army's TMDE program supports a number of technical parameters such as infrared, electro-optics, direct current, low frequency, microwave, RADIAC, mechanical, hydraulics, and pneumatics.

COMMANDER'S RESPONSIBILITY

6-3. Commanders at all levels are responsible for their unit's TMDE readiness, and in accordance with AR 750-43, will appoint a calibration coordinator to interact on their behalf with their assigned TMDE support activity.

COMPANY CALIBRATION COORDINATOR

6-4. The calibration coordinator is required to review the organization hand receipt to identify TMDE requiring support in accordance with TB 43-180. They must ensure each item is placed on the support TMDE activity instrument master record file, turn in supported items, and ensure all items returned from the support activity have a DA Label 80. All TMDE changes which include additions and/or deletions are managed by the organization TMDE Calibration Coordinator.

TMDE PROGRAM OBJECTIVES

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

6-6. The integrity of the Army's TMDE Calibration and Repair Support (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. Figure 6-1, reflects the hierarchy of calibration traceability.

SECTION II – ORGANIZATIONAL STRUCTURE

6-7. The typical Army TMDE support activity is configured with TDA or TOE resources. The size of the TMDE support activity and the expanse of its mission capabilities are dependent on the type and geographical dispersion of supported units. All TMDE support activities operate on an area or regional support basis. Military TMDE support teams are typically assigned to maintenance companies within FORCES command, ARNG, and selected ASCCs.

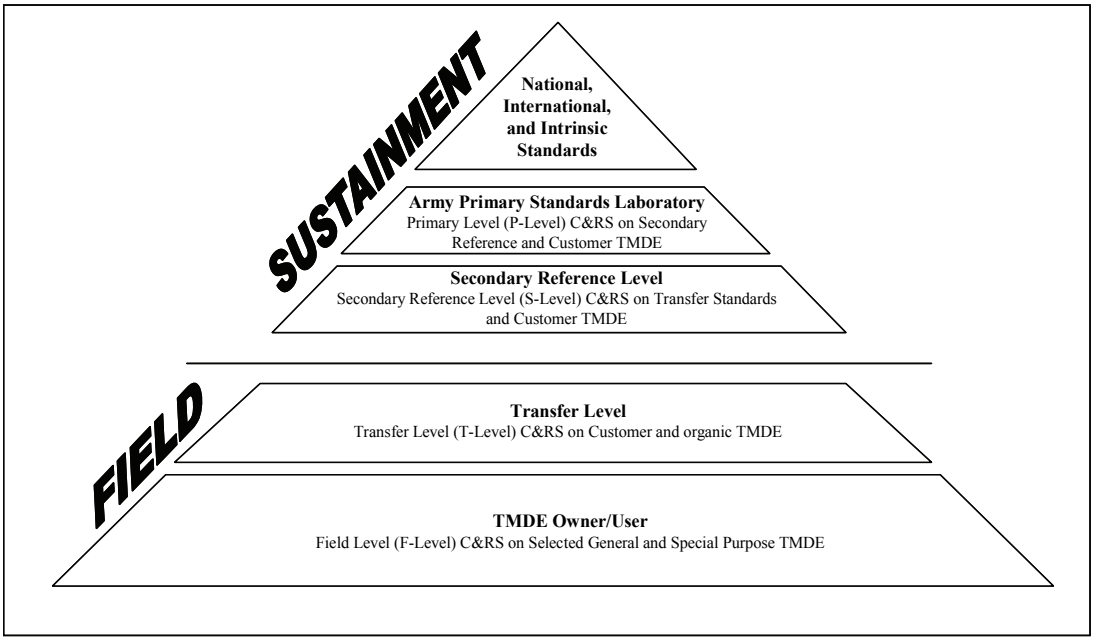

Figure 6-1. Hierarchy of Calibration Traceability

MILITARY AREA TMDE SUPPORT

6-8. **TMDE Calibration and Repair Support Expeditionary Operations Command and Control**. During expeditionary operations the Geographic Combatant Commander (GCC) will exercise theater Command and Control (C2) over all TMDE logistic assets in the current theater of operations. The GCC maintenance cell of the Sustainment Directorate will direct the supporting Army Service Component Commands (ASCC) and the Theater Sustainment Command (TSC) to develop a TMDE support Concept of Operation (CONOP). This CONOP will integrate the TMDE support capability within the GCC footprint into a modular construct that provides TMDE Calibration and Repair Support (C&RS) to TMDE owners assigned to, moving into or through the area of responsibility of the GCC and or subordinate commands. Coordination should be maintained through each of the maintenance cells located in the G4/S4 sustainment office of each command. A modular networked approach to TMDE support will ensure all TMDE customers have a coordinating cell within their immediate command. The higher headquarters needs to be completely aware of how to locate their TMDE support in theater for their units. Each higher headquarters can coordinate services based on the commander's priority and

operational conditions. Continuous coordination must be maintained within the maintenance network from early force entry through combat operations including stability and sustainment operations.

6-9. **Theater Sustainment Command**. The Theater Sustainment Command (TSC) will establish a TMDE liaison officer within the Command SPO staff. This TMDE liaison officer will provide expertise and technical assistance to subordinate sustainment brigades that have C&RS capability as well as TMDE owners. The liaison officer will also coordinate with AMC for civilian and contractor support of TMDE services if needed. The liaison officer shall maintain oversight of C&RS issues, metrics, and reports from subordinate commands to ensure TMDE services are appropriately work-loaded and adequate C&RS assets are on hand to sustain the force in a dynamic environment. The liaison officer shall be the primary coordinator with sustainment brigades that have C&RS assets through the maintenance cell located in the headquarters of the sustainment brigade.

6-10. **Sustainment Brigade.** Sustainment brigades are subordinate units of the Theater Sustainment Command. They consolidate functions previously performed by corps and division support commands and area support groups into a single echelon and provide command and control of the full range of logistics operations. Area TMDE Support Teams (ATST) will fall under the command and control of the sustainment brigade. Each ATST may be Operationally Controlled (OPCON) or Administratively Controlled (ADCON) by the sustainment brigade based on the support mission provided by the sustainment brigade commander. The Area TMDE Support Teams will provide calibration and repair to TMDE owners assigned to the sustainment brigade. Support will also be provided to units that require calibration and repair support within the sustainment brigade itself. One or more sustainment brigades may be assigned to support the GCC Area of Responsibility (AOR). Sustainment brigades that have a C&RS mission will establish communication with each other at the G-4 staff level within the SPO or maintenance cell to provide a theater level C&RS support infrastructure. This communication linkage provides the supported commands with the necessary information and support to ensure that all supported units that require C&RS within the GCC AOR are made aware of where their support is located and how to interface with the ATST for their required calibration and repair support. The sustainment brigades will maintain contact with the Theater Sustainment Command to ensure the Geographic Combatant Commander is able to continuously monitor calibration and repair support within the area of operation. This enables the Geographic Combatant Commander to direct the calibration and repair mission according to the theater commanders' intent and mission objectives. An Electronic Systems Maintenance Warrant Officer assigned to the Sustainment Brigade is responsible for providing management and technical support to the ATST.

6-11. **Area TMDE Support Team.** ATST's are usually assigned to a Maintenance Company within the Sustainment Brigade. Both Active and National Guard Area TMDE Support Teams are manned as 5 to 7-member teams using sets configured to provide one-stop C&RS for the Operational Army. Each ATST is capable of providing field level calibration and repair support to any Army unit that owns and/or uses general purpose or selected special purpose TMDE within the two-level maintenance support concept. The ATST also has the capability to provide split-based type support to forward deployed units that require calibration and repair support. However these smaller "sub-teams" are not able to provide full calibration and repair support services at established base clusters due to mission, environment, or location. The supported unit that requires a split-based type calibration and repair support will need to coordinate that requirement with the supporting sustainment brigade. The maintenance cell of the sustainment brigade will coordinate with the ATST and provide the requested/required services. Reallocating calibration and repair support assets requires prior coordination to ensure other priorities for calibration and repair support are not left uncovered. The ATST must advise the sustainment brigade maintenance support operations of calibration and repair support issues, trends, metrics and workload analysis. This information is to ensure the sustainment brigade has an accurate picture of the state of calibration and repair support within the support footprint of the support teams within its command. Due to the unique design and mission essential requirement of the calibration and repair support team it is

absolutely essential that each ATST remain unencumbered by the host or parent unit and allowed to perform its mission. The sustainment command is responsible for the successful C&RS mission and must maintain visibility of those ATSTs under their C2.

OTHER TMDE SUPPORT ACTIVITIES

6-12. The Active Army's TDA C&RS organizational structure is designed for flexibility relative to the theater mission requirements, while the capabilities to perform the core mission are contained at a single TMDE support activity. A carefully controlled network of TMDE support activities support all levels of the Operational and Generating forces. The US Army TMDE Activity (USATA) provides sustainment level C&RS for all Army components.

6-13. The ARNG's TDA C&RS is embedded in state-operated Combined Support Maintenance Shops. They provide field level support to TMDE owners within their state or region of responsibility.

TACTICAL OPERATIONS COMMAND AND CONTROL

6-14. Throughout the spectrum of operations, FORSCOM and AMC are responsible for providing all TMDE logistics assets in theater and advising sustainment commands on sourcing requirements. These assets include TMDE C&RS mission functions provided by TDA and MTOE elements within the theater of war, to include the Army National Guard.

6-15. The number of Area TMDE Support Teams required to support the overall C&RS mission is based on the category and densities of supported TMDE and the geographic dispersion of supported units. Operational control for all technical aspects of the mission falls under the Area TMDE Support Team's parent maintenance unit. Where Area TMDE Support Team elements are attached to a unit within a designated force, the unit of attachment exercises administrative control of the Area TMDE Support Team.

6-16. AMC's USATA provides a TMDE liaison officer (LNO) to the Army Field Support Brigade (AFSB) to provide Army metrology expertise and technical assistance. The TMDE LNO coordinates and provides support to the TSC G4 on all TMDE requirements. The TMDE LNO monitors and reports on calibration and repair support metrics, oversees evacuation of TMDE to higher levels of support, and provides the necessary coordination to establish and maintain comprehensive C&RS coverage through interlocking combinations of civilian, contractor, and military TMDE Support Teams.

Operational Concept

6-17. The USATA TMDE LNO is the central point within the AO for coordinating internal and external TMDE C&RS technical and operational requirements. Each Area TMDE Support Team will set up operations in the designated area and provide one-stop TMDE C&RS to all units within or passing through their area of support. The Area TMDE Support Teams utilize USATA support for organic and customer secondary reference laboratory support.

6-18. Most area TMDE support teams maintain a split-based, mobile capability, to respond to selected TMDE calibration requirements within the divisional area for a limited timeframe and as determined by the elements of the Division G4.

Mission Equipment

6-19. 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, communications equipment, production control facilities, and workspace for repair functions. The TMDE support team mission can be supported from this single facility. In addition to the principal equipment set 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 (RADIAC, torque, meter, and oscilloscope standards) for use in a split-based mode of operations, where high densities of TMDE are located.

6-20. When used in a split-based mode of operations, the two-man mobile facility is dependent on the parent area TMDE support team's principal equipment set for repair functions and production control operations.

Modes of Operation

6-21. The MTOE Area TMDE Support Team's equipment configuration allows the team to operate in a fully uploaded mobile mode or in a dismounted fixed facility mode of operations. Within the fixed facility mode of operations, the team may retain limited mobile calibration capability with the shelter-mounted set of equipment for special or split-base requirements. METT-TC considerations, as determined by the appropriate SPO, determine the mode of operations.

6-22. The TDA TMDE support 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.

6-23. Both MTOE and TDA units evacuate TMDE to secondary reference laboratories for C&RS of transfer standards and customer equipment requiring S-Level support. This support will normally be provided from designated regional support centers external to the theater.

SUMMARY

6-24. The TMDE C&RS serves a vital role within the Army. Properly calibrated test and measuring equipment can accurately diagnose problems, reduce LRU failure and conduct maintenance to specified tolerances. From instruments used to control a helicopter's flight navigation to the targeting system on a tracked vehicle to the mechanic using a multi-meter to troubleshoot a faulty system, the Army ensures its weapon systems operate safely and properly through routine calibration of its Test, Measurement, and Diagnostics Equipment.

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Chapter 7

Other Maintenance Activities

Each maintenance activity has special requirements and must be tailored to meet the commander's intent. This chapter will discuss those requirements for Communication and Electronics, Missile Systems, and Army Watercraft.

SECTION I – COMMUNICATION AND ELECTRONIC MAINTENANCE

7-1. Communication and electronic (C&E) maintenance is directed toward ensuring that organizational C&E systems are operating to its capability and integrity. Signal MOS' troubleshoot entire signal systems to determine problems within the system to a faulty LRU, LRU replacement (utilizing on-board spares), turning in faulty LRUs to maintenance (when repair exceeds their capability), and identifying/correcting crew training deficiencies. They also inspect, service, lubricate, adjust, replace parts, and subassemblies (for example power amps, antenna groups, and vehicle adapter amplifiers.

7-2. In order to fully understand the maintenance operation for C&E equipment we must first understand the differences between military equipment, who provides support for the equipment, and the key personnel associated with the management process. This section will define the roles, responsibilities and procedures that are required to ensure C&E systems are maintained and readily available.

TYPES OF EQUIPMENT

LIFE CYCLE MANAGED

7-3. Also known as program of record (POR) items. These are procured military equipment items that follow the life cycle from procurement – fielding – sustainment – retirement. These items are designated with a line item number (LIN). An example of this type of equipment is the single channel ground-air radio system (SINCGARS).

NON-STANDARD EQUIPMENT (NS-E)

7-4. These items are often referred to as commercial off the shelf (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. NS-E equipment is acquired through: rapid fielding initiatives, items received after submitting an operational needs statement, joint improvised explosive device defeat organization, secure communication item, or purchased by unit credit card or other funds.

AREA MAINTENANCE AND SUPPORT FACILITY

7-5. The Area Maintenance and Support Facility (AMSF) provides logistical support for theater level non-tactical communications and information systems used in an overseas theater. There are currently two AMSFs in operation: one in Europe and one in the Pacific that provide centralized retail supply and maintenance support for all NETCOM/9th SC(A) telecommunications material, and other C&E material within the European and Pacific theaters of operation.

7-6. The AMSF supports the Defense Satellite Communications System, the LandWarNet portion of the Global Information Grid, Armed Forces Radio and Television Service, Military Affiliate Radio System, and other theater unique communications or command and control systems. The AMSF may also provide support to other US military departments, Department of Defense activities, and other US government agencies or installations. The AMSF may be operated directly by the US Army or may be operated by a civilian contractor with US Army oversight.

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

MAINTENANCE SUPPORT TEAM

7-8. The maintenance support team provides scheduled, emergency, or on-call mobile maintenance support to C&E fixed facilities or other NETCOM/9th SC(A) units. Maintenance support teams are a functional responsibility of AMSF and other authorized command maintenance organizations.

THEATER LEVEL COMMUNICATIONS AND ELECTRONIC MAINTENANCE

7-9. NETCOM/9th SC(A) is responsible for maintenance support of all theater level communications assigned by either the Headquarters Department of the Army or the CIO/G-6. This responsibility includes:

- Organization and operation of all AMSFs supporting OCONUS commanders.
- NETCOM/9th SC(A) maintenance support teams.
- COMSEC logistic support units.
- Module and repair activities required for direct exchange of C&E material and other electronics material as assigned.

CORPS AND DIVISION HEADQUARTERS COMMUNICATIONS AND ELECTRONIC MAINTENANCE

7-10. The division G-6 is responsible for monitoring the status and sustaining the division networks that comprise the LandWarNet. The division G-6, working closely with the division signal company, division headquarters battalion staff, division G-4 and the executive officer, ensures the critical network maintenance is performed and parts are available as needed for C&E systems to remain operational. The Signal Systems Integration Oversight cell is staffed to perform these functions. The deputy G-6 will ordinarily have the day-to-day responsibility of maintaining this oversight.

EXPEDITIONARY SIGNAL BATTALION

7-11. The Expeditionary Signal Battalion (ESB) has sufficient organic supply and maintenance structure to handle normal logistical requirements in garrison or when the subordinate elements are in close proximity to one another during an operation. Companies, platoons, sections, and teams that are deployed separately will ordinarily receive logistical, maintenance, and spare parts support from the supported unit. Maintenance services and repair parts for unit-unique equipment may be provided by the supported unit or may require the deployment of battalion maintenance or maintenance support unit assets. Both the battalion and companies contain C&E/COMSEC maintenance sections for these purposes. Direct coordination between the supported G-6/S-6 and ESB S-3 should be done to ensure the maintenance strategy is understood for each ESB element.

DIVISION SIGNAL COMPANY

7-12. The division signal company staff coordinates network performance and maintenance issues with the division G-6 through the division headquarters battalion staff. The division signal company has crew maintainers tasked with performing field level maintenance on organic signal assemblages. The executive officer of the signal company coordinates maintenance support for organic equipment and maintains oversight on the status of all logistical and maintenance matters within the company.

BRIGADE SIGNAL COMPANY

7-13. The brigade signal company staff coordinates network performance and maintenance issues with the brigade S-6 through the BSTB staff. The brigade signal company has crew maintainers tasked with performing field level maintenance on signal assemblages. The executive officer of the signal company coordinates maintenance support for organic equipment in the signal company and maintains oversight on the status of all logistical and maintenance matters within the company.

FIELD MAINTENANCE

7-14. The battalion S-6 is responsible for the integrity of the battalion's signal systems. The S-6 works in conjunction with the S-4, SPO and the FSC Commander to develop a comprehensive maintenance plan (to include coordination for contractor field service representative (CFSR)) that is then incorporated into the maintenance standing operating procedures (SOP). This ensures that there are clearly understood procedures in place to enhance a positive maintenance posture.

7-15. At the brigade level the S-6 is responsible for monitoring the status and sustaining the brigade networks that comprise the LandWarNet. The brigade S-6, working closely with the brigade signal company, brigade special troops battalion (BSTB) staff, brigade S-4, and the executive officer, ensures the critical network maintenance is performed and parts are available as needed for C&E network systems to remain operational.

7-16. The BSB FMC contains an electronic maintenance section. The electronic maintenance section provides technical inspections, troubleshooting and repair of communications equipment to expeditiously repair and return equipment to supported units. In addition for BCTs, except Stryker, each battalion has a FSC to provide field maintenance support and distribution of all classes of supply.

7-17. The supported battalion's S–4 is the main logistics planner and the FSC commander assists the S–4 in developing plans that are based on the battalion commander's guidance. The FSC commander also works with the battalion XO, S-4 and BSB SPO to ensure logistics efforts are synchronized.

7-18. The FSC Maintenance Control Officer, commonly referred to as the "shop officer," has the following responsibilities: perform maintenance according to the maneuver battalion commander's priorities; monitor the status of equipment undergoing repairs and determine the status of the repair parts required to complete those repairs.

7-19. The FSC is not able to repair most NS-E due to the unit's lack of CLS support, warranties and identified maintainers in the supportability plans. Support will be coordinated by the FSC through the BSB to the BSB SPO to the BDE BLST.

7-20. For the SBCT the BSB Forward Maintenance Company has a missile and electronic section. They provide support through the use of dedicated CRTs. The CRTs are collocated with their supported battalion and are organized and equipped to provide mobile maintenance support to the supported unit. The CRTs perform BDAR, diagnose maintenance problems, and conduct field level maintenance repairs. They are the primary method of sustaining combat power through, on board spares, BDAR, and controlled substitution. Much like the FSC they cannot repair most NS-E equipment and must coordinate for additional support.

WORKFLOW

7-21. Maintenance workflow is the same for C&E equipment as with any other equipment in the Army inventory. Upon identifying a fault on a piece of equipment it is annotated on DA Form 5988E/2404. Once the PMCS is complete, the form is then turned into the appropriate maintenance section for verification and repair. The maintenance section verifies the fault and if possible repairs it. If the item cannot be repaired at their location, the maintenance section opens a work order DA Form 5990-E (Maintenance Request (EGA))/DA Form 2407 (Maintenance Request (EGA)). The maintenance section opens the work order and sends it to the appropriate repair facility or requests for a support team to come forward and make the repair. The unit FSC/FMC is responsible for the equipment and will provide transportation for the repair (for example: flight, convoy or secure mail) and maintain accountability: the work order can act as the hand receipt and must contain the noun/nomenclature/model number and the serial number of the equipment.

7-22. Unit commanders and organizational staff are able to receive status on the readiness of their equipment via reports from the Integrated Logistics Analysis Program (ILAP) or the supporting units SAMS-E.

7-23. Army Battle Command System (ABCS) is made up of 12 separate communications systems. These systems are POR items, however, they are not supported by uniformed personnel. Their primary means of support are Digital Systems Engineer (DSE) and specific Field Software Engineers (FSE). There is one embedded in every BCT at the BLST. For ABCS software related problems, the DSEs or FSEs (or both) will address; if hardware related, it will be another service provider (most of the ABCS functionality relies on a laptop computer and therefore would likely be supported by the Common Hardware-Software/WIN-T Regional Support Center at the Electronics Sustainment Support Center.

7-24. The DSE at the BLST should be able to direct the units to the right support. The CECOM's software engineering center (at the regional level) is in charge of ABCS support, but since there are so many systems, the actual repair people may vary between DSE and various hardware contractors.

SUSTAINMENT MAINTENANCE

7-25. Sustainment maintenance is known as off-system maintenance and consists of structured echelons above the BCT that primarily repair and return equipment and components to the supply system. Sustainment maintenance units are also modular and can tailor capability to support Forward Repair Activities (FRAs) in a theater of operation, repairing, rebuilding or overhauling specific components and end items and returning them to supply system.

BRIGADE LOGISTICS SUPPORT TEAM

7-26. One of the sustainment maintenance activities is the Brigade Logistics Support Team (BLST). The (BLST) is a modular USAMC asset generally linked into the brigade support operations maintenance personnel that can assist prior to the Electronic Sustainment Support Centers.

7-27. The BLST normally have a MAJ/Senior WO, Senior LAR as the Logistics Area Coordinator (LAC), and Logistics Assistance Representatives (LARs) that coordinate for deployable BLST team support on brigade level issues and higher level support. They have a DSEs/FSEs that work in the BLST area and keep the BLST informed, but work for the CECOM LCMC Software Engineering Center (SEC) Regional Manager at the Army Field Support Battalion level.

7-28. The BLSTs have different configurations depending on the type of BCT supported. They usually have between 8 to 15 personnel made up of LARs from LCMCs. A deployed BLST organization is METT-TC dependent. The BLSTs (with contractor augmentation) can perform limited/short-term split-based operations while the BLST displaces in support of the BCT. The BLSTs have a team chief; responsible for the BLST operations, personnel, and day-to-day management of BLST.

LOGISTICS SUPPORT ELEMENT

7-29. The AFSBn is part of the backup for the BLST. At the division level, the AFSBn commander will be the Army Team C2 Information systems lead, with the reset LNO, embedded division lead DSE, and the senior LAR serving as the AFSBn commanders supporting staff.

7-30. Embedded division DSE will support the AFSBn commander by facilitating responses to division technical “questions /concerns/ issues” and serving as the first line for troubleshooting Battle Command system problems, managing DSE pools and establishing work priorities of DSEs, FSRs, and FSEs within the division, ensure work priorities are coordinated, integrated, and synchronized with the AFSBn commander.

7-31. The AFSBn also provides logistics assistance support to units that do not have a BLST, such as Fires Brigades, Maneuver Enhancement Brigades, Battlefield Surveillance Brigades, and Sustainment brigades, as well as most functional Brigades.

SYSTEM CONTRACT SUPPORT

7-32. The AFSB, through its subordinate AFSBns and BLSTs, assists the PEO and subordinate program management offices in providing system contract support to new or partially fielded systems. In some cases, utilizing deployable system contract support personnel, often referred to as field service representatives (FSRs), the PEOs/PMs provide technical support and in some cases (for example, Stryker) complete maintenance support to selected weapon and other major military systems.

ELECTRONIC SUSTAINMENT SUPPORT CENTERS

7-33. The Electronic Sustainment Support Center (ESSC) is a CECOM LCMC forward repair activity which provides deployed and garrison maintenance, supply, and logistics support from CECOM consisting of multiple Regional Support Center service providers.

7-34. The ESSCs assist field maintenance activities in determining who the NS-E service provider is and who should have information on which ones are under warranty. The ESSC Managers can also assist if a disagreement over warranty coverage arises between the service provider and the FSC/maintenance support. To contact the ESSC, the customer will call a main number and will be routed to the service provider required (whether it is printers, laptops, digital cameras, drivers, updates, or patches).

7-35. The ESSC service providers include:

- C4ISR Regional Support Centers: Provide total life cycle contractor support and limited sustainment maintenance support for tactical systems and equipment. They also provide interim contractor support, warranty maintenance, sustainment maintenance and logistics support for NS-E systems, including rapid equipping force items.
- Full maintenance and logistics support, including reset, and forward stockage and pack, wrap, and ship support for over 100 C4ISR systems.
- Software engineering center field software engineers: Software engineering and support services for the ASAS, MCS, GCSS, common ground station , and other systems.
- Common Hardware-Software/WIN-T Regional Support Centers: Provide full maintenance, repair and warranty support for common hardware systems, and for selected WIN-T Increment 1 components.
- The Communications Security Logistics Activity Information-Security Representatives: Technical support and services for COMSEC and information systems security program requirements.

NON-STANDARD EQUIPMENT WORKFLOW

7-36. Maintenance workflow starts with a fault on a piece of equipment being annotated on DA Form 5988E/2404. Once the PMCS is complete, the form is turned into the appropriate maintenance section for verification and repair. The maintenance section verifies the item is non-mission capable and opens a work order DA Form 5990/2407. The FSC/FMC contacts the BLST or AFSBn to see if they have the available resources to repair the item, if not the item must be evacuated to the ESSC IAW their external SOP. Before going to the ESSC, ensure that the battalion S-4 is informed and the BLST (BDE linked asset) is not needed.

7-37. It is possible that another warranty may have been purchased. In some cases the ESSC can give a one-for-one swap for the systems supported, if stocked. The ESSC will also assist the FSC in determining who is the service provider, information on which ones are under warranty, and warranty coverage disputes between the service provider and FSC/maintenance support.

7-38. The unit FSC/FMC is responsible for the equipment. They will provide transportation for the repair (for example: flight, convoy or secure mail). Utilize your local assets at the BLST to help coordinate transportation of the NS-CE and accountability: the work order can act as the hand receipt and must contain the name/model number and the serial number of the equipment.

7-39. The FSC/maintenance support responsibilities are to track work orders via SAMS (if ESSC is able to report data) and contact the ESSC for updates.

COMSEC MAINTENANCE

7-40. COMSEC maintenance will differ based on the type of equipment involved, facilities, support availability, and time considerations. Individual organizations are limited to diagnosis and fault isolation as authorized by the maintenance allocation chart (MAC). Field maintenance organizations are authorized to perform all maintenance tasks coded "C" (operator/crew/signal support specialist) or "F" (maintainer) as outlined in the equipment TM MAC.

7-41. Sustainment maintenance on Army COMSEC material will be performed at an Army Depot on maintenance tasks codes "D" and "H" as outlined in the equipment TM MAC. Only Depot level maintenance organization are authorized to perform the full range of maintenance tasks coded "C,F,H,L,D" as outlined in the equipment TM MAC.

7-42. COMSEC equipment is evacuated through maintenance channels from the unit to the first supporting maintenance unit. Unserviceable classified COMSEC material will be evacuated through the COMSEC material control system. Unserviceable unclassified COMSEC material, including controlled cryptographic items, will be evacuated through the supply channels.

7-43. Army customers are required to submit requirements through the Communications Security Logistics Activity (CLSA) via the information systems security program when requesting a replacement for classified COMSEC equipment and/or controlled cryptographic items in accordance with AR 25-2.

7-44. Items procured under the National Security Agency Commercial COMSEC Evaluation Program will be fielded with a limited vendor warranty. All COMSEC equipment having a vendor warranty will be maintained and serviced by the original equipment manufacturer for sustainment support. Once the vendor warranty expires, all sustainment repairs will be transitioned to an Army Depot for support.

COMMUNICATION AND ELECTRONIC MAINTENANCE SCENARIOS

ARMY STANDARD EQUIPMENT

7-45. Typically a Signal Support Systems Specialist will be notified of a problem such as a malfunctioning SINCGARS mounted in a vehicle. The Signal Support Specialist will validate the operator PMCS on the radio using the appropriate TM and diagnostic tools (multi-meter) to isolate and verify the fault. They will then replace the identified failed LRU. If a repair of the LRU is needed, the Signal Support Specialist will notify the FSC to open a work order, if they cannot make the repair at their level, it will be sent to the BSB for repair.

ARMY NON-STANDARD EQUIPMENT

7-46. In the case of COTS C&E equipment, the crew maintainer, such as a 25N in a WIN-T increment 1, will troubleshoot the equipment and identify the fault using the appropriate TM and BIT equipment contained within the COTS component. After identifying the faulty component, the 25N will replace it with a spare or operational float. This will be verified by a warrant officer MOS 948B or FSR (in the absence of a warrant officer). The faulty component is then evacuated to the supporting regional support center using the most expeditious means available which may include mail or courier. The exact means of evacuation of the equipment will be set by local policy and SOPs.

SECTION II – MISSILE SYSTEM MAINTENANCE

7-47. All maintenance management applications remain the same for missile maintenance companies as it is with any two level maintenance organization. However because these units can be employed on an operational, strategic-theater or strategic-national basis they receive support from EAB units assigned to the sustainment brigade or supported units BSB.

TYPES OF MISSILE UNITS

7-48. There are five basic types of missile units and each varies slightly:

- Air and Missile Battalion (Patriot) Maintenance Company.
- Air and Missile Defense Composite Battalion (Patriot/Avenger-Patriot/Surface Launched Advanced Medium Range Air to Air Missile (SLAMRAAM) Maintenance Company.
- Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS) Battery.
- Terminal High Altitude Area Defense (THAAD) Battery.
- Maneuver Air and Missile Defense Battalion (Avenger/SLAMRAAM) Maintenance Detachment.

AIR AND MISSILE BATTALION (PATRIOT) MAINTENANCE COMPANY

7-49. The maintenance company is employed with the air missile defense (AMD) battalion as part of an integrated air defense system to protect forces and selected geospatial assets from aerial or missile attack. The Patriot missile system is a theatre asset that operates in the BCT's area of operations.

7-50. The maintenance company provides field level maintenance support to all assigned units. Specifically automotive, ground support equipment, communications-electronic and missile peculiar systems. It also maintains an ASL of approximately 2,000 lines of repairable exchange and 550 lines of shop stock. The Component Repair Company performs sustainment level maintenance and repairs as necessary.

7-51. The company consists of a headquarters, maintenance control, technical supply, mechanical maintenance, and recovery sections along with a Patriot system support team, HHB automotive field maintenance team, and four Patriot automotive field maintenance teams.

7-52. Each Patriot automotive field maintenance team may be pushed to a patriot battery and can provide maintenance support for automotive, refrigeration and power generation. The HHB automotive field

maintenance team is responsible for automotive and power generation maintenance to the HHB of the patriot battalion.

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

7-53. The maintenance company has the same characteristics as the Patriot/MEADS company above with the exception of an Avenger system support team and an Avenger automotive field maintenance team (which replaces the Patriot automotive field maintenance teams). Both of these teams provide onsite field maintenance to the avenger battery and platoons which are normally spread throughout the area of operations. It is capable of providing radar, automotive and generator support.

JOINT LAND ATTACK CRUISE MISSILE DEFENSE ELEVATED NETTED SENSOR SYSTEM (JLENS) BATTERY

7-54. The JLENS battery is employed as a battery or as an independent subsystem as determined by METT-TC. It is used to provide a theater "long duration surveillance base piece" for theater surveillance. It provides overlapping coverage necessary to enhance the joint composite tracking process and enables tactical employment flexibility for other Joint Theater Air and Missile Defense (JTAMD) sensors and weapons. The JLENS is also employed to provide integrated fire control support capability in direct or general support of systems and forces, including joint task forces and naval ships operating in littoral regions. JLENS is employed as part of cooperative and integrated capabilities that complement JTAMD weapons and sensors system.

7-55. The battery is comprised of a Headquarters, Field Maintenance and Force Protection Section along with an AMD Planning and Coordination Cell, two Sensor Control and Sensor Sections and a Support Platoon.

7-56. The support platoon is responsible to maintain the battery's bench stock, shop stock, system records, parts inventory, and provides helium support for the battery. The field maintenance section is responsible for providing maintenance of automotive, power generation, radar, and communications-electronic repair.

TERMINAL HIGH ALTITUDE AREA DEFENSE (THAAD) BATTERY

7-57. The primary mission of a THAAD unit is to protect homeland, deployed military forces, and allies from short range and medium range ballistic missiles. They are assigned to the Army Air and Missile Defense Command. The Army Air and Missile Defense Command employs the battery during major combat operations in support of the combatant commander or subordinate joint task force commander.

7-58. The battery consist of a headquarters, field maintenance, fire control, radar, launcher and battery logistics operation sections. In addition there is a sensor platoon headquarters.

7-59. The field maintenance section provides field maintenance capabilities to the battery for all automotive, ground support and communications-electronic equipment. It also provides oversight for the battery logistics operations section and serves as the maintenance support center for all THAAD missile round maintenance and supply operations. In addition they are augmented by interim contract support for THAAD, radar systems, prime power units, cooling equipment unit (repairs that exceed the capabilities of the unit operator-maintainer), and provide communication assets to support user tele-maintenance support operations to the THAAD technical expert centers.

MANEUVER AIR AND MISSILE DEFENSE BATTALION (AVENGER/SLAMRAAM) MAINTENANCE DETACHMENT

7-60. The mission of the maintenance detachment is to provide field level maintenance support to the Maneuver Air and Missile Defense Battalion. It provides all of the automotive, ground support equipment, communications-electronic and peculiar missile systems maintenance. The detachment normally deploys with the HHB.

7-61. The detachment is comprised of a headquarters, mechanical maintenance, recovery and Avenger maintenance sections. The mechanical maintenance section provides all the automotive, ground support and communication-electronic maintenance while the recovery section provides all the lift capabilities for the repair shops along with recovery of organic equipment. It also provides limited recovery and welding to supported units and assist with maintenance to maintenance evacuation support.

7-62. The Avenger electronic/missile field maintenance team is capable of breaking into six teams to provide contact system maintenance support to the avenger battalion. It also serves as an alternate net control station.

ARMY MATERIEL STATUS SUMMARY

7-63. The materiel status report used for missile system readiness is the Army Materiel Status Summary (AMSS) it replaced DA Form 3266-1, Army Missile Materiel Readiness Report. It is due monthly no earlier than the 16th, but no later than the 19th of each month. It can be submitted directly to LIW or through the servicing units SAMS-2E box. Once submitted, the unit has the ability through LIW to view their status for any errors. It is vital to submit as early as possible to allow sufficient time to correct any errors.

NOTE: *Prior to running AMSS, ensure a complete backup is performed by the clerk, once the data is purged it cannot be retrieved without the backup.*

SECTION III – ARMY WATERCRAFT MAINTENANCE

7-64. Army watercraft units are modular, flexible, and able to adapt to and operate at any location in the littoral battle space, and respond to rapidly shifting operational requirements. Waterborne operations supported by an agile, properly equipped, well trained, and organizationally flexible watercraft fleet will be an essential ingredient for success in force projection operations. This necessitates a lean, focused Army watercraft fleet structured, positioned, and capable of responding to the demands of this complex operational environment. This responsive and robust watercraft fleet demands an equally responsive and robust maintenance system that can maintain the watercraft fleet around the world for the duration of the mission. In turn, the Army's watercraft Maintenance system must be able to operate modularly in deployed locations as well as in permanent fixed locations.

ARMY WATERCRAFT CLASSIFICATION

CLASS A VESSELS

7-65. Class A vessels are those that are capable of prolonged, independent operations and can self deploy to a theater of operations. They have extensive life support systems (berthing, messing, HVAC, etc.) for extended voyages. Class A vessels include the Logistics Support Vessel (LSV), Landing Craft Utility, 2000 (LCU-2000), Series 800 Large Tug (LT800) and the soon to be fielded Joint High Speed Vessel (JHSV). Two of these

vessels are detachments unto themselves, the LSV and JHSV. The LCU-2000 and the LT 800 are organized under the Heavy Boat Company and the Floating Craft Company respectively.

7-66. The LSV and JHSV are unique in that they are not just vessels, but also an independent unit. They do not have any other sections within the organization other than the authorized crew; i.e. supply, field maintenance, or a headquarters section. The crew performs all maintenance, both scheduled and unscheduled, as well as operates the vessel systems while underway and in port. If the maintenance workload exceeds the capability of the crew, additional maintenance capability must either be provided from another unit or through a service contract.

CLASS B VESSELS

7-67. Class B vessels are used in and around ports; they are normally operated on a shift basis, and they are dependent on another vessel for deployment. They do not have robust life support systems for extended independent or autonomous operations. This class of vessel consists of the Landing Craft Mechanized, Series 8 (LCM-8), Series 900 Small Tug (ST 900), the Warping Tug (WT), and Causeway Ferry. LCM-8s are organized in the Medium Boat Detachment; ST900s and the BD115 are organized under the Floating Craft Company while and the WTs and Causeway Ferry are part of the Modular Causeway System (MCS) in the Causeway Company.

CLASS C VESSELS

7-68. Class C vessels are non-self propelled vessels. Army vessels in this class are the Barge Derrick 115 Ton (BD115), Causeway Pier, Roll-on Roll-off discharge facility, barge cargo, and barge gas.

7-69. The remainder of Army watercraft are organized under company or detachment level organizations. These organizations do have organic headquarters, maintenance, and supply sections as well as task or mission oriented platoons.

MAINTENANCE OPERATIONS

7-70. Operations personnel must continually communicate with maintenance personnel to manage and influence maintenance operations, and subsequently the operational posture of the organization. This information must flow smoothly between each level of responsibility. Operations and maintenance information originates with the individual vessels. Vessels manage their operational and maintenance status and provide this information to the units' Vessel Support Office (VSO) on a daily basis. The VSO consolidates the information, provides assistance and resources within its ability and provides the status to the Harbormaster Operations Detachment (HMOD). The HMOD was designed and intended to provide a battalion, transportation terminal or otherwise, with the ability and expertise to monitor both the operations and maintenance status of Army watercraft. The HMOD coordinates and monitors maintenance information with the VSOs and the supporting field maintenance organizations and provides this status to the battalion operations staff who then forwards the information to the Sustainment Brigade's Theater Opening Element (TOE). The TOE contains the Sustainment Brigades terminal operations and watercraft operations expertise. Other critical links for Army watercraft include the field maintenance support organization and the Tank-automotive and Armaments Command's (TACOM)'s Watercraft Inspection Branch. The latter organization is the unit's conduit to sustainment maintenance resources. All of these organizations must continually communicate and cooperate to insure vessel availability and ultimately, mission accomplishment.

7-71. Maintenance and operations sections for Army watercraft units are not currently standardized. Heavy Boat Companies have "direct support maintenance sections", Medium Boat Detachments have "maintenance

sections", Floating Craft Companies have "operations sections", and the LSV Detachment has only the crew. As part of the transition of the Army watercraft maintenance system, this requirement will be analyzed and a standard Operations/Maintenance section will be developed and documented under the term "Vessel Support Office". Every Army watercraft unit will be organized or reorganized with a VSO.

7-72. 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 will then prioritize maintenance actions to critical systems and non-critical systems in priority order.

MAINTENANCE STATUS

7-73. There are three maintenance statuses that define the maintenance posture of Army watercraft. The term Mission profiles are no longer used to define or manage vessel maintenance status.

Fully Mission Capable (FMC)

7-74. FMC is a materiel condition of a vessel indicating that it can perform all of its missions. The goal of maintenance management is to keep or restore a vessel and all of its systems to FMC status as a quick as possible. Because of the nature of watercraft and the number of systems , sub-systems, and redundancies, a vessel may actually be able to get underway without all of its systems FMC. All Critical Systems, further addressed below, must be FMC in order for a vessel to get underway. A FMC vessel is manned with a full crew complement, as identified by MTOE and AR 56-9, and is augmented with support maintenance personnel based upon mission requirements. Together, they will complete all scheduled and unscheduled field maintenance under the direction of the Chief Engineer.

Non-Mission Capable (NMC)

7-75. NMC is a materiel condition indicating that a vessel cannot perform any one of its combat missions. NMC is divided into two status types, maintenance (NMCM) or supply (NMCS). NMCM identifies a vessel, or one of its critical component systems, that cannot perform its combat mission because of maintenance performed underway or required. NMCS indicates a vessel or one of its critical component systems that cannot perform its combat mission because of maintenance work stoppage due to supply back orders.

Administrative Deadline

7-76. Administrative deadline is a procedure for taking equipment out of service if the commander or field level maintenance officer determines it is necessary. Administratively deadlined equipment is FMC per the applicable PMCS tables and is reported FMC per AR 700-138 and DA PAM 750-8, but is not used or dispatched. The following conditions are examples of typical situations (not an all-inclusive list) when administrative deadline of equipment would apply:

a. Operation would result in a violation of published Federal, Department of the Army, local commander, or host nation safety regulations if the equipoment were dispatched or used.

b. Pending completion of an official investigation.

c. Pending transfer, turn-in, or disposition instructions.

d. Pending inspection for safety deficiency detailed under a safety-of—use message.

e. Pending receipt of oil resample or special sample results.

f. Pending completion of a required service.

7-77. Note: Vessels in storage are stored at 10/20 standards IAW AR 750-1 but will require activation. Pre-positioned and LBE vessels require periodic (weekly, monthly, semi-annual) maintenance to critical systems and sub-systems, annual technical inspections and re-certifications.

CRITICAL SYSTEMS

7-78. Critical systems are those systems and sub-systems that keep the vessel seaworthy, provide/insure life support, and enable the vessel to perform its mission.

7-79. A critical systems list is being developed for all current vessels and will be part of the ILS process in the acquisition of new vessels. The critical systems list will be used to determine the equipment readiness of a vessel in accordance with AR 220-1. Any critical system that is not operational will make the vessel non-mission capable (NMC) for readiness reporting requirements. Field maintenance managers prioritize maintenance effort for critical systems.

FIELD MAINTENANCE

7-80. Field maintenance is on-craft maintenance, repair and return of subcomponents. Field maintenance actions are typically defined as on-system maintenance and involve replacement of Class IX components, on-system adjustments, supporting repair and return to the user. This includes inspecting, testing, removing, replacing, and lubricating the vessel's components, modules, and assemblies. Field maintenance is the responsibility of unit commanders, vessel masters and chief engineers.

7-81. Field maintenance for Army watercraft is conducted by the Soldiers that make up the vessel crew. Collectively these personnel are equivalent to, and will be treated like a ground based maintenance support team. All regulations, policies, apportionments, and allocations that apply to a MST apply to a vessel crew. For instance a vessel is authorized a shop stock and bench stock the same as an MST. The collective mission of a vessel's crew is to operate the vessel and perform the scheduled maintenance and services required to keep the vessel's systems operational. However, because of the number of systems on a vessel, the sophistication of those systems and the minimum amount of crew personnel available; there may normally be a maintenance backlog on any given class of vessel.

SUSTAINMENT MAINTENANCE

7-82. Sustainment maintenance will be a combination of off-craft maintenance. Sustainment maintenance actions typically involve repair of reparable Class IX components (off-system) for return to the supply system or end item restoration. Maintenance that requires extensive resources such as special equipment, machinery or dry-dock facilities characterizes watercraft Sustainment Maintenance. Under certain conditions the vessel's Chief Engineer is authorized to direct the crew to effect a sustainment level repair. The U.S Army TACOM-LCMC has overall responsibility for funding and executing sustainment level maintenance for watercraft. Sustainment maintenance activities are usually contract maintenance facilities found in or near sea ports. Watercraft units and field maintenance organizations send unserviceable components, modules and assemblies to sustainment maintenance facilities for repair or rebuild and return. Sustainment maintenance includes restoring watercraft and/or their systems to a serviceable condition, contract maintenance support, repair, overhaul or rebuild of watercraft components, modules and assemblies that have been removed from the vessel, and on condition cyclic maintenance (OCCM).

7-83. Under the new Watercraft Maintenance Concept the Sustainment level strategy is not based on the traditional approach to OCCM in which every Class A vessel was brought into the shipyard every three years. The new strategy identifies and groups critical functions that can be accomplished through a combination of on-

station and shipyard maintenance. Further, the Sustainment Maintenance strategy will take into account the operational status and vessel type when identifying annual and multiyear maintenance cycles. This new strategy provides an approach that is defined by three distinct, but integrated, functions within a vessels' operational cycle: multiyear phased maintenance, annual phased maintenance, and inspections/certifications.

MULTIYEAR PHASED MAINTENANCE

7-84. Multiyear Phased Maintenance consists of vessel surveys, multiyear inspections and shipyard maintenance periods required to meet statutory and regulatory requirements for vessels. By separating those actions that require shipyard maintenance from those that can be performed on-station, the new strategy will yield a reduction in shipyard evolutions.

7-85. Multiyear Phased Maintenance includes underwater hull inspections required to meet Title 46 CFR requirements, vessel surveyed to include all operating systems, annual underwater hull inspections for APS wet stored vessels, dry-docking and vessel repairs to include extensive blasting and painting when required, inspections/maintenance for ABS 5 year load line letter, quadrennial crane inspections, hull structural repairs, vessel system repairs exceeding field level capabilities that are best accomplished in a shipyard, deferred maintenance, application of equipment change packages (ECPs) and MWOs, American Bureau of Shipping (ABS) Certification (JHSV), and provides a 90 day warranty.

ANNUAL PHASED MAINTENANCE

7-86. Annual Phased Maintenance consists of interim vessel surveys and contracted maintenance to perform on condition maintenance pier side. By identifying functions that can be performed pier side at the normal station, vessels will be inspected and maintained more frequently and loss of operational availability will be reduced.

7-87. Annual Phased Maintenance includes annual WIB surveys inspecting entire vessel condition and operation of all vessel systems. As required, a conditioned based maintenance contract is generated for pier side repairs, either at military base or contractor's facility, dependent upon which location is most advantageous to the Army. Non-emergency repairs requiring dry-docking will be deferred to Multi-year Phased Maintenance.

INSPECTIONS AND CERTIFICATIONS

7-88. Inspections and Certifications: The third level of sustainment maintenance provides for national level oversight of user level regulatory annually required tests, inspection and certifications.

7-89. Units and field maintenance teams remain responsible for initiating all regulatory (AR 56-9) required tests, inspections, certifications and correcting deficiencies preventing certifications of systems/equipment. Annual inspections may be done during either phased maintenance periods or when determined by TACOM. TACOM will monitor compliance with test, inspection, and certification requirements. The new OCCM strategy will be implemented across the Fleet based on the operational and/or storage status of the vessel type.

MAINTENANCE IN PORT

7-90. When in port the determination as to the use of contracted support for field maintenance will be made by the unit commander based on priority and resource availability. When deployed a vessel master and chief engineer are authorized to coordinate for contracted maintenance support for either level (field or sustainment if authorized by TACOM-LCMC) of repair. However, in the case of sustainment maintenance, the first action will be to contact the TACOM-LCMC Watercraft inspection branch to attempt to use their coordination services. The use of locally contracted support should only be used to restore a vessel to a mission capable

status, not to eliminate maintenance backlog. Contracted maintenance support is not to be used in lieu of organic crew support or support level if reasonably available.

UNDERWAY MAINTENANCE

7-91. The Vessel Master and Chief Engineer are responsible for all maintenance while a vessel is underway. The crew performs all scheduled field maintenance and all unscheduled maintenance necessary to ensure safe and seaworthy operation. The Chief Engineer directs the maintenance effort to critical systems. These systems are necessary for the safe operation of the vessel and its ability to perform its intended mission. If required, the chief engineer may request authorization to conduct repairs that are normally performed by sustainment maintenance. They 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.

MAINTENANCE IN AN AWAY PORT

7-92. When a vessel reaches port the maintenance effort is directed to restoring it to serviceability as determined by its mission profile. The Chief Engineer will have determined 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 required. He must then manage the maintenance effort to bring the vessel to an operational status with regard to critical systems. If sustainment level maintenance tasks have been identified and can be deferred until arrival in port, coordination to affect these repairs will be made at the same time.

MAINTENANCE ON LEFT BEHIND EQUIPMENT (LBE)

7-93. Army watercraft, prepositioned in theater, expedite the geographical combatant commander's ability to provide operational level intra-theater sealift. Because of the low density of vessels in the Army inventory, plans call for CONUS based crews to fall in on these prepositioned craft. When a unit is deployed forward, it leaves its CONUS based vessels behind. These vessels must continue to be maintained and/or preserved. Under certain circumstances the USAMC, through the ASC AFSB, will assume responsibility for this LBE and place the vessels into a storage-like status. Depending on which Army component crews are deployed, coordination between FORSCOM or USARC, and USAMC will determine if vessels are transferred to an AFSB for storage/preservation. The vessels may be retained at the unit's home station under the care of the AFSB or they could be moved to a location of the AFSB's choosing.

SUPPLY SUPPORT

7-94. The crew of a Class A and B vessels are authorized stockage of shop stock and bench stock. Stockage of authorized repair items other than that will be held by the quartermaster supply platoon assigned to the port or installation. Management of loads will be in accordance with Army Regulation 710-2.

7-95. Availability and long lead times in procuring some class IX items for Army watercraft continues to be a challenge. Because of the age of on-hand vessels and the different manufacturers of those vessels, many unique parts have to be procured or manufactured through commercial means. Army watercraft organizations and support organizations must have access to all available sources of supply to include sister service assets. Installation activities with watercraft units on station will maintain watercraft unique items. Repair parts for Army watercraft will continue to be held at unit, installation and national wholesale levels. Components and major end-item replacement parts must be intensely managed at all levels to maintain visibility throughout the distribution system to effect needed repair or replacement.

7-96. Figure 7-1 depicts the general flow of supply requisitions for vessels in port. Underway requisitioning processes depicted in figure 7-2 apply to LCU 2000's and large tugs operating independently or in a task force situation. Because both the LSV and JHSV are independent detachments, the difference between in port and underway requisitioning procedures will be the means of communication to the supply system. Under this concept the SSA support will be provided by a quartermaster support platoon assigned to the home port or installation. When a vessel deploys, the loosing SSA will either provide the vessel an electronic copy of its authorized stockage items or electronically forward that information to the gaining SSA. The support maintenance organization will not have a tech supply and will be authorized only Shop and Bench stocks. All authorized repair parts will be held at the SSA level.

7-97. For new watercraft construction, replacement parts and associated components should be designed to limit packing and crating requirements allowing distribution managers to push and recover needed supplies to the battlefield. While not directly associated with army watercraft Maintenance transformation, components and end items should contain electronic tracking tags that enable serial number tracking and expedite delivery to sources of repair.

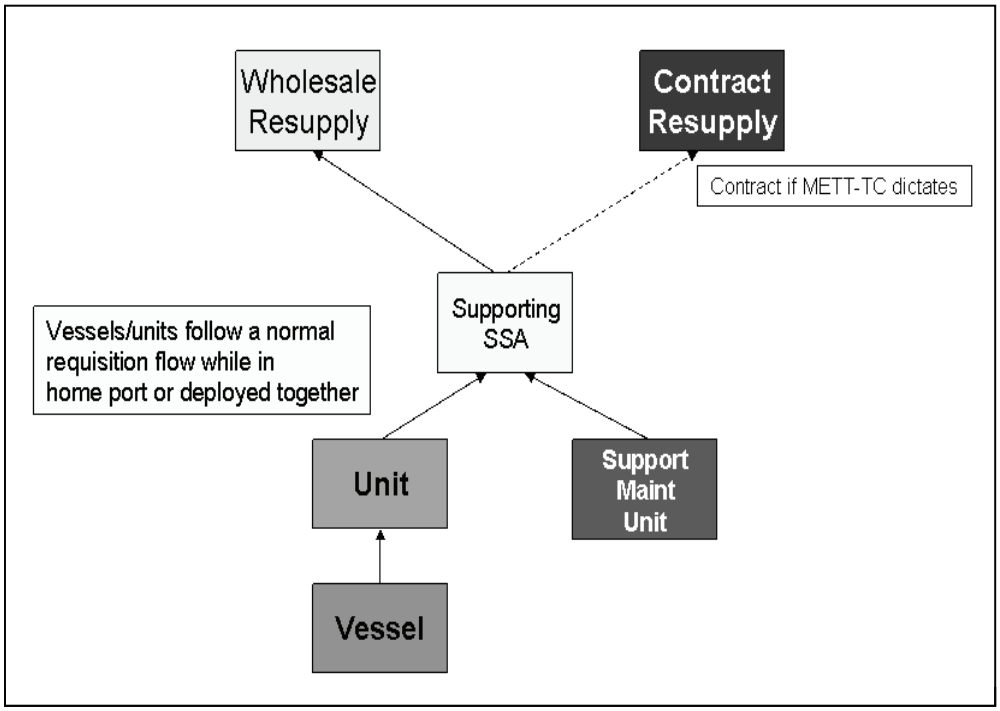

Figure 7-1. Supply Requisition Flow (Port)

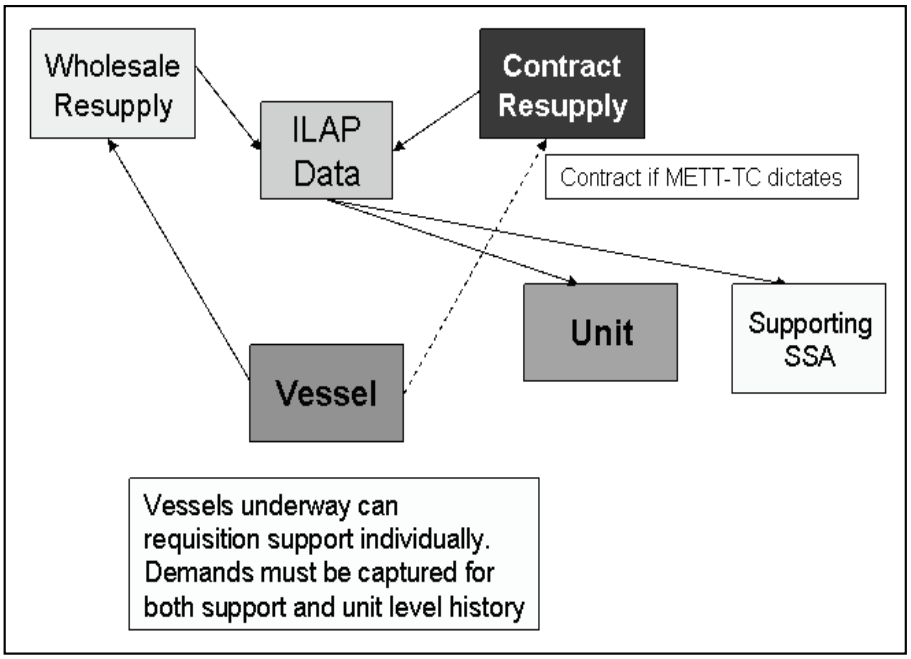

Figure 7-2. Supply Requisition Flow (AFLOAT)

MAINTENANCE MANAGEMENT

7-98. Logistics information systems will continue to support the Army watercraft maintenance, but with a much more enhanced level of support. All Class A vessels; JHSVs, LSVs, LCU-2000s, and the Large Tug will be provided with an on-board Standard Army Maintenance System – Enhanced (SAMS-E) computer. This system will be used both in-port and underway. The difference will be to whom they provide their data. In-port, the data will be transmitted to the shore based asset for management and accountability, who will in turn process the requisition. Underway, the vessel will transmit the data directly to the source of supply for shipment. Requisitions will be shipped directly to the vessels deployed location or to the next port of call. The shore based unit provides the derivative UIC (with the exception of the LSV and JHSV because they are detachments) and RIC for underway Class A vessels and will provide oversight and management of those requisitions via ILAP. The vessels will manage their own supply assets while underway. Class B vessels; LCMs, Small Tugs, Barge Derrick Cranes, and Causeway Systems will remain dependent upon their organizational maintenance and supply assets for support. These vessels are harbor craft that do not have the capability to support stand alone systems nor do they have the communications systems needed to operate remotely. However, they will use the SAMS-E "Logbook" feature to record and submit their maintenance and supply data electronically.

SUMMARY

7-99. When planning for maintenance operations there are several units that have special requirements and capabilities. A good understanding of the units mission, organization, roles, functions, and support structure will maximize their employment.

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Appendix A

Geographical Considerations for Maintenance Operations

Adverse environments encompass a wide range of geographies (desert, jungle, and mountainous terrain) and usually are accompanied by extreme weather conditions that will affect mission preparation and performance. Extreme heat, cold, humidity etc… directly affects personnel as well as certain components of the systems maintained. This appendix discusses key areas that should be considered when operating in different environments.

DESERT OPERATIONS

A-1. Maintenance support for desert operations requires an understanding of the environment. Temperatures vary according to latitude and season. In some deserts, day to night temperature fluctuation can exceed 70^0 F. Desert terrain varies from place to place; the common denominator is lack of water and little, if any, vegetation. This environment can profoundly affect military operations.

A-2. **Location.** Desert locations are seldom close to normal LOCs. The effects of the environment (extreme heat and sand) on equipment are severe, requiring increased levels of maintenance to maintain readiness. Distances between units and LOCs are long.

A-3. **Class IX Supply Support.** Demand for repair parts will increase due to harsh desert environmental factors and the extra maintenance effort required. Small items with high-usage rates should be held as far forward as practical. Typical high-consumption items include, filter elements, tires, water pumps, gaskets, fan belts, water hoses, clamps, sprocket nuts, wedge bolts, and cleaning fluids for electronic equipment.

A-4. **Terrain.** Terrain varies from nearly flat with high traffic areas to lava beds and salt marshes with little or no traffic areas. Drivers must be trained to judge terrain in order to select the best routes of travel based on the conditions. Tracked vehicles are best suited for desert operations. Wheeled vehicles will go many places that tracked vehicles can go, however, their lower average speed on poor terrain may be unacceptable during certain operations.

A-5. Vehicles should be equipped with extra water cans, fuel cans, meals, air recognition panels, signal mirrors, and tarpaulin (to provide shade for the crew).

A-6. The harsh environment requires a high standard of maintenance. This maintenance may have to be performed well away from specialized support personnel. Operators must be fully trained to operate and maintain their equipment. Some types of terrain can have a severe effect on suspension and transmission systems, especially those of wheeled vehicles. Items affected by mileage (such as wheels, steering assemblies, track wedge bolts, sprocket nuts, and transmission shafts) must be checked for undue wear when completing before-, during-, and after-operation maintenance checks.

A-7. **Heat.** 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 ensure extra maintenance is scheduled for them. Check oil levels frequently (a too high level may be as bad as a too low level) and check seals for leaking**.** 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. Cooling hoses must be kept tight (one drip per second amounts to seven gallons in 24 hours). Operators should not remove hood side panels from engine compartments while the engine is running. This causes turbulence, leading to ineffective cooling.

A-9. Air vents must be kept clean or vapors may build up pressure and cause the battery to explode. Voltage regulators should be set as low as practical. Stocks of dry batteries must be increased 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. Care must be exercised to ensure working pressure of all equipment is within safety limits. Caution must be exercised when removing items such as filler caps. Some items of equipment are fitted with thermal cutouts that open circuit breakers when equipment begins to overheat. Overheating can be partly avoided 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 likely to fly off as handles shrink.

A-11. Keep ammunition away from direct heat and sunlight. If it can be held by bare hands, it is safe to fire. White phosphorous ammunition filler tends to liquefy at temperatures over 111^0 F, which will cause unstable flight unless projectiles are stored in an upright position.

A-12. **Radiant Light.** Radiant light or its heat effect may be detrimental to plastics, lubricants, pressurized gases, some chemicals, and Infrared tracking and guidance systems. Items like CO^2 fire extinguishers and Stinger missiles must be kept out of constant direct sunlight. Since optics may discolor in direct sunlight, limit their exposure to the sun's rays.

A-13. **Dust and Sand.** Dust and sand are probably the greatest dangers to efficient functioning of equipment in the desert. Lubrication must be 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. Lube fittings, which are critical items, should be checked frequently. Teflon bearings require constant inspection to ensure that the coating is not being removed. Engine maintenance is critical due to the strong possibility of sand or dust entering cylinders or moving parts when the equipment is stripped. 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. All cables likely to be damaged should be protected with tape before insulation becomes worn.

A-15. Sand will also find its way into electrical items like "spaghetti" cord plugs. This can prevent electrical contact or make it impossible to join the plugs together. A brush (for example, an old toothbrush) should be carried and used to brush out such items before they are joined.

A-16. Dust affects communication equipment such as amplitude-modulated (AM) radio frequency (RF) amplifiers and radio-teletypewriter sets. The latter is especially prone to damage due to their oil lubrication, so

dust whenever possible. Some receiver-transmitters have ventilating parts and channels that can get clogged with dust. Check them regularly and keep them clean to prevent overheating.

A-17. Weapons may become clogged or missiles jammed on launching rails due to sand and dust accumulation. Sand- or dust-clogged barrels can lead to in-bore detonation. Keep muzzles covered by a thin cover so an explosive projectile can be fired through the cover without risk of explosion.

A-18. Missiles on launchers must also be covered until used. Working parts of weapons must have minimum lubrication. It may even be preferable for them to be totally dry, as any damage caused during firing will be less than that produced by the sand-oil abrasive paste.

A-19. All optics are affected by blowing sand. Their performance gradually degrades due to small pitting and scratches. It is 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. Those in use should be kept where free air can circulate around them and they should be purged in frequent intervals.

A-20. Sand and dirt can accumulate in hull bottoms of armored vehicles and, when combined with condensation or oil, can cause jamming of control linkages. Sand accumulation in the air bleeder valve can inhibit heat from escaping the transmission and result in damage.

A-21. **Temperature Variations.** In deserts with relatively high dew levels and high humidity, overnight condensation can occur wherever surfaces are cooler than the air temperature (such as metal exposed to air). This condensation can affect optics, fuel lines, and air tanks. Fuel lines should be drained at night and in the morning. Optics must also be cleaned frequently. Weapons, even if not lubricated, will accumulate sand and dirt due to condensation; another reason for daily cleaning.

A-22. Air and fluids expand and contract according to temperature. Tires inflated to the correct pressure during the night may burst during the day. Fuel tanks filled to the brim at night will overflow as temperatures rise. Check the air pressure when equipment is operating at an efficient working temperature and fill fuel tanks to their correct capacity as defined in the appropriate TM.

A-23. **Static Electricity.** Static electricity is common in the desert, caused by atmospheric conditions coupled with an inability to ground out due to dry terrain. It is particularly likely with aircraft or vehicles having no conductor contact with the soil. The difference in electrical potential between separate materials may cause a spark on contact. If present, flammable gases may explode or cause a fire. A grounding circuit must be established between fuel tankers and vehicles being refueled. It must be maintained before and during refueling and both tankers and vehicles must be grounded.

A-24. **Winds.** The velocity of desert winds can be destructive to large, relatively light material (such as aircraft, tentage, and antenna systems). To reduce wind damage, materiel should be given terrain protection and firmly picketed to the ground.

DESERT MAINTENANCE

A-25. Establish a recovery and maintenance SOP before or immediately after arrival in-theater. The SOP should include field level maintenance recovery, expedient repair, recovery priorities by vehicle types, limitations of field expedient recovery techniques (for example, the distance/time that one tank is allowed to tow another considering the heat buildup in transmissions in this environment), and security.

A-26. The Recovery Plan should include locations of maintenance collection points for equipment that cannot be repaired forward. These points must be located where they can be reached by heavy equipment transporters (HETs), which may require the recovery vehicle to perform a longer than normal tow.

A-27. The field maintenance point should cover a large area to allow for dispersion of the supporting unit's equipment and inoperable weapon systems. An FMT from the FSC will normally be located at the field maintenance point to determine the disposition of inoperable equipment. Equipment authorized for disposal may be used for controlled exchange to support the repair of like vehicles. When considering recovery in the desert, pay special attention to ground-anchoring equipment since natural anchoring material is scarce.

COLD WEATHER OPERATIONS

A-28. One of the major problems for units operating in cold weather conditions is the lack of personnel with adequate training in cold weather operations and maintenance support. If troops stationed in warm climates must move to cold climates to perform their mission, cold weather training is of utmost importance. Much time and energy in cold weather areas are expended in self-preservation. This reduces personnel efficiency in operating and maintaining materiel. Maintenance personnel must learn how to live and work in cold regions.

A-29. **Locations.** Operation of materiel in temperatures down to -10^0 F present a few problems. Conditions are similar to those in the northern portions of the CONUS during the winter. From -10^0 F to -40^0 F, operations become difficult.

A-30. Proper maintenance and training will prevent failures of materiel and injuries to personnel. When the temperature is below -40^0 F, operations become increasingly difficult. At temperatures near -65^0 F, the maximum efforts of well-trained personnel are required to perform even a simple task with completely winterized materiel.

A-31. **Class IX Supply Support.** The effect of cold weather on Class IX supply support makes handling and storage of materials of prime importance. Supplies are delivered as far forward as weather, terrain, and the tactical situation permit.

A-32. Supply handling requirements will vary significantly from those encountered in temperate climates. Metals become brittle at extremely low 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. Tires become rigid when cold, causing flat spots on portions that come into contact with the ground during shutdown periods. At extreme low temperatures, sidewalls become brittle and crack. Plastics expand and contract much more than metal or glass. Any parts or materials made of plastic must be handled carefully. Glass, porcelain, and other ceramics should perform normally at low temperatures if handled carefully. Cracking may result if heat is applied directly to cold windshields or vehicle glass. Fabrics retain their flexibility even at extremely low temperatures provided they are kept dry.

COLD WEATHER MAINTENANCE

A-33. Personnel must be aware of the importance of maintenance, especially PMCS. Maintenance of mechanical equipment is exceptionally difficult during cold weather. Automotive and other mechanical maintenance cannot be completed with normal speed because equipment must be allowed to warm up before maintenance personnel can make repairs. Routine tasks require additional time. The time lag, which cannot be

overemphasized, must be included in all planning. Personnel efficiency is reduced by bulky clothing, which must be worn at all times.

A-34. The resulting loss of the sense of touch further reduces efficiency. Even the most routine operations, such as handling latches or opening engine enclosures, become frustrating and time-consuming with gloves. At temperatures below -20^0 F, 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-35. The following requirements, affecting maintenance planning and preparation, should be complied with before beginning a cold weather operation: shelter for materiel requiring maintenance, proper clothing and tools for maintenance personnel, ground cover (plywood or canvas) for personnel to lie on under vehicles, adequate portable heaters, suitable methods to store and issue antifreeze materials, fuels, hydraulic fluids, and lubricants, sufficient lighting equipment, supply of repair parts for equipment, sufficient equipment for removal of snow and ice.

A-36. **Building and Shelters.** Heated buildings or shelters are needed for cold weather maintenance operations. Maintenance of many components requires careful, precise servicing. Without heaters, the increase in maintenance man-hours will be from 25 to 500 percent above normal requirements. When buildings are not available, maintenance tents are used as a temporary expedient. When possible, wooden flooring should be laid inside all tents. Heat tents by portable duct heaters or tent stoves.

A-37. In the absence of buildings or maintenance tents, tarpaulins may be used as a field expedient to create overhead shelter and wind breaks. The tarpaulin can be supported on a framework of poles erected around the vehicle.

A-38. **Lighting Equipment.** Sufficient equipment must be available to furnish lights during maintenance operations. Lights with ample cable extensions, attachment plugs, connectors, and spare bulbs are essential.

A-39. **Maintenance Personnel, Tools, and Equipment.** An increase in the number of mechanics will be required to maintain equipment in cold weather operations. As a minimum, a highly organized, more intensive effort is required of personnel on-hand. Remember that the amount of work performed under cold conditions is considerably less than work accomplished in moderate temperatures.

A-40. An additional supply of battery chargers must be available to meet the heavy requirements for battery maintenance in subzero temperatures. Hydrometers and testers must be on-hand to check the state of charge of batteries. Tools provided in the various tool kits are adequate for maintenance at subzero temperatures.

A-41. Gloves worn while performing maintenance on fuel systems and lubrication of cooling systems may become saturated with fluids. This reduces the insulating value of the gloves and may result in a cold weather injury to personnel. Maintenance personnel should carry extra gloves.

A-42. Personnel should avoid leaning on cold, soaked equipment or kneeling or lying on the ground. Rapid body cooling caused by heat transfer to the equipment or ground may result in a cold weather injury. Some sort of insulation (such as fiber packing material, corrugated cardboard, rags, or tarpaulins) should be placed between the mechanic/repairer and the equipment.

A-43. When performing maintenance under arctic winter conditions, a box or a pan should be used to hold small parts. A tarpaulin should be placed under the vehicle to catch parts that may be dropped to prevent them from being lost in the snow.

JUNGLE OPERATIONS

A-44. Maintenance units in a jungle environment retain the same basic mission and capabilities as in other environments. However, they must make adjustments due to terrain, weather, and vegetation.

A-45. **Location.** 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.

A-46. **Class IX Supply Support.** Repair parts that deteriorate or wear out faster in the jungle environment must be identified. The shop stock/bench stock must reflect the increased turnover of these parts.

A-47. **Maintenance.** Maintenance units in the jungle function essentially the same as in other operations. High humidity and temperatures in jungle areas increase maintenance requirements. PMCS on any items affected by moisture and heat is extremely important. The need for responsive maintenance support means the number of repair parts for immediate use must be increased.

A-48. **Transportation.** Maintenance units should consider the employment of all types of transportation. Surface transportation facilities are poor in most jungle areas. They especially cannot handle heavy military traffic without extensive improvements. Human portage is a basic means of moving supplies and equipment in jungle operations. However, this method, at best; is slow, laborious, and inefficient.

A-49. Wheeled vehicles are normally restricted to roads and wider trails. However, sometimes even these may prove impassable during heavy rains. Sometimes repair parts must be transported by transloading from wheeled to tracked vehicles. For example, large wheeled vehicles move supplies as far forward as possible, where they are transloaded to tracked vehicles. The tracked vehicles move the supplies cross-country. In rugged terrain, supplies may require further transloading to pack animals or native supply bearers.

A-50. 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-51. Airdrop of supplies is an alternative to air landing. Airdrop makes deliveries to isolated units possible without further transloading. Disadvantages include the dispersion of supplies and the possibility of lost cargo under the jungle canopy, vulnerability to local enemy air defense, and requirements for, at least, local friendly air superiority.

MOUNTAIN OPERATIONS

A-52. 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. In all but the most extreme terrain and weather, infantry, with its light equipment and mobility, remains the basic maneuver force in the mountains. With proper equipment and training, the infantry is ideally suited for fighting the close-in battle commonly associated with mountain warfare. Mechanized infantry can also enter the mountain battle, but it must be prepared to dismount and conduct operations on foot. Because of the severity of the environment, maintenance support in mountainous areas can be somewhat difficult.

A-53. **Location.** Due to terrain constraints, it may be necessary to disperse units over a wide area. Dispersion reduces the vulnerability however, it may cause problems with command, control, and local security. Since support units will be high-priority targets, they must have adequate protection against ground and air attack to ensure continuous operations.

A-54. **Class IX Supply Support.** In mountain operations, rugged terrain and climatic extremes cause repair parts consumption to increase. Movement of repair parts should be expedited into and within the combat area. Parts with high usage rates should be stocked on the Authorized Stockage List (ASL), 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.

A-55. **Maintenance.** Fixing equipment as far forward as possible is extremely important in mountain operations. Vehicle crews and maintenance personnel must be trained to accurately evaluate damage to their equipment. Recovery of equipment will be very difficult. When recovery is required, equipment should be moved only as far rearward as the point where repairs can be made.

A-56. **Transportation.** Although vehicles are used to move a large share of repair parts forward, they are not always able to reach deployed units. Locally obtained animals or individual Soldiers must often move repair parts from roads to unit positions. Whenever possible, use vehicles to move heavy, bulky items or repair parts.

A-57. When weather permits, use helicopters to move repair parts from the Supply Support Activity (SSA) directly to forward units. Helicopters speed resupply operations and reduce multiple handling. Helicopters are good for emergency resupply and movement of high-priority supplies. Use helicopters whenever possible. Resupply by US Air Force aircraft is another option.

URBAN OPERATIONS

A-58. The urban battlefield does not cause significant changes in maintenance doctrine or organizations. However, it does impact how maintenance is provided. Urban regions normally contain a well-developed distribution system, major portions of which are highways, rail lines, airfields, manufacturing plants, and storage areas.

A-59. Built-up areas frequently provide suitable locations for deployment of maintenance units. Such areas offer excellent cover and concealment. They may also contain easily adaptable maintenance and storage facilities. At the same time, rubble or damaged built-up areas may present obstacles along LOCs, which are vital to the effective functioning of maintenance units.

A-60. **Location.** 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. Supplies and equipment must be protected from both enemy attack and theft. Refugees may seriously impede or block movement over routes required by FMT/CRTs or movement of equipment to field maintenance points. Maintenance units may take advantage of hard stands, overhead lift, installed communication systems, and maintenance facilities existing in their areas of responsibility.

A-61. **Class IX Supply Support.** 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. FMT/CRTs will operate on-site with the supported unit or from the BSB/FSCs location.

A-62. **Maintenance.** Fixing equipment on-site is extremely important in urban operations. Maintenance personnel must be trained to evaluate damage to their equipment accurately. Recovery of equipment will prove

very difficult. When recovery is required, equipment should be moved only as far rearward as the point where repairs can be made.

A-63. **Transportation.** Although wheeled vehicles are used to move many repair parts forward, they are not always able to reach the unserviceable equipment due to rubble and blocked roads. Tracked vehicles can often move repair parts forward over the obstruction. Individuals and Soldiers must often move repair parts from clear areas to equipment locations.

NIGHT OPERATIONS

A-64. Night operations use the same organization and require the same functions as daylight maintenance support. Commanders continue to effect internal adjustments of their maintenance assets to meet unique situations. Maintenance elements retain responsibility for performing their assigned function. Those that must be deferred until daylight remain the responsibility of the deferring maintenance element.

A-65. **Training.** The goal of night maintenance operations is to attain the same degree of effectiveness as in daylight operations. Its goal is also to sustain the effort over long periods of time. 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-66. Tasks that cannot be performed under subdued visible light or by using night vision goggles are identified. Procedures are developed for deferring them until daylight hours. Procedures are developed for preposition of equipment, tools, and repair parts supplies to allow ready access, identification, and handling at night. Procedures for night movement and relocation stress light discipline and camouflage.

A-67. **Planning.** Detailed planning for maintenance support of night operations is essential. Maintenance support planners must provide a realistic assessment of the capability to support night operations. The assessment is based on the degree of proficiency attained by the maintenance elements concerned in training and on the SOP for night maintenance operations.

A-68. With the present night vision technology, planners must anticipate built-in backlog each morning. They must ensure that the Maintenance Support Plan (Annex I, Service Support) provides timely support without interfering with or compromising the tactical plan.

A-69. **Procedures.** Using night vision devices, maintenance elements repair and return to service those critical items within their repair capability. Night vision devices are used for tasks that must be 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-70. Where enemy observations may be possible, field expedient drape-type shelters are constructed to hide the light source. Lightproof shelters with visible subdued light are used for the repair of small items of equipment (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-71. Night recovery is conducted on a case-by-case basis depending on the tactical situation and the need for recovery of the item. Equipment, tools, and repair parts are pre-positioned and marked for easy location, identification, and handling. Elements must also be concerned with aerial observation of heat and light source signatures. Where required, the supported unit provides security for the recovery element. Support teams dispatched from support elements into areas farther forward should have night vision devices.

Appendix B

Maintenance Management Information Systems (Ground)

Maintenance management includes forecasting, distributing, scheduling, and controlling the production of maintenance workloads. Factors that impact on 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 the automation systems and how they interface effecting maintenance management.

FORCE XXI BATTLE COMMAND, BRIGADE AND BELOW

B-1. The Force XXI Battle Command, Brigade and Below (FBCB2) system is the digitized battle command information system for mounted and dismounted units providing real-time information for brigade and below units.

B-2. Functionally, the FBCB2 system will support lower-echelon battle command tactical mission requirements including real-time SU for commander, staff, and Soldiers, shared common picture of the battle space, graphical displays with friendly and enemy unit locations, target identification, integrated logistics support, and communications/electronics interfaces with host platforms.

B-3. A COP is provided by collecting, integrating, and displaying a common picture of the battlefield that is consistent in both time and space at each user display. Software being developed for the FBCB2 COP allows the geographical location of individual Soldiers, weapons/platforms, command posts, and other operational facilities to be collectively presented on a display. Since the Army tactical internet is a true, seamless internet based on the worldwide internet model, it is possible to communicate each individual geolocation to every FBCB2-equipped user within the tactical internet.

B-4. The application of the COP, with the enhanced capability to request maintenance support, results in more effective and efficient application of repair parts and CRT/FMT utilization. These efficiencies ultimately translate into reduced footprint for sustainment operations in the operational area.

STANDARD ARMY MAINTENANCE SYSTEM-ENHANCED

B-5. The Standard Army Maintenance System – Enhanced (SAMS-E) has replaced the Unit Level Logistical System – Ground (ULLS-G), Standard Army Maintenance System (SAMS) level one and two maintenance (SAMS-1 and SAMS-2) and SAMS- Installation/Table of Distribution and Allowances (I/TDA) by merging selected functionality from these legacy systems and modernizing it by incorporating a Microsoft Windows Operating System Graphical-User-Interface (GUI), which meets or exceeds the Defense Information Systems Agency *(DISA) Gold Standard.

B-6. This system provides critical digital data for two critical areas of field maintenance; equipment information for the using unit and their respective maintenance personnel and management capabilities for the Support Operations and Maintenance Managers personnel.

B-7. SAMS-E provides consolidated maintenance and repair parts data and is generally located at the Field Maintenance Teams (FMT), Combat Repair Teams (CRT), Forward Support Companies (FSC), Field Maintenance Companies (FMC), Brigade Support Battalions (BSB), Combat Sustainment Support Battalions (CSSB), Separate Battalions and Brigades, Sustainment Brigades, Component Repair Companies (CRC), Support Maintenance Companies (SMC), and higher level materiel management organizations.

B-8. The SAMS-E application/suite consists of selected ULLS-G, SAMS-1, SAMS-2 and SAMS-I/TDA functionality and will provides the Army Maintenance Community (ground only) a means to transition (bridge) from the older DOS-based maintenance management systems to the newer Enterprise Logistics Solution (ELS). The character preceding the "E" in the name "SAMS-E" is the functionality indicator to ease conversation with regards to functionality. The functionality indicator of "1" will be used for ULLS-G and SAMS-1, "2" will be used for SAMS-2, and "I" for SAMS-I/TDA functionality.

PRIMARY TOOL

B-9. The SAMS-E is the primary tool used for maintenance management. Daily transfers of data from the Maintenance Company MCS to the Battalion Support Operations Section (SAMS-1E to SAMS-2E) keep the Support Operations Maintenance Officer abreast of the maintenance situation of supported customers.

B-10. In addition to automated SAMS-E reports, Support Operations sections may develop local procedures and reports to track maintenance status.

Daily Analysis

B-11. The daily analysis of SAMS-E reports will reveal trends or situations requiring command or staff action. SAMS-E readily provides information on work order greater than 30-60-90 days old, significant increases in shop input, excessive number of items awaiting parts, low production, excessive time in any status, and class IX requests with no status.

B-12. Corrective actions for these problems might include augmenting subordinate units with additional repair capability, cross training, revising maintenance time guidelines, and/or increased use of controlled exchange or fabrication.

Daily Transfers

B-13. On a larger scale, the TSC/ESC keeps abreast of the maintenance situation through its SAMS-2E. Daily/weekly transfers are provided by SAMS-1 activities to their supporting SAMS-2, who in turn transmits the data to LOGSA. This data can be accessed by any higher HQ or management entity to evaluate workload capabilities and the capabilities of maintenance units, cross-level maintenance resources and repair parts, establish maintenance priorities, direct retrograde, and coordinate maintenance issues though the support operations section for resolution.

B-14. Maintenance data is also used by TRADOC and the USAMC in analyses to determine manpower requirements and TOE structures, repair parts requirements, trends, equipment reliability, and force readiness. These analyses require accurately reported data.

REPORTS AND OUTPUTS

B-15. All reports and outputs for the SAMS-1E can be found in AISM 25-L21-AHN-ZZZ-EM. All reports for the SAMS-2E can be found in AISM 25-L26-AHO-ZZZ-EM.

DATA TRANSFER FLOW

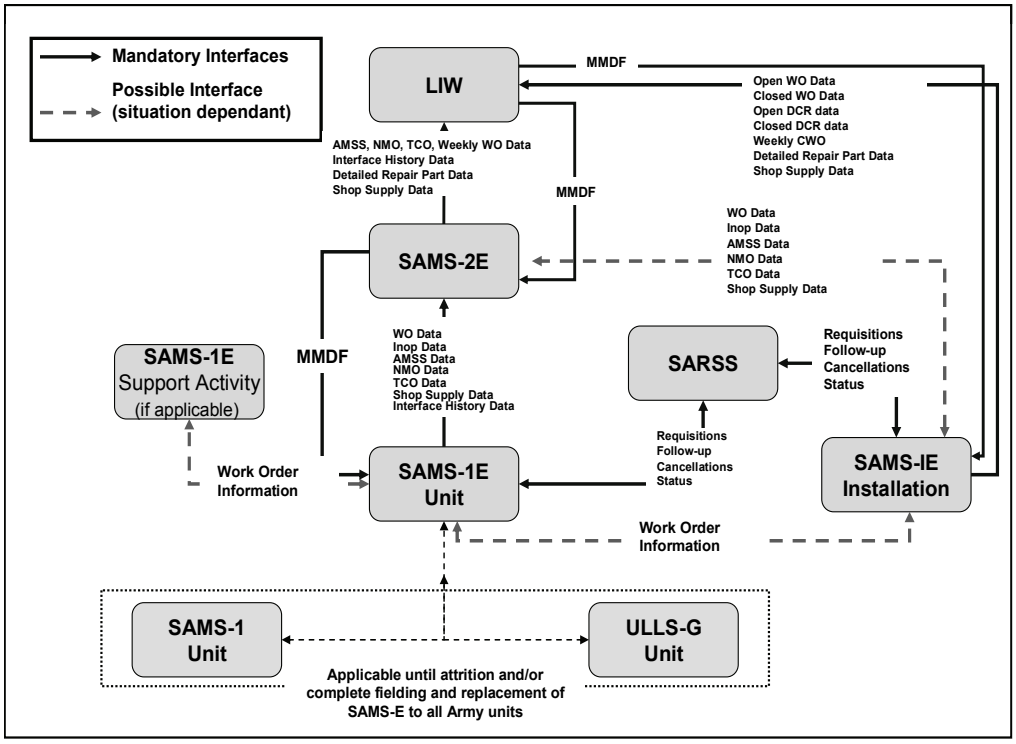

Figure B-1. Data Transfer Flow Between Logistic Information Systems

B-16. Figure B-1 shows data flow between the various LIS Systems and Figures B-2 and B-3 shows how data flows across echelons.

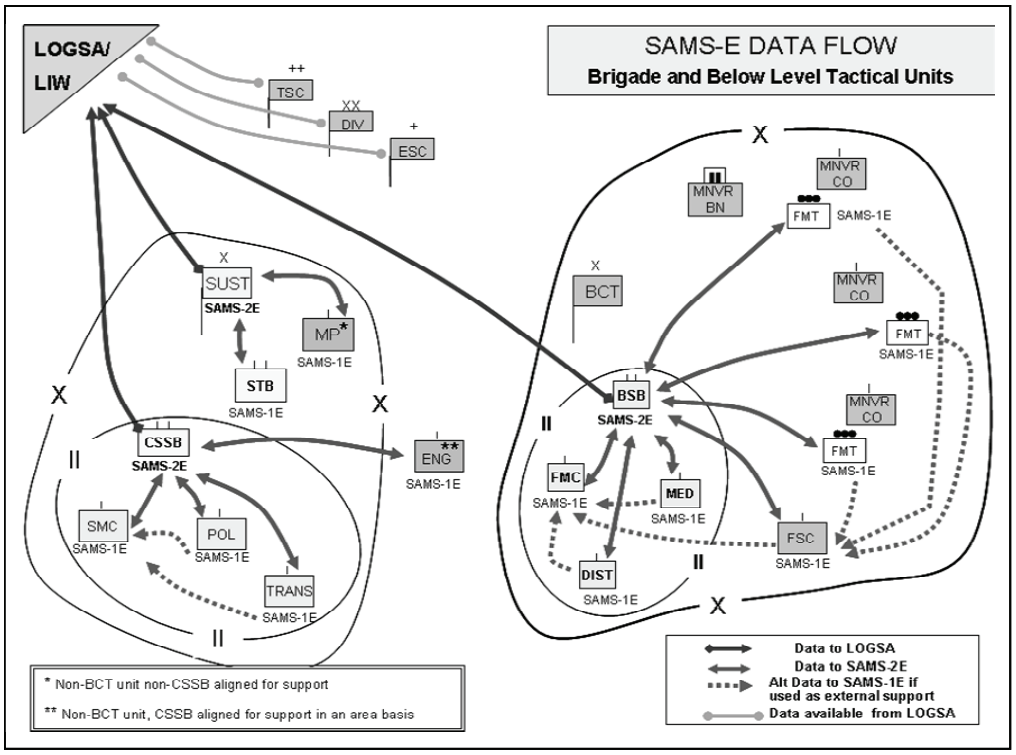

Figure B-2. SAMS-E Data Flow for Brigade and Below Tactical Units

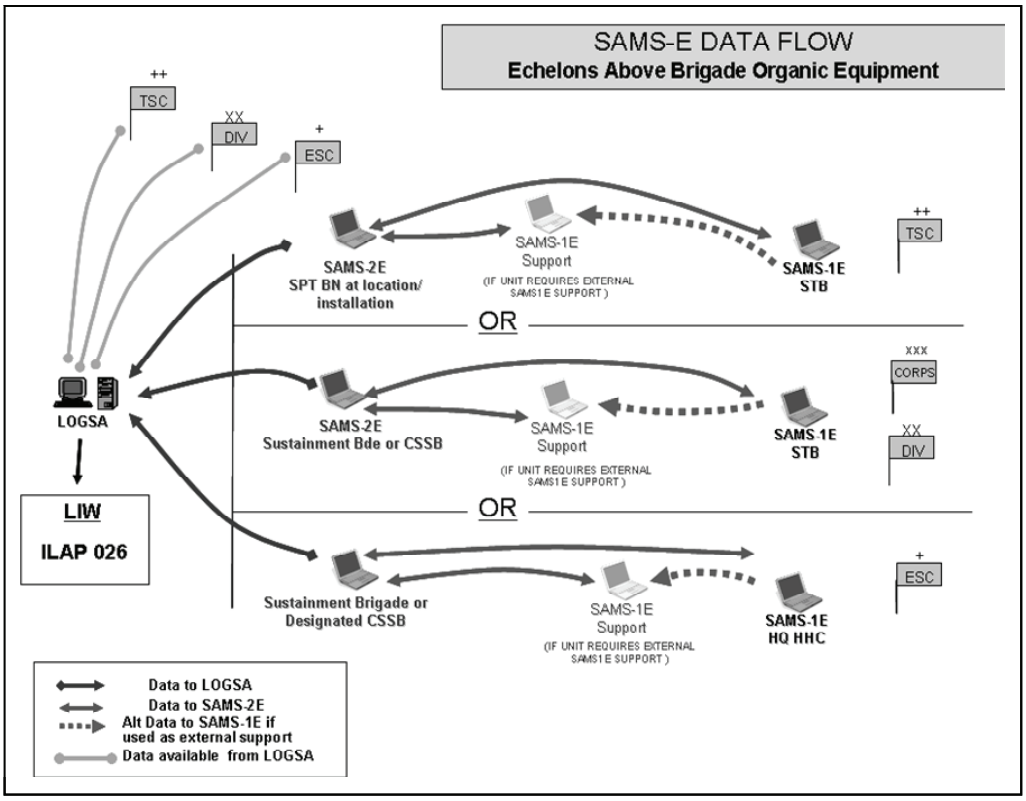

Figure B-3. SAMS-E Data Flow for Echelons Above Brigade

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Appendix C

Maintenance Allocation Chart

To ensure balance in the maintenance system, it is important that responsibilities of each maintenance level be kept in perspective. It is a tactical necessity for owning units to perform preventive maintenance. The Maintenance Allocation Chart (MAC) designates overall authority and responsibility for the performance of maintenance functions on an item. This appendix discusses the functions and effects modularity had on the MAC.

OBJECTIVES

C-1. The Army Maintenance System is organized to service and repair equipment throughout its in-service life. Organizations are tailored to provide the required equipment maintenance capability at appropriate levels throughout the maintenance system.

C-2. As of the date of this publication, most Technical Manuals have yet to be updated to reflect the change to Two level maintenance (TLM). Refer to AR 700-82, (Joint Regulation Governing the Use and Application of Uniform Source Maintenance and Recoverability Codes), table D-1. Figure C-1 gives an example you will see in most TMs. Figure C-2 displays an updated view of a Two Level Maintenance compliant TM.

MAINTENANCE ALLOCATION CHART

1 Group Number	2 Component Assembly	3 Maintenance Function	4 *Maintenance Level C	O	F	H	D	5 Tools and Equipment	6 Remarks
05	COOLING SYSTEM CONT								
0505	Fan Tower Assembly	Inspect		0.2					
		Test		0.2					
		Replace			0.3				A
		Repair		4.5				35	
		Overhaul				**		37	
06	ELECTRICAL								
0601	Alternator	Inspect		0.2					
		Test		0.2					B
		Replace		2.0					
		Repair			8.0				
		Overhaul				**			
0602	Voltage Regulation	Inspect		0.2					
		Test		0.2	0.2				
		Replace		2.0					
		Repair			1.0				
		Overhaul							
0603	Motor Starting	Inspect		0.2					
		Test		0.2					
		Replace		2.0					
		Repair			2.4			48	
		Overhaul				**			

***Worktimes are included in DMWR*

*C Operator or crew
O Organizational maintenance
F Direct support maintenance
H General support maintenance
D Depot maintenance

Figure C-1. Maintenance Allocation Chart (Legacy)

C-3. Each column of the MAC gives pertinent information to all users of the MAC. An explanation of each column is listed in the following paragraphs.

C-4. **Column 1- Group Number**: Listed group numbers, which identify components, assemblies, subassemblies, and modules with the next higher assembly.

C-5. **Column 2- Component /Assembly**: Contains noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

C-6. Column 3- Maintenance Function: Lists functions to be performed on items in Column 2.

C-7. **Column 4- Maintenance Level:** Specifies the lowest level of maintenance authorized to perform the function listed in Column 3. Under the two-level maintenance system, Field Level maintenance is authorized to perform all functions listed as C, O (until deleted by an update), and F. Below depot Sustainment Level Maintenance activities are authorized to perform any function listed as H, and depots are authorized to perform and function listed as H and D.

C-8. **Column 5-** Tools and Equipment: Names, common tool sets, special tools, and test/support equipment required to perform the designated function.

C-9. **Column 6-Remarks:** Lists references to the page at the end of the MAC.

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		1.5			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				16.0	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 BOARDS, STP-34							
010101	E-EB/01	Inspect		0.1				A
		Replace		0.5			1, 2	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	

Figure C-2. Two Level Maintenance Allocation Chart

LOCATION

C-10. The MAC is found in equipment TMs that contain field-level (–12, –13, –14, –20, –23, and –24) maintenance procedures. Some recently fielded, highly complex weapon systems have separate manuals for the MAC. In those instances, the TM has the same first eight digits as other series TMs, followed by "MAC."

FUNCTIONS

C-11. There are many functions that are essential to ensure that equipment sustains its service life. Maintenance functions are defined in the following paragraphs.

C-12. **Inspect**- To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination. This includes scheduled inspections, gauging, and evaluation of cannon tubes.

C-13. **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.

C-14. **Service-** Operation required periodically to keep an item in proper operating condition; e.g. to clean, preserve, drain, paint, or to replenish fuel, lubricants, chemical fluids, or gases.

C-15. **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.

C-16. **Calibrate**- To determine corrections and cause them to be made or to make adjustments on instruments of TMDE used in precision measurement. Consists of comparisons of two instruments, one of which is in certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

C-17. **Remove/Install**- To remove and install the same type of item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, replacement part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

C-18. **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 (SMR) code.

C-19. **Repair**- The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

C-20. **Overhaul**- To restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul does not normally return an item to like new condition.

C-21. **Rebuild-** Consist of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing tolerances.

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Glossary

This glossary lists acronyms and terms with Army, multi-Service, or joint definitions, and other selected terms. Where the Army and joint definitions are different, *(Army)* follows the term. Terms for which FM 4-0 is the proponent manual (the authority) are marked with an asterisk (*). The proponent manual for the other terms is listed in parentheses after the definition.

AFSB	Army Field Support Brigade
AFSB	Army Field Support Battalions
AOAP	Army Oil Analysis Program
APS	Army Pre-positioned Stocks
ARFORGEN	Army Force Generation
BCS3	Battle Command Sustainment Support System
BCT	Brigade Combat Teams
BDAR	battle damage assessment and repair
BFSB	Battlefield Surveillance Brigade
BLST	Brigade Logistics Support
BSB	Brigade Support Battalion
BSMC	brigade support medical company's
BTB	Brigade Troops Battalion
C&E	Communication and electronic
CBM+	Condition Based Maintenance Plus
CLOE	Common Logistics Operating Environment
CLS	contracted logistics support
COTS	commercial off the shelf
CRC	Component Repair Company
CRT	Combat Repair Teams
CSB	Contracting Support Brigade
CSSB	Combat Sustainment Support Battalion
DMC	distribution management center
EOD	explosive Ordnance disposal
ESC	Expeditionary Sustainment Command
FMP	Field Maintenance Platoon
FMT	Field Maintenance Team
HMOD	Harbormaster Operations Detachment
ITV	in-transit visibility
LBE	Left-Behind Equipment
LCMCs	Life Cycle Management Commands
LNO	liaison officer
LOGCAP	Logistics Augmentation Program
LOGSITREP	logistics situation reports
LRU	Line Replaceable Units
MAC	Maintenance Allocation Chart
MCO	Maintenance Control Officer
MCS	Maintenance Control Section
MEB	Maneuver Enhancement Brigade

MLC	medical logistics company
NGOs	non-governmental organizations
NMP	National Maintenance Program
OCCM	on condition cyclic maintenance
OCP	operational command post
PC	production control
PDTE	Pre-deployment Training Equipment
PERSITREP	personnel situation reports
PMCS	Preventive Maintenance Checks and Services
POR	program of record
QA/QC	Quality Assurance and Quality Control
RCM	Reliability Centered Maintenance
RIC	routing identifier code
SAM-E	Standard Army Maintenance System-Enhanced
SMC	Support Maintenance Company,
SMR	Source, Maintenance, and Recoverability
SPO	support operations office
SRUs	shop replaceable units
SSA	supply support activities
STAMIS	Standard Army Management Information Systems
TAV	total asset visibility
TLM	Two level maintenance
TMDE	Test, Measurement and Diagnostic Equipment
TMs	Technical Manuals
TOE	Theater Opening Element
TPE	Theater-Provided Equipment
VSO	Vessel Support Office

References

SOURCES USED

The following lists the sources quoted or paraphrased in this publication.

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FM 100-9, *Reconstitution,* 13 January1992.
TB 43-180, *Calibration and Repair Requirements for the Maintenance of Army Materiel*, 1 April 2011.

REFERENCED FORMS

Unless otherwise indicated, Department of the Army (DA) forms can be downloaded from the Army Publishing Directorate (APD) Web site: www.apd.army.mil.

DA Form 2028, *Recommended Changes to Publications and Blank Forms*
DA Form 2404, *Equipment Inspection and Maintenance Worksheet*
DA Form 2406, *Materiel Condition Status Report*
DA Form 2407, *Maintenance Request*
DA Form 3266-1, *Army Missile Materiel Readiness Report*
DA Form 5988-E, *Equipment Inspection Maintenance Worksheet (EGA)*
DA Form 5990-E, *Maintenance Request (EGA)*

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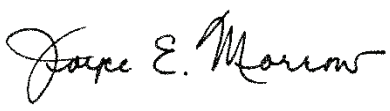
***ATTP 4-33 (FM 4-30.3)**
18 March 2011

By Order of the Secretary of the Army

GEORGE W. CASEY, JR.
General, United States Army
Chief of Staff

Official:



JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
1104902

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