Chapter 4

Maintenance Management

This chapter describes maintenance management processes and resources, levels of management, maintenance management information systems, maintenance control, and unit internal management procedures for various types of maintenance operations.

PRINCIPLES OF MAINTENANCE

4-1. Broad principles of maintenance that provide the framework for operating a maintenance shop are found in AR 750-1. Those that apply to maintenance support are listed below.

- Commanders are responsible for establishing a command climate that ensures all assigned equipment is maintained according to appropriate TMs and AR 750-1.
- Commanders are responsible for providing resources, assigning responsibility, and training their soldiers to achieve the desired standard.
- The MAC is the primary tool used to determine the degree of maintenance and to specify the tasks to be performed at each level.
- The decision to repair or evacuate is based on the maintenance recovery code (MRC) and the recovery code (RC), the urgency of need, and the METT-TC considerations.
- Unserviceable reparables beyond the MAC's authorization to repair must be evacuated promptly to the appropriate maintenance activity for repair.

PROCESS

4-2. The Maintenance Management process includes the following:

- Forecasting.
- Scheduling.
- Production control.
- Quality assurance.
- Technical assistance.
- Provisioning of repair parts.
- Workloading/cross-leveling regional workload.
- 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 for garrison maintenance missions. Safety concerns must be addressed in the SOP and the Operation Orders (OPORDs).

4-4. Maintenance management policies and procedures are contained in the Maintenance Management UPDATE, which includes AR 750-1, AR 710-2, and DA Pamphlet 710-2-2. Divisional and non-divisional units use the SAMS to collect maintenance data and provide management information to each level of command. Repair parts management policies and procedures for both the using unit and DS maintenance units are found in the Unit Supply UPDATE.

Sustainment Maintenance

4-5. Sustainment maintenance structures and operations are based on requirements generated by the ASCC and TSC. Sustainment maintenance leadership will perform the following:

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

4-6. The sustainment information management systems will perform the following:

- Include connectivity with current maintenance and supply STAMIS' (for example, SAMS, Standard Army Retail Supply System (SARSS), Availability Balance File (ABF), and so on).
- Recommend pre-assigned maintenance support routing identifier code (RIC) instruction to Theater Materiel Management Center (TMMC)/ Corps Materiel Management Centers (CMMCs) for in-theater and strategic base (CONUS/OCONUS) integrated sustainment maintenance (ISM) operations.
- Monitor worldwide component availability for items identified as ASCC/TSC core weapon systems and critical equipment components (Classes VII and IX).
- Maintain visibility over repair part availability, identifying potential line-stopper parts for critical items that support the repair of components of major and secondary items.
- Assist in maintenance retrograde and redeployment phases of the operation.

Figure 4-1 lays out the sustainment maintenance support structure from the sustainment base to the corps rear.

Readiness and Sustainment Maintenance Managers

4-7. The various management functions required resulted in classification of maintenance management into two echelons – 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 assigned to support battalions support brigade-sized units.

4-8. SMMs integrate sustainment maintenance (minus medical) for the total Army. They recommend support structure to the Combatant Commander, and implement policies and procedures that provide optimal sustainment maintenance support to the full spectrum of total Army missions. This is a seamless process, transparent to the user. They participate in development and integration of the LSE.

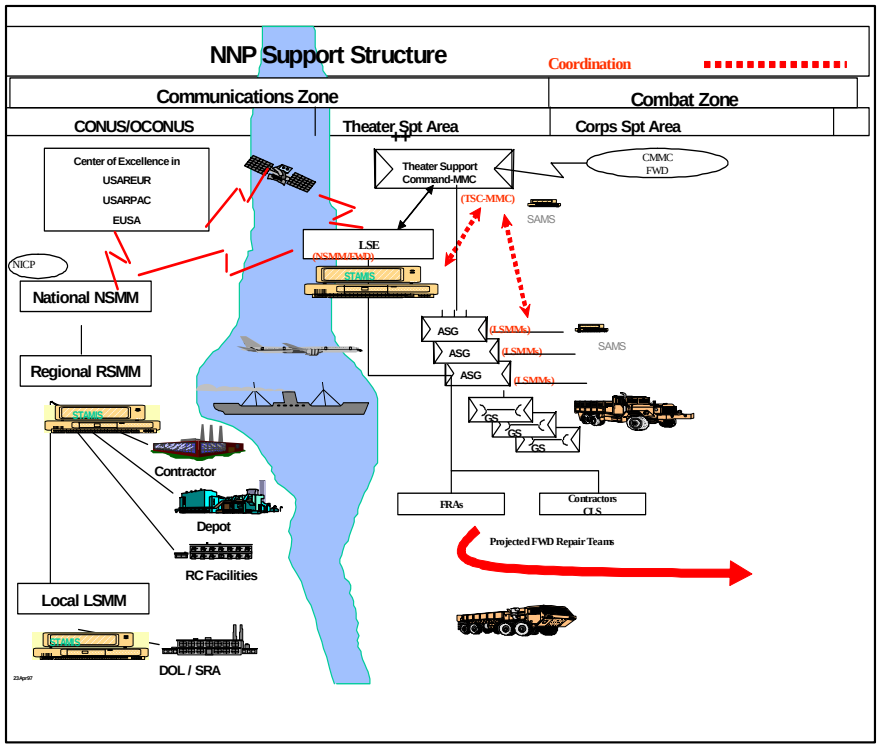


Figure 4-1. Layout of Sustainment Maintenance Support Structure

4-9. **National Sustainment Maintenance Manager**. The NSMM has the following responsibilities:

- Serves as the principal agent for developing, coordinating, and integrating the Sustainment Maintenance (SM) relations portions of contingency Stability and Support Operations Plans.
- Provides a SM support structure as part of the LSE to support the theater.
- Provides oversight of the total Army SM capabilities and capacities.
- Recommends changes in infrastructure, facility upgrades, realignments, and modernization. Also recommends consolidation of SM capability to maximize efficiency.

- Rounds out RC GS maintenance unit technical training requirements with existing resources. Assist in the development of training plans to enhance SM skills.
- Develops, integrates, and standardizes SM procedures, policies, and operations.
- Coordinates and provides input to materiel developers and commodity managers in the ILS process as it relates to SM support resources.
- Works with combat developers to revise input to materiel developers in identifying special tools and TMDE requirements for new weapon systems.
- Works with combat developers in articulating SM aspects and requirements for standard and emerging logistics management information system integration, including financial system interface.
- Provides recommendations to regional and national level agencies on how best to achieve SM objectives by consolidating regional and national requirements.
- Identifies non-executable SM requirements and recommends resolutions.
- Monitors and tracks SM cost, production, and performance data. Also recommends improvements on day-to-day and future operations.
- Assists regional and national agencies in resolving line stoppers, non-mission-capable equipment, and quality deficiency reports.
- Monitors and realigns/balances the regional workload by cross-leveling between regional and national agencies.
- Provides continuity mechanism for backfill of regional and local management functions during mobilization, contingencies, deployments, and stability and support operations situations.

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION 9000

4-10. National Maintenance Program Certification is a two-part process. This process leads to a fully certified National Provider both in terms of having a compliant quality system and in technical competence capable for performing the required repairs. The process for assessing Quality System compliance and evaluating Technical Capability are sequential in nature. A candidate Source of Repair (SOR) most first develop, implement, and maintain its Quality System in accordance with the provisions of the ISO 9002 standard. Once the quality system has been determined to be in compliance, the candidate SOR's facilities, tools, equipment, and skills will be evaluated for technical capability, capacity, and competence on an NSN-by-NSN basis.

4-11. Once the SOR has satisfied the certification requirements, it will be certified as a National Provider and is eligible to participate in National PP&C. National Provider certification will be on a three-year cycle. National Provider may also be subject to decertification.

Decertification may be total or partial. Total decertification means all National Maintenance program work will be transferred to a certified national provider and the decertified National Provider will be prohibited from participating in future National PP&C until cause(s) for decertification are resolved to the total satisfaction of the National Provider Officer (NPO). Failure to remain in compliance with ISO 9002 will result in total decertification.

4-12. Partial decertification means that a certified National Provider may have a technical issue with one or more lines as a result of a facility, tool, equipment, or skill issue that has caused it to lose the Technical Certification for the line(s) in question. The line(s) in question may be transferred to another workload process. The loss of Technical Certification for National Maintenance Program line(s) places the National Provider in an ineligible category for the line(s) in question during the next National PP&C.

4-13. In order for a decertified National Provider to again become eligible for National Maintenance Programs, the NPO will direct the site to develop, implement, and maintain corrective and preventive action plans for all decertification issues. Once the plans are approved, the NPO will closely monitor implementation and maintenance. Each decertified National Provider must undergo a complete compliance audit and a comprehensive evaluation of its facilities, tools, equipment, and skills in order to be eligible to participate in future National PP&C. Once recertified, the repair site will be eligible to participate in the next scheduled PP&C. Programs lost through decertification will not be returned unless awarded during the PP&C or direct workload process.

4-14. Reasons for decertification are as follows:

- Failure to comply with ISO 9002 Standards.
- Failure to correct internal and external audit findings.
- Failure to conduct an annual internal audit.
- Excessive Quality Deficiency Reports.

4-15. **Regional Sustainment Maintenance Manager.** The RSMM, located at a designated geographical area, has the authority to prioritize and redirect workloads among the LSMMs. Depending on the extent of support required, an RSMM operation may be established in an overseas theater of operations as part of LSE support. The RSMM has the following responsibilities:

- Tailors reparable programs submitted by LSMMs to meet regional demands and training requirements, weapon system availability, and cost avoidance.
- Determines regional normal and surge capability and capacity.
- Determines COE selections.
- Receives national-level requirements, performs capacity and capability assessments, bids on national workload, and submits program status reports.
- Performs cost analysis assessments.

- Identifies work that cannot be accomplished within the region and elevates it to the NSMM.
- Plans for sustainment maintenance support for mobilization and deployments.
- Interfaces with LSMMs, the NSMM, Field Commanders, and staff.

4-16. **Local Sustainment Maintenance Manager.** The LSMM workloads all sustainment maintenance units and activities in a designated geographic area, which could be at multiple Maintenance Centers. There may be situations where an LSMM operation is established in an overseas theater of operations as part of LSE support. The LSMM has the following responsibilities:

- Develops reparable programs to meet local demands.
- Conducts work center capability and capacity assessments.
- Prepares bids and competes for COE selection for the region, as well as for national work.
- Performs exception management.
- Identifies work that cannot be accomplished within the local geographical region and elevates it to the RSMM.
- Conducts cost analyses.
- Interfaces with customers, other LSMMs, and the RSMM.
- Plans for mobilization, deployments, and stability and support operations.
- Plans for capacity and capability modernization.

4-17. SMMs 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. SM managers are assigned to Theater and DA Support Commands. Managers use their maintenance knowledge and experience, along with assistance from their management interfaces and CSS computers, to determine potential and developing problems and to facilitate avoidance or resolution. Figure 4-2 illustrates how sustainment managers interface.

Materiel Management Center

4-18. The MMC is the maintenance manager for deployed Army forces. It is the link between the deployed forces and the support base. The MMC maintains a close working relationship with the LSE. Theater-level GS Maintenance Companies may come under the LSE for workloading. The MMC may also support equipment of other services or multi-national forces.

Distribution Management Center

4-19. The DMC acts as the distribution management support element for the deputy commander for support operations (DCSO). It provides staff supervision to the TSC MMC and Movement Control Agency (MCA), and coordinates with the Medical Logistics Management Center (MLMC). It synchronizes operations within the distribution system to maximize

throughput and follow-on sustainment, and executes priorities in accordance with ARFOR Commander directives.

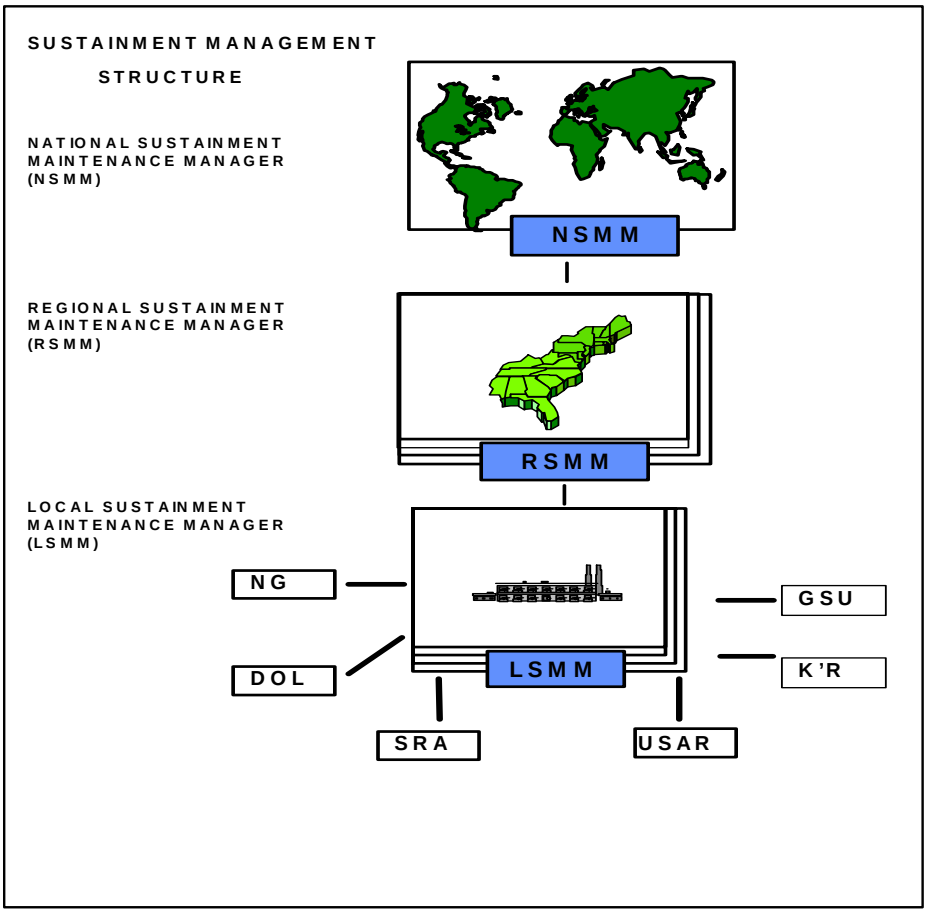


Figure 4-2. Sustainment Management Interface

RESOURCES

4-20. Resources are the tangible and intangible assets needed to accomplish the mission. They include the following:

- People.
- Tools.
- Test equipment.
- Repair parts.
- Publications.
- Facilities.
- Time.
- Skills.
- Funds.

4-21. Maintenance managers' objectives are to maintain readiness at the optimal level with the least expenditure of resources. Managers must decide which resources are needed to support specific mission

requirements and advise the commander on the logistics impact of various courses of action (COAs).

4-22. Maintenance management deals with the following various factors effecting a unit's mission:

- Command emphasis.
- Day-to-day management skills.
- Supervision.
- Motivation.
- Technical skills.

Managers use these tools to channel maintenance efforts. Failure to achieve wanted results often stems from failure in one or more of these areas.

Command Emphasis

4-23. The commander sets the tone for what is important within the command. The personal example of leaders shows their concern for specific aspects of the unit's mission. The soldiers in the command translate this concern into action. To place command emphasis on maintenance operations, the commander shows an active interest in these operations and in the materiel readiness of unit equipment. Maintenance managers use command emphasis to influence the support mission even though they may not be in the chain of command. Commanders need to balance mission, training, and administrative requirements to form a cohesive unit.

Management Skills

4-24. Maintenance managers continually strive to improve their operations. Since the management process itself plays a key role in maintenance operations, managers should always look for ways to improve planning, organizing, coordinating, directing, and controlling. Managers must also look for ways to be proactive (influencing events before they happen) rather than reactive (reacting to events as they happen). Feedback and After-Action Reports are also vital tools used by maintenance managers.

4-25. Under the stress of day-to-day operations, these elements may lose visibility and may not seem to have a direct bearing on materiel readiness. However, small improvements in the total system bring greater overall benefits than a heroic effort directed toward one or two items. The maintenance manager must be extremely careful that changes to maintenance operations do not undermine other initiatives established by the commander.

Supervision

4-26. First-line supervisors are a vital link in the chain of command. The commander depends on them to accomplish the day-to-day mission and to ensure the welfare of the troops. First-line supervisors receive instructions and turn them into tangible results. Passing along the commander's requirements is only a small part of their responsibilities. Their major challenge lies in ensuring the people they supervise accomplish the mission. First-line supervisors are the individual soldier's

primary source of assistance and further professional development. They need to know the standards and objectives set by the chain of command in order to direct their soldiers' efforts.

4-27. First-line supervisors must be aware of mission requirements and the capabilities and limitations of the soldiers under their control. They must continuously train their subordinates to support the needs of the battlefield. Next to the mission, the welfare of soldiers and their professional development are paramount in the supervisor's mind.

Motivation

4-28. Motivation is the need instilled in an individual to perform designated tasks. The leadership demonstrated by commanders and supervisors greatly influences motivation of soldiers. Effective leadership is the key to motivation. Effective leaders define objectives, communicate them, evaluate how well they are achieved, and provide feedback to soldiers doing the work. Maintenance managers often underestimate the importance of this process. Most soldiers want to perform well, but they must know the objectives and standards and receive performance feedback. Superior achievement must be recognized and substandard performance must be corrected.

Technical Skills

4-29. Technical skills are the ability to perform tasks associated with duty positions. Training provides these skills. A soldier's skills are one of the commander's most important assets. When the battle begins, there will be little time for training. The commander must always strive for high levels of training. The Army training system depends on the Unit Commander's continuance of the training process begun during advanced individual training. Many training resources are available. The commander and the maintenance manager must use these resources to maximum advantage. To a Maintenance Company Commander, training on technical tasks is as important as training on tactical skills. Mission Training Plans (MTPs) and soldier training publications (STPs) establish the requirements for technical maintenance training.

UNIT SET FIELDING

4-30. Unit Set Fielding is the Army's capstone program for fielding new/enhanced capabilities to units in combat team packages. Unit Set Fielding does not replace Total Package Fielding and other materiel fielding processes. The goal of Unit Set Fielding (normally brigade equipment sets) is to modernize all equipment and automation support in a designated unit. It is seen as a major improvement in fielding systems over incremental system fieldings. Unit Set Fielding produces combat capable units, in the shortest time. As the Army moves forward with modernization, the environment must shift from a focus on fielding "stand alone" systems, to fielding "systems of systems" configured unit sets.

4-31. One of the top Army G4 modernization priorities is the disciplined modernization process and strategy that results in the fielding of an increased capability/function in support of the Legacy, Interim, and finally, the Objective Forces. The Unit Set Fielding process drives the integration and synchronization of multiple systems fieldings occurring

during a defined fielding window, to reduce the impact on force readiness, increase force effectiveness, and streamline the fielding process. Execution of unit set fielding focuses on system interdependencies and operational readiness impacts because readiness is the driver. The Unit Set Fielding process is a cycle that begins seven years prior to the beginning of a unit's Unit Set Fielding window and ends approximately two years after the window closes. A Unit Set Fielding cycle consists of five steps: *Preparation, Reorganization, Fielding, Training,* and *Validation*.

- **Preparation:** This step covers actions seven years to six months before a unit enters its Unit Set Fielding window. Program managers (PMs), MACOM, the Corps of Engineers, and installation managers ensure requirements for installation facilities, ranges, information infrastructure, training simulators, or other infrastructure changes are identified and submitted for military construction funding. These requirements are then submitted to HQDA and MACOMs for inclusion in the Program Objective Memorandum-build. MACOMs will also ensure environmental impacts of all actions are documented. MACOMs and units will receive the Critical Mission Equipment List and schedule the fielding windows on their long range training calendars. The MACOM and unit will receive a detailed Materiel Fielding schedule two years out. New Materiel Introductory briefs and reorganization planning will begin one year out.
- **Reorganization:** Unit reorganization begins about six months prior to the Unit Set Fielding window and concludes at fielding-date. This reorganization includes actions and activities required to transition from the unit's current MTOE to a new MTOE, which reflects the new equipment and personnel in the unit. Facilities are completed; training devices, training support infrastructure, and tactics, techniques, and procedures are in place; personnel are assigned; and equipment turn-ins are completed.
- **Fielding:** Systems in the unit set will be fielded during the window. The PM for each system will conduct new equipment training (NET). Completion of NET for all systems in the unit set closes the window and the unit will be taken off C5 status.
- **Training:** The unit is responsible for conducting collective and sustainment training. This training will start after completion of NET and will normally be completed within 18 months after the unit's fielding date.
- **Validation:** The gaining MACOM is responsible for ensuring validation of the operational readiness of the unit to execute its assigned mission. Validation will be the final activity conducted during the training step. Validation completes the Unit Set Fielding cycle.

4-32. Current and future warfighting systems are interdependent and require interconnectivity to maximize effectiveness. The Army uses Unit Set Fielding as a modernization process to assemble and issue individual

and interdependent systems. However, this process may not be practical for all units and components in brigade sets, particularly in the reserve components. Therefore, Unit Set Fielding may be executed at battalion, separate company, or team/detachment.

4-33. Synchronizing equipment and software fielding increases efficiency and reduces disruption to the unit. With the increased number of digitized and modernized systems being fielded, along with accompanying successive software upgrades, Unit Set Fielding ensures these digitized systems, inherently designed to be used in a system-of-systems environment, create the intended synergistic effect.

4-34. A unit can realize the full capability of new weapons, sensors, digital command and control systems, and corresponding training aids, devices, simulators, and simulations. To do this, equipment must be integrated into the unit as a set to include the facilities to operate, maintain, and train on the delivered equipment.

LEVELS OF MANAGEMENT

4-35. Maintenance operations must have careful direction, supervision, and management. These functions are accomplished at the company and higher HQ levels. The higher HQ elements concerned with maintenance operations are the MMC for the command and the Support Operations Office for the battalion. The chain of command and other supporting units provide technical assistance on request. Close coordination with the MMC and the battalion's Support Operations Office is essential. The MMC and the battalions must work together and have a thorough understanding of the capabilities and limitations of each.

4-36. Unprogrammed requirements have a significant impact on the maintenance mission. The MMC 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.

MATERIEL MANAGEMENT CENTER

4-37. The MMC mission performs the following:

- Is the central data collection and analysis element for all maintenance activities belonging to the command.
- Has the responsibility for gathering, maintaining, analyzing, and acting on information in maintenance management information systems.
- Establishes procedures for gathering data and distributing the resulting information to subordinate units and commanders as required.
- Provides technical direction and control of battalion operations for the higher HQ.
- Provides guidance and day-to-day planning for integrated maintenance and supply management.

- Disseminates information, instructions, and directions through the Battalion HQ.
- Controls attachment of augmentation MSTs to tailor support to match the requirements of the supported force. The Support Group HQ performs administrative support and exercises command and operational control functions (except for technical direction of maintenance support operations).

A principal function of the MMC is to advise the command and staff on significant trends and deviations from established standards and to recommend necessary actions.

Capabilities

4-38. The MMC provides most instructions and directives to the Maintenance or Support Battalion relative to disposition of end items or components requiring evacuation. It sets priorities and controls ORFs (peacetime only), provides maintenance and repair parts status, and establishes maintenance repair time guidance. Instructions are broad enough to provide flexibility to Battalion HQ in the organization and deployment of maintenance units and the management and control of their operations.

4-39. The MMC provides the following:

- Disposition instructions for evacuation of unserviceable items that must be routed to other maintenance units or C&C Service Companies.
- Information and instructions on the use of MWOs.
- Information on priorities relating to repairs of specific types of equipment or support of specific units.
- Maintenance management information derived through analysis of maintenance data and reports; ensures availability of repair parts required for Maintenance or Support Battalion operations.

The MMC does not directly control workload input of DS maintenance units. However, it can influence the workload and accomplish workload balancing by recommending priorities and changes in repair time guidance.

Evacuation Management

4-40. Items being evacuated by owning units are normally turned in directly to a maintenance unit or prepared for retrograde as directed by the MMC. If materiel is identified for retrograde, it will be processed by DS units and shipped directly to a port.

4-41. The MMC will normally publish evacuation instructions applicable for a specified time period to avoid the necessity for providing individual instructions for the disposition of all items requiring evacuation. The MMC may require reports on certain critical or controlled items before issuing disposition instructions. The TSC or Corps-COSCOM C&C Company performs the mission.

SUPPORT OPERATIONS OFFICE

4-42. The Support Operations Office coordinates all maintenance operations in a support group or battalion, provides guidance on maintenance priorities, and sets objectives for production. The relationship between the Support Operations Office and Shop Officers is vital to mission success. The SPO coordinates and integrates the battalion's DS-level maintenance mission.

BATTALION-LEVEL MANAGEMENT

4-43. At the battalion level, the SPO manages DS-level supported customer units. He supervises, controls, and directs the operation of battalion units for the following:

- DS-level maintenance.
- Recovery/evacuation.
- Repair parts supply.
- RX.
- Technical assistance.

The Support Operations Office is also a key element in maintenance data collection by ensuring its units provide automated data and generate appropriate Maintenance Reports on their operations.

4-44. The Battalion HQ commands and controls the displacement, mission assignment, and operations of its units in accordance with higher HQ plans, policies, and directives. It provides command direction and instructions, supervises, provides assistance, and performs management and control functions to satisfy requirements of supported units in accordance with the higher commanders intent.

4-45. The Battalion HQ advises Support Group HQ on maintenance and repair parts supply matters. These include recommendations concerning the following:

- Personnel requirements.
- Facilities and equipment requirements.
- Maintenance performance.
- Repair parts supply status.

They also identify other problem areas as required. The HQ reports the state of materiel readiness, deployment, and employment of battalion units.

COMPANY-LEVEL MANAGEMENT

4-46. Unlike at battalion and higher levels, maintenance management at company level is more focused on each job. The DS-level 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.

4-47. 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 the following:

- Leadership.
- Production control.
- Workload analysis.
- Determining maintenance requirements.
- Work simplification and work measurement.
- Total quality management (TQM).
- Quality assurance.
- Motivation.

Leadership

4-48. All supervisors must use effective leadership. Leadership is the most powerful of the management techniques. Supervisors must know what is to be done and how and when to do it. They must know the resources available to do the job. They must also know the limitations and other factors influencing job performance and how to motivate personnel to improve performance and productivity.

Production Control

4-49. Production control involves the following tasks:

- Production planning and scheduling.
- Proper routing and rerouting of work.
- Attaining maximum production by keeping all shop elements working at or near capacity.
- Proper shop layout to achieve time, motion, and movement economies.

4-50. **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 MCS. It helps prevent over commitment of resources when too much work is accepted with unrealistic priorities and deadlines. Analysis is continuous and is aided by the use of automated SAMS outputs.

4-51. **Estimating Maintenance Requirements.** In order to forecast maintenance locations and anticipated workload, the Control Section of each DS maintenance unit maintains a current operations map and equipment density list. The operations maps show personnel the location of adjacent units and supply distribution points, indicate aircraft landing areas, and denote MCP and UMCP locations. MSTs also use them to make strip maps to ensure they arrive at their proper destination. Equipment density lists keep personnel up-to-date on which and how much equipment is supported and where it is.

4-52. **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 and maintenance units engaged in similar types of operations. Units keep records that show production results on a week-by-week basis.

4-53. 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. Battalion HQ 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.

Total Quality Management

4-54. TQM is a management technique used to supplement QC procedures by motivating all personnel to produce high-quality work the first time. A functional TQM program becomes evident when soldiers display the motivation and initiative to inspect their own work and take immediate corrective action to resolve QC problems. TQM should be applied in all units, at all times, in all functions.

Quality Assurance and Quality Control

4-55. 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, both as a function and as an organizational element, must be separated from Production Control (PC). This separation of QA and PC insulates QA from the pressures of meeting production schedules at the expense of meeting standards. Within most maintenance organizations, this places the QA function and section directly subordinate to the commander. However, to facilitate coordination, the QA section (frequently called the Inspection Section) is located close to, and works closely with, the PC Section or even specific work centers. Persons assigned to the QA Section should be technically qualified and have additional training on QA techniques and procedures. Additional QA measures are provided in the form of technically- 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.

4-56. QC is a separate and distinct function. QC is a leadership function and must be applied to all aspects of unit operations, including initial, in-process, and final inspections. Usually, organizational leadership personnel who are inherently subject to production pressures perform QC functions. Persons performing QC functions must be trained and motivated to place quality concerns at least on par with production concerns.

4-57. **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 738-750, AR 710-2, and AR 750-1 is required.

4-58. **Process-Oriented QA/QC.** So far, QA/QC has been discussed in the context of the repair of equipment. However, it has an application for keeping the various processes and programs used within maintenance organizations on track and performing to standard. Whether it is ordering parts in the Shop Supply Section, planning work in the Production Control Section, or arranging shop space within a work center, the QA/QC model used for technical inspections applies.

4-59. **How QA/QC Pays Off.** Routinely and consistently applied in peacetime garrison and field training, the concept of supervisors exercising QC by inspecting the work, directing the correction of errors, and reinforcing adherence to proper procedures. It is reinforced by an independent set of eyes assuring quality by validating achievement of the applicable standards. QA/QC results in soldiers, supervisors, and leaders knowing proper procedures and correct standards; and, most importantly, applying them as a matter of course. QA/QC pays off in the form of a high quality, more effective and efficient maintenance operation. The practice of leaders exercising QC by observing and inspecting work, directing correction of errors, and reinforcing adherence to proper procedures will spill over into other unit operations to produce a high performance, high quality unit.

Motivation

4-60. Supervisors must continually motivate personnel to perform to Army maintenance standards. Commanders and Shop Officers must develop incentive programs that reward superior performance.

MAINTENANCE MANAGEMENT INFORMATION SYSTEMS

4-61. Automation greatly increases the ability of maintenance managers to manage the flow of maintenance data. The SAMS automates the DS-level maintenance functions while the ULLS-G automates unit-level functions. 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.

4-62. At division and non-division levels, work force utilization data, maintenance performance measures, and cost accounting are managed by the SAMS and ULLS-G. The SAMS provides a maintenance management system that ranges from the DS/GS maintenance unit to the MMC level. The ULLS-G provides unit-level maintenance activities with automated maintenance management procedures. The SAMS and ULLS-G procedures are in DA Pamphlet 738-750 and the applicable End User manuals. Figure 4-3 depicts an overview of the relationship between the SAMS-1, SAMS-2, ULLS-G, and SARSS.

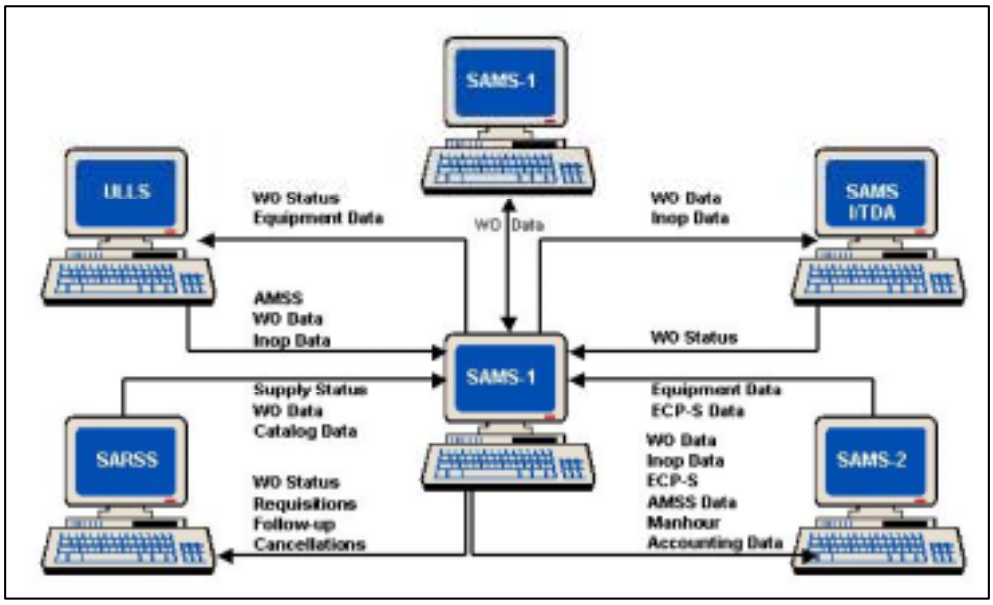


Figure 4-3. Relationship between the SAMS-1, SAMS-2, ULLS, and SARSS

STANDARD ARMY MAINTENANCE SYSTEM

4-63. The SAMS for the DS/GS levels provides maintenance and management information to each level of command from user to division, corps, wholesale, and DA. The SAMS is the primary tool used by maintenance managers to maintain maintenance information flow between the users, DS and GS levels, and higher-level commands. The use of SAMS output reports as tools to manage maintenance operations is discussed later in this chapter. The SAMS is divided into two levels, SAMS-1 and SAMS-2.

Standard Army Maintenance System–Level 1

4-64. The SAMS-1 operates at the DS/GS Maintenance Company level. It is an interactive, real-time maintenance management system that operates on a desktop computer system. The SAMS-1 has the capability to produce work order numbers automatically, requisition parts, manage bench and shop stocks, manage shop workload, and provide detailed civilian and military labor costs related to specific work orders.

4-65. **Functions.** The SAMS-1 tracks all work orders and repair parts requisitions, and processes status and usage information received from supporting units (ULLS-G). It also passes significant management information to higher commands (SAMS-2).

4-66. **Interfaces.** The SAMS-1 interfaces with the following STAMIS':

- SAMS-2.
- ULLS-G.
- SARSS.
- SAMS-I/TDA.

NOTE: Interface infers data flow in both directions.

4-67. **Inputs and Customer Benefits.** Table 4-1 shows which information the SAMS-1 receives. It also shows how that information is a benefit to the customer.

Table 4-1. SAMS-1 – Inputs and Customer Benefits

Inputs	Customer Benefits
The SAMS-1 receives the following information:	The SAMS-1 provides accurate and timely:
Data from customer units (ULLS-G).	Requisitioning of parts.
Data from DS/GS maintenance units (SAMS-1).	Issuing of bench and shop stock.
Data from higher levels (SAMS-2 and SARSS).	Transferring of repair parts.
Military standard requisitioning and issue procedure (MILSTRIP).	Accounting of non-stock items ordered but not used.
Shop stock list (SSL) and bench stock list (BSL).	Maintenance of SSL and BSL records.
	Posting of the document register.
	Replenishing of shop stock.
	Controlling of funds for expendable supplies.
	Issuing and repairing of ORF assets.
	Accounting for manhours.

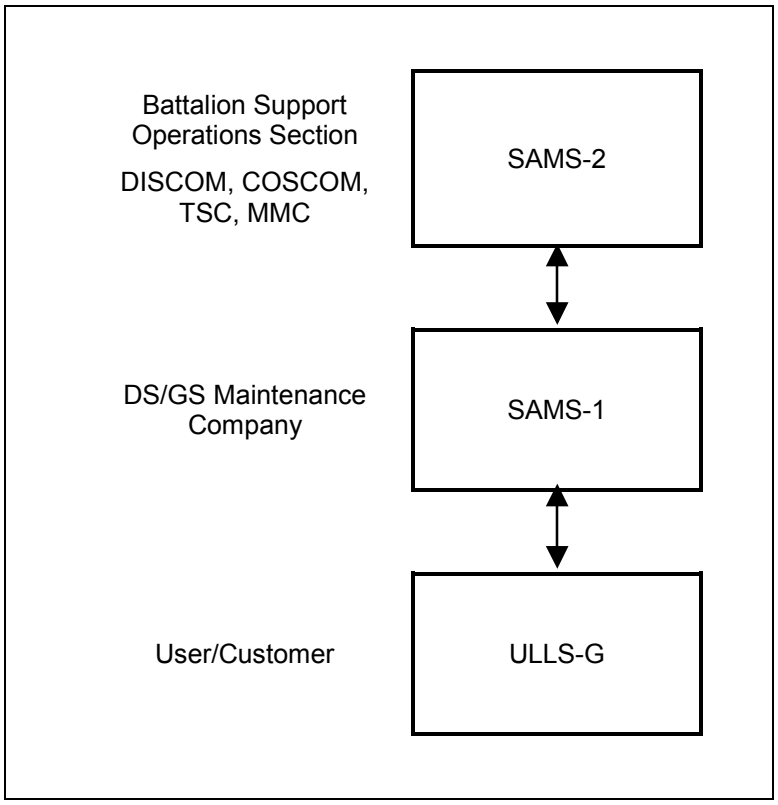
Standard Army Maintenance System – Level 2

4-68. The SAMS-2 is an interactive, real-time, maintenance management system that operates on a desktop computer system. The SAMS-2 performs the following:

- Operates at command levels above the DS/GS Maintenance Company, such as the Support Battalion or Maintenance Battalion (Support Operations Office) or Maintenance Battalion Materiel Officer (MATO), MMC, Division Support Command, Corps Support Group, Corps Support Command, and EAC (TSC/ASGs).
- Has the capability to automatically produce management information related to work orders, shop capabilities, backlogs, manpower and parts costs, and inoperative equipment status.
- Provides information through preformatted reports, manager-created reports, and visual displays.

4-69. **Functions.** The SAMS-2 collects, stores, and retrieves maintenance and supply information from the SAMS-1 and allows managers to coordinate maintenance workloads. The SAMS-2 also passes significant information on to higher commands, as well as down to the SAMS-1. Table 4-2 shows the progression of SAMS management levels.

Table 4-2. Progression of SAMS Management Levels



4-70. **Communications Capabilities.** As the system interfaces, the SAMS has three types of automated communications capabilities:

- Monitored asynchronous protocol.
- Communications man-machine interface.
- Blocked asynchronous transmission.

UNIT-LEVEL LOGISTICS SYSTEM – GROUND

4-71. The ULLS-G collects maintenance and supply data and provides management information at the unit level. The ULLS-G has replaced portions of TAMMS. The ULLS-G interfaces with the SAMS and SARSS.

4-72. This section will concentrate on the ULLS-G in support of general Army maintenance. The ULLS-G is an automated system developed to meet the maintenance and repair parts management requirements of Company (Unit) Commanders conducting unit-level maintenance operations.

Function

4-73. The ULLS-G provides Unit Commanders with the following:

- Improved accuracy and maintenance reporting.
- Consolidated data needed for unit status reporting by automating the following:
  - Unit maintenance functions in DA Pamphlet 738-750.
  - Class IX supply functions in DA Pamphlet 710-2-1.

The ULLS-G gives commanders and maintenance managers on the battlefield more immediate accurate information for decision-making.

Hardware

4-74. ULLS-G hardware may differ from unit to unit, but the operating principles of the system inputs and outputs are compatible. Figure 4-4 shows some of the major inputs to the ULLS-G.

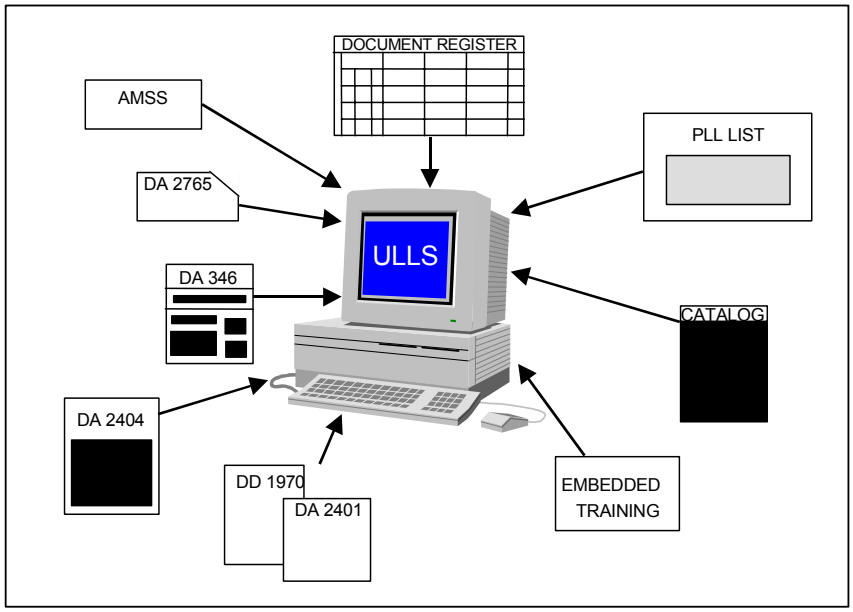


Figure 4-4. Major Inputs to the ULLS-G

4-75. **Functional Groups.** The six functional groups available in ULLS-G include the following:

- Supply.
- Maintenance operations.
- Utilities.
- Embedded training.
- Army Materiel Status System.
- Security.

Table 4-3 shows the function of each group.

Table 4-3. ULLS-G – Functional Groups

Group	Function
Supply	Enables the operator to process supply transactions and maintain PLL data, including demand records.
Maintenance	Enables the operator to input and maintain records on equipment, operators, scheduled services, and dispatched equipment.
Utilities	Provides backup and restores capabilities for unit data system files and permits establishment of passwords.
Embedded Training	Provides sustainment training with self-paced tutorials and allows novice users to learn system operation without damage to live files.
AMSS	Provides automated materiel condition status reporting.
Security	Controls for system users.

4-76. **Supply Options.** The supply options available in the ULLS-G include the following:

- On-line Class IX Catalog.
- Document Control Register (DCR).
- Automated PLL.

Table 4-4, page 3-22, describes the functions of each supply option.

Maintenance Options

4-77. The ULLS-G interfaces with the Army Maintenance Management System by automating many maintenance operation forms, procedures, and records. Figure 4-5, page 4-22, shows ULLS-G Maintenance Management outputs.

Unit Level Logistics System – Ground Generated Forms

4-78. The ULLS-G automates or replaces many complete or partial TAMMS forms with ULLS-G printouts. Some TAMMS forms become unnecessary with the ULLS-G. Table 4-5, page 4-23, compares some DA/DD forms with their ULLS-G equivalents.

Table 4-4. ULLS-G – Supply Options

Option	Description	Function
Class IX Catalog	A tailored Army Master Data File (AMDF) of stock items that have current demands	Provides user with current part usage information
Document Control Register	Automatically updated list of parts, supplies, and their status	Provides user with: Current status list of parts and supplies List of parts on hand but not installed
Automated Prescribed Load List	List of authorized quantities by unit	Provides user with automatic replenishment of PLL items Recommends additions and deletions to PLL

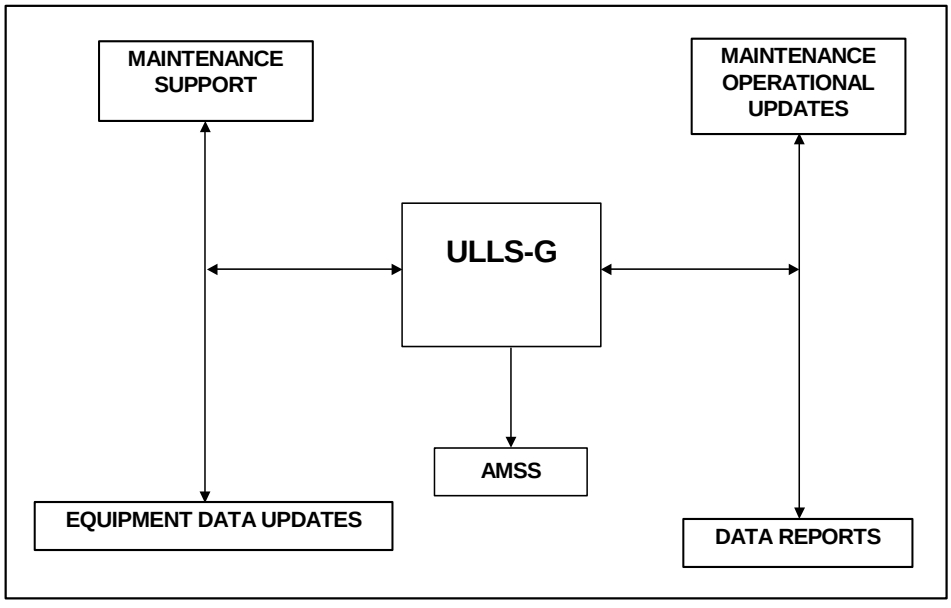


Figure 4-5. ULLS-G Maintenance Management Outputs

Table 4-5. ULLS-G Equivalent Forms

Form Name	TAMMS	ULLS-G Equivalent
Equipment Utilization Record	DA Form 5823	Not needed in ULLS-G
Motor Equipment Utilization Record	DD Form 1970	DA Form 5987-E
Organizational Control Record for Equipment	DA Form 2401	DA Form 5986-E
Preventive Maintenance Schedule and Record	DD Form 314	DA Form 5986-E
Materiel Condition Status Report	DD Form 2406	Will be automated with completion of AMSS module
Equipment Inspection and Maintenance Worksheet	DA Form 2404	DA Form 5988-E
Maintenance Request Register	DA Form 2405	DA Form 5989-E
Maintenance Request	DA Form 2407	DA Form 5990-E
Uncorrected Fault Record	DA Form 2408-14	DA Form 5988-E
Oil Analysis Request	DD Form 2026	DA Form 5991-E
Equipment Operator's Qualification Record	DA Form 348	DA Form 5983-1-E
Equipment Control Record	DA Form 2408-9	DA Form 5992-E
US Government Motor Vehicle Operator's Identification Card	OF Form 346	DA Form 5984-E

Menu Options

4-79. The five maintenance options available from the ULLS-G menu are as follows:

- Maintenance operational processes.
- Equipment data updates.
- Equipment data reports.
- Maintenance support.
- Army Materiel Status System (AMSS).

Maintenance Operational Processes

4-80. Maintenance operational processes and system-generated reports provide the information needed to plan, manage, and control equipment. The operational processes menu contains the options and functions listed in Table 4-6.

Table 4-6. Maintenance Operational Processes

Process	Function
1. Equipment Dispatch and Return	Permits regular or alert equipment dispatching with/without DA Form 2404/5988-E. Records equipment return from dispatch. Lists all equipment dispatches.
2. Maintenance and Inspection Worksheet (DA Forms 2404, 5988-E)	Provides worksheet for all equipment with a Department of Defense Activity Address Code (DODAAC).
3. Maintenance Faults	Lists all maintenance faults found during PMCS; records technical inspections and parts ordered.
4. Parts Received/Not Installed	Lists all parts received for a document number or administrative number.
5. Services Performed	Lists all services performed, or scheduled to be performed, on specified equipment Updates service due files and equipment data files.
6. Operator Records	Maintains record of operator documentation. Automatically calculates operator's miles and maintains records of restrictions, awards, and training.

Equipment Data Updates

4-81. This process allows the user to update equipment and administrative number data. The user can update the equipment catalog, change NSN and serial number (SN) data for administrative number data, and update the equipment data files (EDFs). Administrative number changes will update all applicable system files (such as document control registers, dispatch control files, maintenance fault files, equipment service files, and inoperative equipment files).

Equipment Data Reports

4-82. The equipment data report option allows users to quickly prepare maintenance and usage reports. Table 4-7 lists some of the available reports.

Table 4-7. ULLS-G Equipment Data Reports

Report	Type
Oil Analysis Request	Routine or special
Equipment Availability	Availability and status
Fuel Usage	Monthly, quarterly, or yearly
Service Schedule	By administrative, DODAAC or NSN numbers
Non-mission-capable	Deadline report
Equipment Operator/Class Code	Operator qualifications by class code or by operator ID card
Equipment Usage	Automated DA Form 2408-9
Equipment Data File	Data on major end items, components, or system/subsystems by NSN or administrative number

Maintenance Support Functions

4-83. The following ULLS-G functions are necessary to provide an interface with the SAMS. Table 4-8 lists ULLS-G and SAMS interface functions and what they provide for the user.

Table 4-8. ULLS-G and SAMS Interface Functions

Function	Action
SAMS Transactions	Allow user to send maintenance request data directly to SAMS
Maintenance Request	Produces maintenance request with/without administrative number Produces equipment inspection maintenance worksheet
Manual Maintenance Status Updates	Allow user to manually update the maintenance status of equipment on the maintenance request register

Table 4-8. ULLS-G and SAMS Interface Functions (continued)

Function	Action
Automated Maintenance Status Updates	Allow ULLS-G, through SAMS, to automatically update the maintenance status of equipment that is in direct support
Maintenance Request Register	Displays or prints the maintenance request register
Automated Maintenance Master Data	Updates the equipment catalog file and allow user to print the master file
AMSS	Sends the Materiel Condition Status Report forward to the MMC

Utilities Options

4-84. Utilities options that can be selected from the menu system provide system security features through commander-assigned passwords and user identifications. The passwords and user identifications permit only authorized users to enter the ULLS-G.

Embedded Training

4-85. The embedded training package available on the ULLS-G allows novice operators to receive ULLS-G training directly from the system software. The embedded training package available from the menu system provides the following user benefits:

- A guided tour of the ULLS-G, including the menu system, available reports, and hardware-software interface with other systems.
- Practice using the system without risk of damage to live files.
- Sustainment training for all users.

Army Materiel Status System Options

4-86. AMSS options automate the Materiel Condition Status Report (MCSR). The AMSS options allow units to send and receive AMSS records from the ULLS-G through the SAMS to the LOGSA. It also allows the unit to generate and submit an automated MCSR for unit status reporting.

Security Options

4-87. The ULLS-G security options allow the commander to control user access to the system. The options include updating user information, user access, and adding or deleting system users.

COMBAT SERVICE SUPPORT CONTROL SYSTEM

4-88. The CSSCS is one of a suite of five C2 systems, which collectively comprise the Army Battle Command System (ABCS). The CSSCS receives data from the current CSS STAMIS': the SPBS-R, ULLS, SAMS, SARSS, and Defense Integrated Military Human Resources System

(DIMHRS). Also receives data from manual inputs by operators and by interfaces with the FBCB2 system.

4-89. Apart from forming a bridge between the CSS STAMIS' and the Army's Command, Control, Communications, Control and Intelligence (C4I) architecture, the CSSCS provides commanders and their staffs (from FSB through COSCOM and TSC) with current CSS data, which can be tailored to be displayed graphically or in detail. The CSSCS enhances deployment capabilities by performing split-based operations. The CSSCS matches logistics TEMPO to the warfighters' OPTEMPO. The CSSCS collects, processes, and displays the types of information that, in the past, was gleaned from voice, message and courier reports, and hard copy outputs from the CSS STAMIS'. Staff personnel then manually condensed this information into formats usable by commanders. This was a time-consuming and laborious process, which yielded information from which decisions had to be made that was hours (if not days) old. Figure 4-6 details the integrated architecture of the CSSCS from the brigade through the theater.

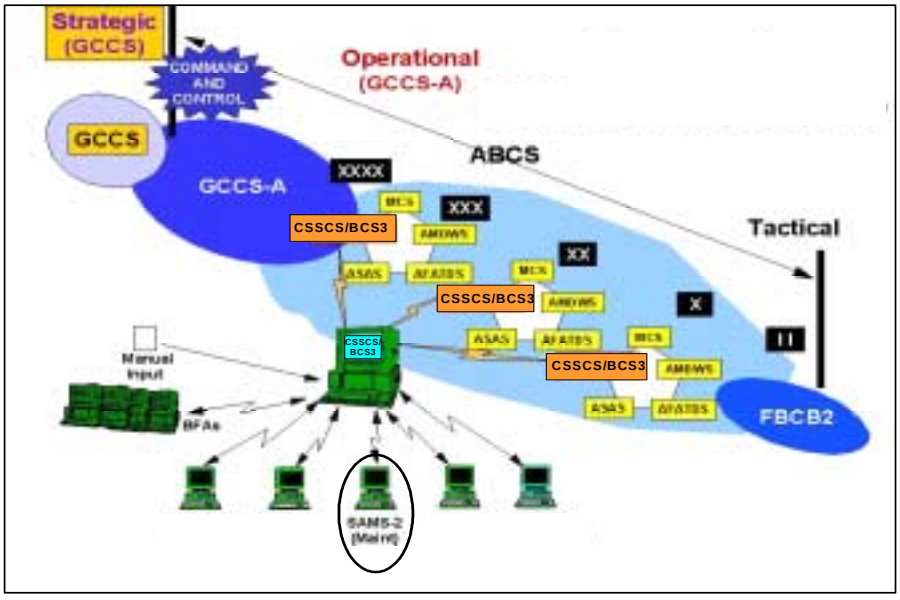


Figure 4-6. The CSSCS Integrated Architecture

NOTE: From its inception, CSSCS has been the premiere C2 logistics system for the Army. However, in today's operational environment, the Army needs the ability to command, control, and track not only Army forces, but also Joint and Combined/Coalition forces. To meet the sustainment information needs of the Army, the Battle Command Sustainment Support System (BCS3) will replace CSSCS. BCS3 in its objective state will use data provided by GCSS-Army with merged ERP business solutions.

BATTLE COMMAND SUSTAINMENT SUPPORT SYSTEM

4-90. BCS3 is the Army's maneuver sustainment C2 system used to fuse sustainment, in-transit, and force data to aid commanders in making critical decisions. BCS3 is the Army's logistic "fusion center" at all echelons for maneuver sustainment support. It is modular, tailorable, and scaleable to meet the full spectrum of operations and interoperates with ABCS. The BCS3 design will include those features of CSSCS that are relevant to current and future needs and will incorporate the features from other automated systems such as Joint Deployment Logistics Model (JDLM), ILAP and ITV, which currently comprise the Logistics Common Operating Picture (LCOP). BCS3 will provide a near real time, continuous graphical representation of the current situation within the land AO to include all friendly and enemy (known and suspected) locations, identification, and unit status and provide the logistics portion of the COP to maneuver and logistics commanders with enhanced briefings and data management capabilities.

4-91. The CSSCS does not replace the CSS STAMIS'. It complements them and makes their data user-friendly for C2. CSSCS devices are located down to the battalion level for CSS units. The CSS-STAMIS' and their eventual successor (the GCSS-A) are still needed to provide the management and operational tools to make sustainment work. See Chapter 9 for more detail about the GCSS-A.

Force XXI Battle Command, Brigade and Below

4-92. The FBCB2 system is the FXXI digitized battle command information system for mounted and dismounted units providing real-time information and SU for the Heavy Division Brigade and below. This system is designed to provide the status of equipment and stocks to CSS Commanders (see Figure 4-7. The FBCB2 system enables CSS (maintenance) managers to respond to FBCB2 generated support requests.

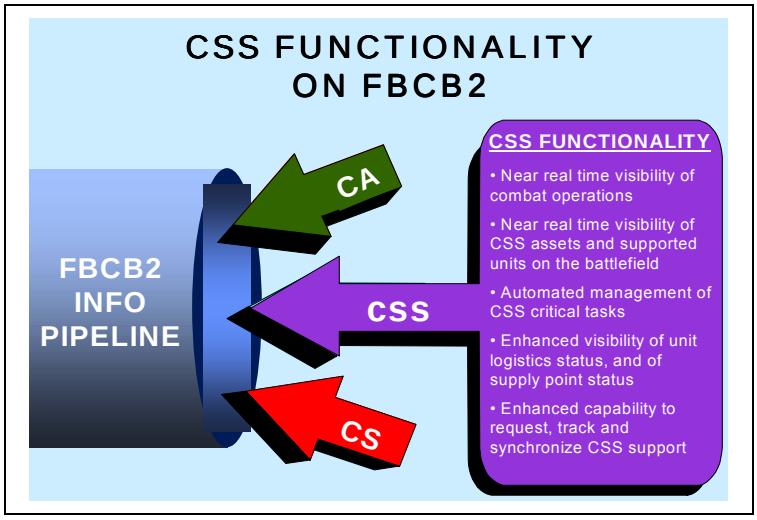


Figure 4-7. CSS Functionality on FBCB2

4-93. Functionally, the FBCB2 system will support lower-echelon battle command tactical mission requirements including the following:

- Real-time SU for commander, staff, and soldiers.
- Shared common picture of the battlespace.
- Graphical displays with friendly and enemy unit locations.
- Target identification.
- Integrated logistics support.
- Communications/electronics interfaces with host platforms.

The FBCB2 system is comprised of hardware, software, and databases being acquired under the applique and other programs. The FBCB2 system interfaces with the following:

- Items already found at brigade-and-below echelons. Examples of these are C4I capabilities embedded in weapons systems/platforms.
- The Army Tactical Internet.

4-94. 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. Addressing mechanisms allow geolocations to be flexibly and selectively communicated, and SU software functionality will contain the necessary filters and roll-up mechanisms for each user to be able to selectively display only the locations of units of interest.

4-95. 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 utilization. These efficiencies ultimately translate into reduced footprint for sustainment operations in the operational area.

SOLDIER PORTABLE ON SYSTEM REPAIR TOOL

4-96. Further complementing the family of maintenance management related information systems is the SPORT (see Figure 4-8, page 4-30). The SPORT is the Army standard system tester and is an essential maintenance tool in support of the Army's ground vehicle and aviation fleets. It is used at all levels of maintenance to automatically diagnose weapon system operations and to identify faulty components for immediate replacement. The SPORT hosts interactive electronic manuals and expert diagnostics systems, conducts intrusive testing in support of weapon systems, and provides a means for accessing electronic gateways into the standard Army logistics systems.

Figure 4-8. Soldier Portable On System Repair Tool (SPORT)

INTERACTIVE ELECTRONIC MAINTENANCE MANUALS

4-97. Greatly enhancing maintenance management information capabilities are IETMs that provide the mechanic with compact disk read only memory (CD ROM) access to all maintenance TMs via laptop computer or the SPORT. They also provide the capability to requisition repair parts from the same platform. This technology, coupled with embedded diagnostics and prognostics, serves as a maintenance "force multiplier" by allowing limited maintenance personnel resources to concentrate on repairing equipment expeditiously and correctly by automating and streamlining the front-end diagnostics and repair parts identification and requisitioning tasks.

DIAGNOSTICS AND PROGNOSTICS

Diagnostics

4-98. Diagnosing equipment faults is as old as maintenance itself. However, the ability of equipment to self-diagnose is a relatively new development. As equipment designs have become more complex and sophisticated, the level of self-diagnostics has increased. Most current equipment, even today's family car, is equipped with some type of on-board diagnostics device, which captures and stores fault indicators for later retrieval by maintenance personnel. When queried by maintenance personnel using devices such as the SPORT, on-board diagnostics allow identification of faults to the LRU level. This capability shortens the fault isolation process and helps to eliminate misdiagnoses.

4-99. More sophisticated designs display the fault indicators for the operator to see and react. This capability allows the operator to provide the fault information to the supporting maintenance activity in advance of an inspector or technician actually seeing the equipment. This is particularly helpful in preparing for on-site maintenance visits.

4-100. The evolving capability is for the on-board diagnostics devices to capture fault indicators and transmit them to maintenance personnel at remote locations in real-time, as well as displaying them for the operator. The purpose of all this is to allow repairers and maintenance managers to

capture the most accurate and fullest possible view of their current requirements in real-time so they can make best use of their resources. Systems that can report their faults to remote locations in real-time allow maintenance managers to see the "maintenance battlefield" and marry this information with his customers operational view to determine how best to repair systems in concert with the customers battle rhythm. Chapter 9 provides more detail about evolving diagnostics/prognostics systems.

Prognostics

4-101. Prognostics are the predicting of faults before they occur. Until recently, prognostics has been a matter of taking note of when and how equipment fails and taking pre-emptive action before the time at which the failure is anticipated. The odometer, hour-meter, equipment logbook, and technical publications were the primary tools employed by operators and maintainers in this method of prognostics. At set intervals (miles driven, hours operated or rounds fired), equipment was taken out of service, inspected, specified parts were replaced (based on a set service life), and any additional faulty or suspect parts were also replaced. Absent any other means of prognostics, this method still has application, especially for equipment whose failure can lead to injury of personnel or mission failure.

4-102. Sampling methods (such as the AOAP) allows the equipment to remain in service while the sample is analyzed and predict faults without having to take the equipment out of service for lengthy inspections. When the sample indicates an impending failure, corrective action is taken before the equipment fails. This prevents failure during operation and allows the affected components and assemblies to be repaired using less resources than if they are operated to failure.

4-103. The evolving prognostics capability is on-board sensors. These sensors monitor systems, subsystems, and even components, and report the impending or future failure to the operator as well as to remote maintenance personnel. This will allow maintenance managers to capture the most accurate and fullest possible view of their future requirements in real-time so they can plan the best use of their resources. Systems that can report their predicted faults to remote locations in real-time allow maintenance managers to see the "future maintenance battlefield" and marry this information with his customers current and future operational plans to allow pre-emptive maintenance and repair actions to be integrated with the customers battle rhythm. Chapter 9 provides more detail about evolving diagnostics/prognostics systems.

MAINTENANCE CONTROL

4-104. 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.

4-105. A primary function of maintenance control is to reduce and, when necessary, correct overload conditions in the shop. While a maintenance shop should always work at or near capacity, backlogs must be kept manageable. Overloads are caused by improper routing of work, lack of personnel, or failure to inform higher HQ of workload problems. TC 43-4

provides details on how to use automation as a tool supporting effective, efficient maintenance operation management.

PROCEDURES

4-106. Maintenance control is a key element of maintenance management. In a maintenance shop, maximum production, effective use of personnel and 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.

4-107. For operational purposes, the MCS is usually organized according to the functions performed. The result is a maintenance control element, a quality control or inspection element, and a shop supply element. Maintenance control elements perform the following functions:

- Carefully screen maintenance requests.
- Assign work to various Shop Sections.
- Maintain workload status in the Shop Section.
- Improve operational procedures.
- Assist in determining parts requirements.

Operations

4-108. 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

4-109. The MCS must effectively coordinate with the unit's SSA to ensure prompt availability of required repair parts and other maintenance supplies. Table 4-9 outlines the coordination steps.

Table 4-9. Coordination Steps

Step	Action
1	Schedule shop input and assign work to various Shop sections to keep all shop elements working at capacity.
2	Carefully screen Maintenance Requests and Inspection Reports to ensure maximum unit-level repair. This may also involve evacuation of an item based on the availability of resources, the capability of personnel, and shop capacity.
3	Keep abreast of the status and quantity of work in each Shop section to foresee and minimize overload, and to take corrective action when necessary.
4	Aggressively pursue repair parts that are not available within the unit.

Overloads

4-110. A prime function of a MCS is to take action to reduce overload conditions in any of the Shop Sections. Supported units expect prompt repair and return of items taken to DS level maintenance. Overload conditions in any of the Shop Sections can seriously delay repair operations to the detriment of the unit's overall maintenance mission. Overload conditions can result from the following:

- Failure to perform unit-level maintenance.
- Required workload temporarily exceeding the available capacity of one or more Maintenance Shop Sections.
- Temporary loss of maintenance capability in the Maintenance Shop Section.
- Failure to evacuate work as directed.
- Competing priorities due to tactical operations.

Avoiding Overloads

4-111. To avoid overloading, adhere to the following:

- Distribute work among the various Shop Sections to keep all sections working at or near capacity. This is accomplished by carefully routing jobs entering the shop. 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.
- Resolve the problem by rerouting work or supplementing the capacity of the overloaded section with personnel from other sections working below capacity. The battalion may also take action to realign missions, reduce workloads, or provide additional personnel (see Table 4-10, page 4-34).
- Analyze workloads during field operations. This is critical. Available manhours may be severely reduced by guard duty, defense operations, enemy attacks, weather, unit movement and 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.

Table 4-10. Rerouting the Work

When...	Consider...
Shifting personnel,	Their individual capabilities. The degree of training necessary to permit them to perform the functions required.
Unit personnel are cross-trained in several specialties,	This as an alternative to shifting personnel.
Movement is impractical due to the partial disassembly of bulky equipment or other factors,	Moving repairers from other sections to the job. Changing the sequence of repair operations. Moving all items to another shop section.
A vehicle needs engine repairs, as well as body and fender work,	Performing the engine repairs first.
The number of engine repair jobs exceeds the capacities of available automotive mechanics,	Completing the body repair work first.

Maintenance Control Officer

4-112. For an effective maintenance control operation, the Maintenance Control Officer must do the following:

- Have a thorough knowledge of the mission and functions of the entire company.
- Be thoroughly familiar with capabilities and capacities of the individual sections.
- Keep informed of priorities assigned to supported units, expected workloads, shop progress, difficulties encountered, and maintenance supply status.

Management Tools

4-113. 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. The SAMS-1 reports listed in Table 4-11 are commonly used for automated maintenance management at DS level.

Table 4-11. Commonly Used SAMS-1 Reports

Title	Function
Production / Backlog Status Report (AHN-022)	Shows overall distribution of workload by Maintenance Shop: Backlog, distribution by section. Workable backlog. Work orders evacuated. Work orders deferred. Status. Back order age. (Report can be run daily or weekly.)
Work Order Register Status (AHN-007)	Work orders in WON sequence. Equipment, customer, manhours, and work order status data. Total unit backlog and trends.
Shop Section Summary (AHN-006)	Open work orders and their status. Work order parts required and supply action. Only parts on document register. Current, 30-, 60-, and 90-day status (tailored). This data is used for reviewing— Shop backlog. Shop expediency of repairs. Workload trends efficiency in determining and ordering repair parts.

Tub File

4-114. Tub files are constructed by the unit as a backup to the automated systems. Their use is not mandatory and other file systems may be used. Size and design are dictated by unit requirements. Tub files are used to store Maintenance Work Request Envelopes (DA Form 3999-4), which contain active Maintenance Requests (DA Form 5988-E/5990-E), and pertinent records such as parts requests, continuation sheets, and inspection forms.

4-115. Tub files are organized into sections by status. It is recommended for ease of maintenance that common files be located in a single location. This encourages use and accuracy. The DA Form 3999-4s are moved from section to section as a particular job progresses. They are stored in maintenance request number sequence in respective Tub File sections.

4-116. Tub files are maintained by the following four sections in order to control the maintenance backlog:

- Inspection.
- Maintenance Control.
- Shop Supply.
- Maintenance Shop Sections.

Each Maintenance Shop Section maintains its work orders in status tub files as shown in Figure 4-8.

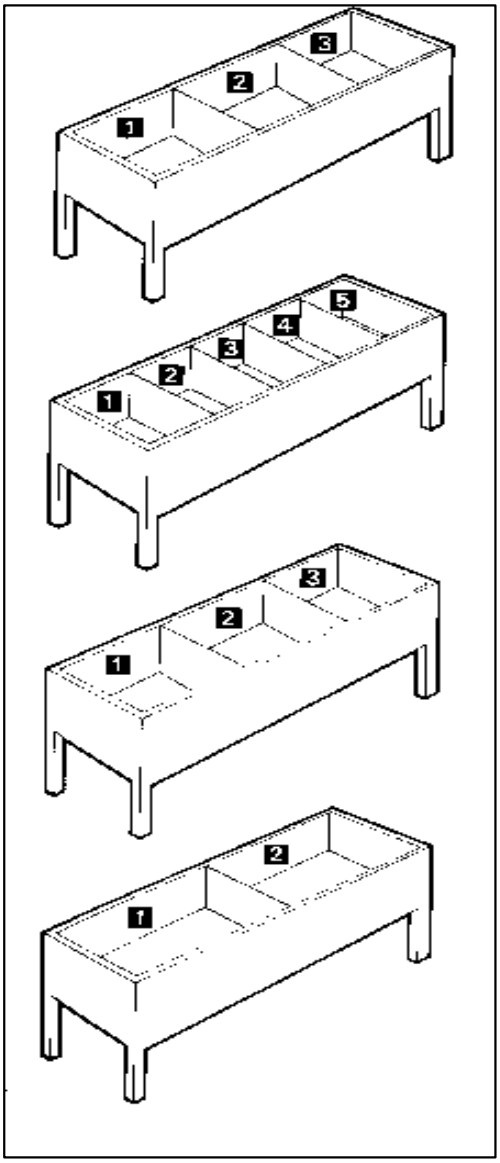


Figure 4-8. Tub Files

PRODUCTION METHODS

4-117. Production methods used in a DS maintenance unit include base shop (bay shop and job/bench shop) and on-site maintenance operations. The method used depends on the type of materiel to be repaired and the personnel, facilities, and time available. The production line is a production method primarily used by GS and higher-level maintenance activities. It may be used to a very limited extent at DS level for repairing large quantities of RX items.

Planning and Control

4-118. The PP&C process is used as a major tool at the local, regional, and national levels. This process plans and controls sustainment maintenance requirements and performance. PP&C meetings are held monthly at the local level and quarterly at regional and national levels.

4-119. Local-level initial PP&C meetings review the performance of the current year's production program and identify requirements for the upcoming fiscal year. The local manager develops the annual program based on requirements for the geographic area and its capabilities and capacity. The local manager forwards the recommended program to the regional manager, who reviews the requirements and uses this information to select NSNs for concentrated repairs at single installations called COEs.

4-120. **Center of Excellence Selection.** COE-reparable candidates are generally selected from items that appear on the installation's RX lists. Lines are reviewed in light of readiness and availability needs, cost avoidance, and annual demands. Readiness and availability impacts are determined by reviewing historical weapon system readiness/availability, asset posture, and the item's availability through the wholesale system.

4-121. Selection priority is assigned to each candidate item based on potential cost avoidance per hour. Cost avoidance is evaluated on the difference between the repair or buy cost prior to the establishment of the COE and the repair cost as a COE item repaired at one location. The "top 300 cost drivers" for each installation may be used to identify candidates for repair in a COE, even though they may not already be on an installation RX list.

4-122. COE candidates are reviewed and selected based on the following criteria:

- The item must support a major weapon system or be a significant readiness/availability item.
- The cost to repair (including transportation, packing, and fully burdened labor and materiel) must be less than 80 percent of the buy cost (AMDF price minus table credit). Or the item must be in short supply at the wholesale level and projected demands will exhaust current stockage within six months.
- There must be at least two demands for components per year within the region for aviation reparables.
- Items on DS RX lists that do not require GS-level repair should not be considered.

- The item must currently be repaired by one installation with at least six repairs per year (ground) and three repairs per year (air).
- The washout rate for the item must be less the 25 percent at the COE.
- Wholesale items must meet established stockage thresholds.

4-123. **Repair Quotas.** Maintenance activities will be workloaded based on their capacity and capability. When the SMM selects an item for the reparable program, an annual repair quota, by month, will be assigned for the item during the PP&C. The repair quota assigned to a COE item will be initially based on projected demands. These quotas may be reviewed and modified at subsequent PP&Cs. Changes may be required based on specific reasons, such as actual demands, capacity limitations, training cycles, or reported installation excess.

4-124. COE repair quotas will be initially set at 80 percent of the previous year's demands and will be sent to each RSMM for review prior to the quarterly regional PP&C. All changes in production goals will be justified to the RSMM and the other LSMMs. Changes in production schedules for national work will be coordinated with the NSMM. Input for all the LSMMs, the RSMM, and the NSMM is required to establish a COE line.

4-125. Once a COE line is accepted, the installation has a maximum of 90 days to prepare the production line before the quota is executed. The RSMM recommends which maintenance activities in the region will be the COE site for a specific reparable line based on the local bid submitted by the LSMM. The recommendation is based on several criteria, including the bid for manhours and parts submitted by the LSMMs. The recommendations and criteria which should be considered include:

- Repair costs (parts and fully burdened labor).
- Washout rate.
- Capacities and capabilities.
- Training requirements.
- Demands.
- End item density.
- COE for similar item.
- Special repair authority.

4-126. **Realignment.** COE lines are realigned as follows:

- COE assignments and performance evaluations are conducted on a quarterly basis during PP&C meetings.
- The evaluation process identifies COE lines that may be advantageous to reassign to another installation or state within the region.

- The RSMM uses the following guidelines to reassign COE lines:
    - All COE lines with average repair costs exceeding the COE bid by 25 percent or greater after 12 or more months are reviewed to determine reassignment or retainment.
    - When COE turnaround time (TAT) over the last 6-12 months is excessive (approximately 25 percent greater than the regional average), and another installation/state can repair the items with a shorter TAT at comparable costs, the COE will be reassigned.
    - When the current COE no longer has the capability to repair the regional program, the RSMM may recommend a new or multiple COEs.
    - When a new installation/state meets all repair criteria and is clearly advantageous as the CEO due to significantly lower costs, predominance of the regional demand, SRA authority, or material time and training required, the COE will be reassigned.
    - When the current COE's capacity is overwhelmed by new regional players or increased demands from current regional participants, a new COE or a second COE will be assigned.

4-127. National-level work is work that can be accomplished in the region by sustainment maintenance activities to meet wholesale-level requirements. Wholesale item managers identify candidate assets for regional repair and send the RSMM requests for bid and a comprehensive statement of work for review and distribution to LSMMs.

4-128. The LSMMs assess their work center capacity and capability, parts costs, packaging/crating costs, and so on; and submit their bid to the RSMM. The RSMM reviews the LSMM's bid and submits the regional proposal to the NSMM, who reviews and submits it to the item manager. The proposal becomes an official document representing a binding agreement with the installation and the wholesale level.

Bay Shop

4-129. 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.

4-130. Bay Shops are used to repair vehicles, artillery, construction equipment, major missile items, and materiel handling equipment (MHE). Assemblies, components, and on-equipment materiel may be

removed from an end item in a bay and repaired in other shops (for example, a Fuel and Electric Shop). In a field environment, bays are nothing more than physically separated sections of the maintenance area where work is performed in the open or under maintenance shelters (tents). If adequate covered space is available, buildings may be divided into bays (or stalls).

Job/Bench Shop

4-131. 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 the following:

- Components and assemblies.
- Small arms and fire-control instruments.
- Fuel and electrical system components.
- Electric motors.
- Leather and textile items.
- C-E equipment.
- Missile electronic items requiring repair under controlled conditions.
- Similar items that can be moved without difficulty.

On-Site Maintenance

4-132. On-site maintenance is performed by MSTs to the maximum extent possible. There are several advantages to conducting maintenance at the equipment breakdown site. Some of the advantages include the following:

- Reducing equipment downtime, thereby increasing customer unit readiness.
- Eliminating time and resources required for recovery/evacuation.
- Reducing the battlefield signature caused by recovery/evacuation.
- Reducing the potential for increased damage during recovery/evacuation.

4-133. MSTs providing on-site maintenance are organized based on known requirements. Therefore, before being dispatched, they should be fully informed on the following:

- Problem; including type of equipment, malfunction symptoms, and anticipated repair.
- Location, route, and link-up point.
- Requesting unit, point of contact, and frequency and call sign for radio contact.
- Enemy situation and current threat.

Production Line

4-134. The Production Line 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

4-135. A technical inspection of materiel is one of the most important aspects of the DS-level maintenance operation. Inspection is essential for an effective, overall QA program. Accurate initial, in-process, and final inspections are vital in maintaining efficient shop operations and ensuring quality repairs.

Initial Inspection

4-136. Large, bulky, or heavy items (such as vehicles, artillery, and MHE) are normally inspected before shop entry to determine the following:

- Equipment faults.
- Extent of work required.
- Economical reparability.
- Parts requirements.
- All on-equipment materiel is present.

This initial inspection or preliminary diagnosis is also useful in determining if the using unit has been fulfilling its unit-level maintenance responsibilities. The inspection provides a basis for the following:

- Recommending evacuation of the item.
- Determining ORF candidates.
- Recommending Report-of-Survey action (AR 735-5), in lieu of accepting the item 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 repair parts requirements.
- Determining manhours required per the MAC.
- Determining necessary maintenance tasks.
- Estimating required maintenance manhours.
- Determining if required work is DS-level repair.

See Table 4-12, page 4-42, for other items.

4-137. Jobs noted in Table 4-12 are normally placed into an “in shop” status during inspection for fault diagnosis. This also applies to items that require disassembly to determine equipment faults. Diagnostic

inspections are performed using the applicable TM. Equipment fault and parts requirements are recorded on DA Form 2404 and DA Form 2407.

Table 4-12. Other Initial Inspection Items

Other items, such as...	Which...	Are...
C-E Equipment Small Arms	Do not present bulk or weight problems.	Inspected in the Shop section.
Fire-control Instruments Generators Motors	Require inspection at a bench or by special diagnostic equipment.	Responsible for their repair.

In-Process Inspections

4-138. In-process inspections are necessary to ensure work is being performed properly. Shop supervisory personnel perform these inspections. Inspectors assigned to the MCS may assist them.

Final Inspection

4-139. Inspectors perform a final inspection after work is completed. This inspection determines the adequacy of repairs and requires a technical inspection of an item, including an operability test to determine serviceability and safety. Final inspections are recorded like initial inspections. If a final inspection reveals uncorrected faults or unsatisfactory repair, the item is returned to the responsible shop element with the cause for rejection indicated on DA Form 2407. Inspectors may make minor repairs or adjustments during the final inspection when they do not warrant formal rejection of the item.

Personnel

4-140. **Maintenance Unit Area.** In the Maintenance Company, inspectors are assigned to the Control Section for inspection of automotive, engineer, generator, and communications equipment before shop entry. Although assigned to the Control Section, inspectors are directly responsible to the Company Commander for the quality of their inspections. However, their immediate supervisor and the Maintenance Control Officer direct their daily work.

4-141. If the commander desires additional inspection capabilities in the Control Section, qualified maintenance personnel from the Maintenance Shop sections may be used. These personnel become part of the inspection element. When no longer required as inspectors, they revert to their respective Maintenance Platoon or section. Inspection personnel work closely with the maintenance control element when performing inspections. Commanders ensure inspectors are allowed to independently evaluate work and determine whether quality standards are met without shop influence or coercion. If desired, the commander may designate inspection personnel on unit orders.

4-142. **On-site Maintenance.** Inspections are also required during the performance of on-site maintenance. On-site inspection is the

responsibility of the team chief or supervisor of the team performing the on-site maintenance functions.

WORK FLOW

4-143. The procedures discussed here apply particularly to vehicular end items and similar heavy items inspected prior to shop entry. With slight modifications, they can be adapted to most maintenance shop operations. Forms used in the maintenance shop are illustrated and explained in DA Pamphlet 738-750. The following procedures (see Table 4-13 and Table 4-14 and Tables 4-15 through 4-23, pages 4-44 through 4-48) are in accordance with the automated SAMS.

Table 4-13. Work Flow Procedures Number 1 (Customer Unit Action)

Step	Customer Actions
1	Verifies equipment malfunction.
2	Annotates the signature of the requestor on DA Form 2407/5990-E.
3	Prepares DA Forms 2404/5988-E and 2407/5990-E and equipment for support maintenance.
4	Performs unit maintenance on equipment.
5	Enters unit data on DA Form 2407/5990-E.
6	Forwards equipment/request and related forms to maintenance unit Maintenance Control section.

Table 4-14. Work Flow Procedures Number 2 (Maintenance Control Section Action)

Step	Maintenance Control Clerk Actions
1	Receives work request.
2	Edits/screens/verifies work request.
3	Annotates DA Form 2407/5990-E with the work order number and tasks.
4	Prepares DA Form 3999-4.
5	Assigns work section to perform repair (if known).
6	Enters DSU data on required DA Form 2407/5990-E into the SAMS-1.
7	Enters status “A” on the work order. (Status is updated daily from the Work sections.)
8	Directs the customer with DA Form 3999-4 to the Inspection section.

Table 4-15. Work Flow Procedures Number 3 (Inspection Section Action)

Step	Inspector Actions
1	Receives DA Form 3999-4.
2	Edits/screens/verifies DA Form 2407/5990-E.
3	Performs acceptance/initial inspection.
4	Annotates DA Form 3999-4 maintenance tasks and parts requested on DA Form 2407/5990-E.
5	Prepares the intra-shop work request (if required).
6	Assigns a task sequence number to each required repair task on DA Form 2404/5988-E.
7	Enters the signature (from the inspector who accepts the work order) on DA Form 2407/5990-E.
8	Submits status change “C” to the Maintenance Control Clerk (if no parts are required).
9	Issues a copy of the work request to the customer.
10	Forwards DA Form 3999-4 with forms and records to the Maintenance Control Supervisor or Shop Supply Clerk.

Table 4-16. Work Flow Procedures Number 4 (Maintenance Control Section Action)

Step	Maintenance Control Supervisor Actions
1	Receives DA Form 3999-4.
2	Edits/screens/verifies DA Form 2407/5990-E.
3	Annotates DA Form 3999-4.
4	Prepares the evacuation request (if required).
5	Determines repair priorities (repair, evacuation, ORF, intra-shop, or deferred, and so on).
6	Enters tasks from the Inspection Section into the SAMS-1 (through the Maintenance Control Clerk).
7	Submits the appropriate status (evacuated, ORF, deferred, and so on) to the Maintenance Control Clerk.
8	Forwards DA Form 3999-4 with forms and records to the Shop Supply Clerk and Shop Repair section.

Table 4-17. Work Flow Procedures Number 5 (Shop Supply Section Action)

Step	Shop Supply Section/Clerk Actions
1	Receives DA Form 3999-4.
2	Edits/screens/verifies DA Form 2407/5990-E.
3	Annotates DA Form 3999-4 and DA Form 2407/5990-E when parts are issued.
4	Prepares the repair parts listed on DA Form 2407/5990-E using the SAMS-1.
5	Performs supply actions and follow-ups.
6	Submits status change “1” or “K” for awaiting parts and “C” when parts are on-hand to the Maintenance Control Clerk.
7	Issues repair parts to the Shop Repairer.
8	Forwards DA Form 3999-4 with forms and records to the Maintenance Control Supervisor or Shop Section Supervisor.

Table 4-18. Work Flow Procedures Number 6 (Repair Shop Section Action)

Step	Shop Section Supervisor Actions
1	Receives DA Form 3999-4.
2	Annotates DA Form 3999-4.
3	Assigns the Repairer/Mechanic based on repair priority.
5	Submits status change “B” to the Maintenance Control Clerk when work is started.
6	Enters manhours remaining on the task worksheet.
7	Forwards the task worksheets for daily manhour accounting to the Maintenance Control Clerk.
8	Performs in-process inspections.

Table 4-19. Work Flow Procedures Number 7 (Repair Shop Action)

Step	Repairer/Mechanic Actions
1	Receives job and repair parts.
2	Verifies correct parts on hand for task/job completion.
3	Annotates DA Form 2407/5990-E (work started by) and logbook entries (when required).
4	Performs assigned repair task.
5	Enters the signature (from the Repairer) on DA Form 2407/5990-E.
6	Informs the Supervisor when the job is completed.
7	Forwards the work completion information on DA Form 2407/5990-E to the Shop Section Supervisor.

Table 4-20. Work Flow Procedures Number 8 (Repair Shop Section Action)

Step	Shop Section Supervisor Actions
1	Receives information from the Repairer.
2	Verifies all tasks on DA Form 2407/5990-E are completed.
3	Annotates DA Form 3999-4.
4	Performs a quality control inspection.
5	Directs rework as needed (places items in the holding area).
6	Submits status change “E” to the Maintenance Control Clerk when the work is finished and “C” if other work is required.
7	Forwards DA Form 3999-4 with forms and records to the Inspection sections.

Table 4-21. Work Flow Procedures Number 9 (Inspection Section Action)

Step	Inspection Section Actions
1	Receives DA Form 3999-4.
2	Edits/screens/verifies DA Form 2407/5990-E.
3	Annotates DA Form 3999-4 and DA Form 2407/5990-E (final inspection).
4	Performs the final inspection.
5	Directs additional/corrective work if the job does not pass final inspection.
6	Assigns additional task sequence numbers (if required).
7	Enters the signature (from the Inspector) on DA Form 2407/5990-E.
8	Submits status change “F” to the Maintenance Control Clerk for final inspection passed (other status as appropriate).
9	Forwards DA Form 3999-4 with forms and records to the Maintenance Control Clerk.

Table 4-22. Work Flow Procedures Number 10 (Maintenance Control Section Action)

Step	Maintenance Control Clerk Actions
1	Receives DA Form 3999-4.
2	Edits/screens/verifies signatures/entries on DA Form 2407/5990-E, including intra-shop jobs.
3	Annotates DA Form 3999-4 (initial customer notification).
4	Prepares the closeout of all tasks on DA Form 2407/5990-E. Submits status change “S” when the work is completed.
5	Performs initial unit contact.
6	Enters the contacted unit/time on DA Form 3999-4. Submits status change “R” when the customer is notified
7	Issues the completed work request to the customer. Submits status change “U” to close the job when picked up.
8	Forwards the completed work request to the shop office files.

Table 4-23. Work Flow Procedures Number 11 (Customer Unit Action)

Step	Customer Actions
1	Receives repaired equipment.
2	Annotates the receipt of equipment with a signature on DA Form 2407/5990-E.
3	Performs an acceptance inspection on equipment.
4	Submits the unit's copy of work required to the Maintenance Control Clerk and receives the completed copy for the unit files.

Intra-shop Work Orders

4-144. Intra-shop work orders are used when components or assemblies are removed by a Shop Section for repair by another section in the same unit. Work orders prepared for these transactions provide an audit trail for the parent work order. The Inspection Section or requesting Shop Section personnel prepare the Intra-shop Maintenance Request (DA Form 2407/5990-E). When the Maintenance Control Clerk enters the intra-shop work order into the SAMS-1, the parent work order remains in the Shop Office. If work can be done on the parent and intra-shop work orders simultaneously, both work orders are routed to their respective Shop sections.

EVACUATION

4-145. Evacuation is the act of moving equipment and documentation from a maintenance activity to another maintenance activity. For example, during a major offensive operation, a DS Maintenance Company Shop Officer realizes that the shop has become overwhelmed with work and a backlog of open jobs is beginning to accumulate. Evacuation of the maintenance requests backlogged may allow equipment to be repaired and returned to the using unit on a more timely basis.

4-146. The Support Operations or Maintenance Control Officer's decision to evacuate equipment is based on the following:

- Initial inspection findings (repairs beyond authority of activity).
- Current or projected workload at the repair activity.
- The time required to repair the item.
- Capability of the unit to complete repair (lack of personnel, equipment, time, and so on).

Follow the procedures in Table 4-24 to conduct evacuation procedures.

Table 4-24. Evacuation Procedures

Step	Who...	Will.....
1	Support Operations Officer or Maintenance Control Officer	Coordinate the decision to evacuate a work order with the: Maintenance Control Supervisor. Supporting Maintenance Activity.
2	Maintenance Control Supervisor	Alert appropriate Maintenance Shop sections to prepare for and evacuate designated work order.
3	Maintenance Control Clerk	Prepare DA Form 2407/5990-E, annotate DA Form 3999-4, and obtain the MCO or MCS signature for approval. Enter status code “O” (awaiting evacuation) and place DA Form 3999-4 in the tub file. Annotate DA Form 3999-4 (once evacuated) and place the request number and support activity in upper left corner. Retain copy number 1 (receipt) of DA Form 2407/5990-E and enter status code “M” (evacuated for repair and return). Upon completion of repair, place copy number 3 (organization) into DA Form 3999-4. Annotate and close DA Form 2407/5990-E in accordance with procedures.

MANAGEMENT TOOLS AND TECHNIQUES

4-147. Automation greatly increases the ability of maintenance managers to make decisions regarding maintenance operations. The SAMS provides the maintenance manager with the tools needed to make timely and accurate decisions.

Primary Tool

4-148. The SAMS is the primary tool used for maintenance management. Daily transfers of data from the Maintenance Company MCS to the Battalion Support Operations Section (SAMS-1 to SAMS-2) keeps the Support Operations Section Maintenance Officer abreast of the maintenance situation in subordinate unit shops.

4-149. In addition to automated SAMS reports, Support Operations sections may develop local procedures and reports to track maintenance status (such as daily submission of DA Forms 2406, Daily Production Reports, Backlog Reports, jobs awaiting parts, and so forth).

Daily Analysis

4-150. The daily analysis of SAMS printouts (or other locally directed reports) will reveal trends or situations requiring command or staff action. Examples of problems to watch for are:

- Jobs greater than 30-60-90 days.
- Significant increases in shop input.
- Excessive number of items awaiting parts.
- Low production.
- Excessive time in any status.
- Class IX requests with no status.

The problems mentioned above might be caused by the following poor conditions:

- Unit-level maintenance.
- Supply procedures.
- Production/quality control.
- Repair techniques.
- Treatment of equipment.
- Emphasis on site maintenance.

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

Daily Transfers

4-151. On a larger scale, the MMC keeps abreast of the maintenance situation in the corps or TSC through its SAMS-2. Daily transfers are received from subordinate company or battalion SAMS sites. This data is used for the following:

- Evaluate workload capabilities and the capabilities of maintenance units.
- Cross-level maintenance resources and repair parts.
- Establish maintenance priorities.
- Direct evacuation and retrograde.
- Coordinate maintenance issues though the Support Operations Section for resolution.

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

SAMS-1 Reports and Outputs

4-152. Table 4-25 is a listing of SAMS-1 outputs. These outputs are readily available for making maintenance management decisions.

Table 4-25. SAMS-1 Outputs

PCN	Title
AHN-001	Workable Jobs
AHN-002	Shop Stock List (SSL)
AHN-003	SSL/Work Order (WO) Issue Candidate Listing
PCN	**Title**
AHN-004	Customer WO Reconciliation
AHN-005	WO Master Schedule Listing Part I – Work Orders in Shop Part II – Work Orders Awaiting Shop Part III – Work Orders Awaiting Parts Part IV – Other
AHN-013	Supply Activities Requirements
AHN-014	Manager Exception Data
AHN-015	SSL Constrained Replenishments
AHN-016	Error Exception Listing
AHN-017	SSL Audit File Purge Listing
AHN-018	Work Order Detail
AHN-019	Supply Status Listing
AHN-020	RPM Update Exception Listing
AHN-021	Equipment Status Listing
AHN-022	Production/Backlog Status
AHN-023	Bench Stock List
AHN-024	Bench Stock Replenishment Review List
AHN-025	Shop Stock Bin Labels

Table 4-25. SAMS-1 Outputs (continued)

PCN	Title
AHN-026	Bench Stock List (Purged)/Recommended Deletions
AHN-027	Bench Stock Bin Labels
AHN-028	Follow-Up Error Listing
AHN-029	Baseline Versions Report
AHN-030	Turn-In to Supply Support Activity (SSA) (D6Z)
AHN-031	Recoverable Items Report
AHN-032	SSL Manual Inventory Listing
AHN-033	SSL Inventory Report Part I – Inventory Adjustments Part II – Exception Listing Part III – New Labels Required
AHN-034	NSN/UI Change Report
AHN-035	Man-Hour Accounting Utilization Report (Transfer)
AHN-036	Man-Hour Accounting Utilization Report (History)
AHN-037	RPM NSN Change Report
AHN-038	Task Work Sheet

SAMS-2 Reports and Outputs

4-153. Table 4-26 is a listing of SAMS-2 outputs. These outputs are readily available for making maintenance management decisions.

NOTES: Preformatted reports are available for management at the SAMS-2 site (Battalion Support Operations Office and MMC).

Hard-copy ad hoc reports may also be produced that provide a wide variety of management data. The SAMS-2 currently has eight preformatted ad hoc reports available. Additionally, the ad hoc inquiry process provides maintenance managers with the ability to produce hard-copy reports per the command's data and format requirements.

Procedures and contents are in AISM 18-L26-AHO-BUR-EM and TC 43-4.

Table 4-26. SAMS-2 Outputs

PCN	Title
AHO-001	Deadlined Equipment Listing Weapon System Part I – Reportable Items Part II – Maintenance Significant Items
AHO-002	Command Deadlined Equipment Summary Part I – Reportable Items Part II – Maintenance Significant Items Part III – Summary
AHO-003	Equipment Deadlined Over NNN Days by Unit Part I – Reportable Items Part II – Maintenance Significant Items Part III – Summary
AHO-004	Completed Work Order Summary
AHO-005	Support Maintenance Turnaround Time (Days) Unit/Activity
AHO-006	Support Maintenance Turnaround Time (Days) ECC
AHO-007	Support Maintenance Meantime to Repair (Manhours), Unit/Activity
AHO-008	Support Maintenance Meantime to Repair (Manhours), ECC
AHO-009	Selected Work Order Status Listing
AHO-010	Workload Status Listing Part I – ECC Part II – Unit/Activity
AHO-011	Workload Age Summary Listing Part I – ECC Part II – Unit/Activity
AHO-012	Parts Detail Exception Listing
AHO-013	Multiple Parts Request Exception Listing
AHO-014	Production/Backlog Status
AHO-018	Completed Work Order File Purge Listing
AHO-019	Maintenance Cost Command Roll-Up

Table 4-26. SAMS-2 Outputs (continued)

PCN	Title
AHO-020	Maintenance Cost by Commodity
AHO-021	Maintenance Cost by ECC
AHO-022	Maintenance Cost by Customer
AHO-023	Maintenance Cost by APC
AHO-024	Bypassed Receipted Parts Records
AHO-025	Maintenance Production/Backlog Report
AHO-026	Equipment Deadlined over NNN Days by Battalion Part I – Reportable Items Part II – Maintenance Significant Items Part III – Summary
AHO-027	Reportable Equipment Validation File Listing
AHO-028	Diskette/Comm Interface Parameter File Listing
AHO-029	Maintenance Production/Backlog Report (by Work Order Count)
AHO-030	Maintenance Production/Backlog by ECC (for Support Unit by Item Count)
AHO-031	Maintenance Production/Backlog by ECC (for Support Unit by Work Order Count)
AHO-032	Work Order Status/Parts Listing
AHO-033	Maintenance Production/Backlog by ECC (for Battalion by Item Count)
AHO-034	Maintenance Production/Backlog by ECC (for Battalion by Work Order Count)
AHO-035	Maintenance Production/Backlog by ECC (for Division by Item Count)
AHO-036	Maintenance Production/Backlog by ECC (for Division by Work Order Count)
AHO-037	Inop Transfer Listing
AHO-039	Monthly Float Usage and Accumulative Report (by SPT UIC)

Table 4-26. SAMS-2 Outputs (continued)

PCN	Title
AHO-040	Monthly Float Usage and Accumulative Report (by LIN)
AHO-041	ORF Status and Utilization Report
AHO-042	Serial Number Tracking Report
AHO-043	Serial Number Tracking Report Purge Listing
AHO-044	Manpower Utilization Report
AHO-046	Manpower Utilization Report Purge Listing

Inspections and Visits

4-154. Inspections and visits are management tools, which contribute materially to an effective QA/QC program. They indicate materiel readiness, proficiency of personnel, adequacy of operations, and effectiveness of maintenance and supply management. They allow staff personnel to see conditions as they are in the unit, rather than only as represented in reports. If used properly, they are a quick, effective way of noting and correcting problems. The Battalion Commander, Command Sergeant Major, SPO, Maintenance Company Commander, and Maintenance Control Officer should make subordinate unit visits a matter of routine.

OPERATIONAL READINESS FLOAT TRANSACTIONS

4-155. ORF is a quantity of selected end items or major components of equipment authorized for stockage at CONUS installations and overseas support maintenance activities, which extends their capability to respond to materiel readiness requirements of supported activities. It is accomplished by providing supported activities with serviceable replacements from ORF assets when their like items of equipment cannot be repaired or modified in time to meet operational requirements. The SPO or Shop Officer is responsible for reviewing equipment requirements of supported units in accordance with ARs 710-2 and 750-1, and when appropriate in directing ORF transactions.

Process

4-156. When an ORF transaction becomes necessary, the following process should be followed:

- The Maintenance Control Supervisor reviews all transactions and their documentation before submission to the Support Operations or Maintenance Control Officer for final approval.
- The SPO or MCO directs/approves the ORF transaction.
- The Maintenance Control Clerk prepares all documentation for the ORF transaction.

Procedures

4-157. Follow the procedures in Table 4-27 when an ORF transaction becomes necessary.

Table 4-27. ORF Procedures

Step	Who...	Will.....
1	Maintenance Control Supervisor	Monitor and supervise the Maintenance Control Clerk in conducting the ORF transaction.
2	Maintenance Control Clerk	Generate a new work order on the SAMS-1 for issuing a serviceable float item. Annotate awaiting float transaction status code "7" (initially) on the new work request on completion of the ORF transaction. Annotate a "U" (picked up). Report to the Maintenance Supervisor when the actual issue and turn-in of property are completed in accordance with policy and procedures identified in ARs 710-2 and 750-1, and DA Pamphlet 710-2-2. Correct accountability is maintained at the ORF SRA and in the Property Book.

STATUS CHANGES

4-158. Status changes annotated on a maintenance request document are the result of the physical tracking of a job and its documentation. Routinely updated status allows managers to have current visibility of a specific job. Therefore, effective emphasis can be applied to expedite supply and repair actions. Table 4-28 outlines procedures for changing the status on a work request.

NOTE: Unit must update Property Book, AOAP, ULLS-G, and so on when a float transaction occurs.

SHOP SUPPLY OPERATIONS

4-159. Shop Supply is a critical aspect of shop operations. This element provides repair parts and consumable items to support DS-level maintenance operations. A unit with an effective shop supply operation provides effective support to its customers.

4-160. The Shop Supply element is usually collocated with the maintenance control element. It normally consists of one to two equipment automated logistics specialists who do the following:

- Prepare repair parts requests based on information from repairers or inspectors.
- Maintain an automated or manual document register.
- Process monthly recon with SSA.
- Record information on repair parts supply transactions.
- Receive, store, and issue parts for specific job orders.

- May obtain, store, and issue demand-supported repair parts (shop stock) and obtain and issue high-demand, low-cost consumables (bench stock).
- Monitor turn-in of recoverable items.

Table 4-28. Status Changes on Work Requests

Step	Who...	Will.....
1	Shop Section Chiefs	Submit daily manhour accounting to the Maintenance Control Clerk on each work order (by Shop section that performs hands-on work) using the Task Worksheet, PCN AHN-038. Submit changes in status by other means (for example DA Form 3999-3-R) for sections that do not track manhours. Report status changes for all maintenance requests in the section to the Maintenance Control Clerk daily.
2	Maintenance Control Clerk	Enter all status changes submitted from Shop sections into the SAMS-1 at the end of the workday. Ensure data transfer to the SAMS-2 is correct, complete, and timely. Identify and verify each open maintenance request in the shop against the piece of equipment in for repair. Monitor and manage the progress of each job in the section. Provide daily customer disk status report.
3	Maintenance Control Supervisor	Monitor and review the status of all maintenance requests and ensure the most current status is annotated on all documents. Directly supervise the Maintenance Control Clerk to ensure end-of-day status changes are properly annotated into the SAMS-1.

Ordering Repair Parts

4-161. Shop Supply Clerks use DA Form 2407/5990-E or DA Form 2407-1 to request parts with the SAMS-1. DA Form 2407/5990-E or DA Form 2407-1 must list all parts based on data provided by the Inspector. Clerks need the following information for ordering parts electronically:

- Action code.
- Related task number.
- NSN or part number.
- Quantity required.
- Not-mission-capable supply (NMCS) status.

Types of Shop Supply

4-162. DS maintenance units maintain the following two types of Shop Supply:

- Bench stock.
- Shop stock.

AR 710-2 and DA Pamphlet 710-2-2 contain additional details on bench stock and shop stock.

4-163. **Bench Stock.** Bench stock consists of low-cost, high-usage, consumable items used by maintenance personnel at an unpredictable rate. It must meet criteria set forth in AR 710-2. Bench stock includes the following:

- Common hardware.
- Transistors.
- Resistors.
- Webbing.
- Thread.
- Welding rods.
- Sandpaper.
- Capacitors.
- Wire.
- Tubing.
- Hose.
- Rope.
- Other expendable materials.

4-164. The Maintenance Control Officer performs the following:

- Selects stockage based on mission needs. The only required records for maintenance of bench stock are Bench Stock Record Lists (approved semiannually by the commander) and Bench Stock Replenishment tags. For information of these records, see DA Pamphlet 710-2-2.
- Closely monitors bench stocks to maintain unit mobility and supply economy. Frequent stockage review and prompt requisition for bench stock items ensures adequate levels of supply. Maintenance activities may stock up to a 15 to 30 day supply of bench stock.

4-165. **Shop Stock.** Shop stocks are demand-supported repair parts and consumables used by a DS-level maintenance activity. Programmed and unprogrammed shop stocks support internal DS-level maintenance requirements. Shop stocks are authorized for the following:

- To repair items in support of the reparable exchange program.
- For elements of maintenance units operating at a remote location, such as MSTs.

- To repair items requiring diagnostic modules.
- For maintenance units not supported by an organic supply support activity operating under the direct support system (DSS).

DSS customers are those units that requisition directly from the wholesale supply system through the intermediate level with no backup assigned stockage list at the DS level.

4-166. To qualify for shop stock, an item must have at least three demands in a 180-day control period. Stockage level for shop stock is developed from the requisitioning objective table contained in DA Pamphlet 710-2-2. As the Army's efforts at distribution management produce shorter, more reliable OSTs, shop stocks' stockage levels will be reduced, if not eliminated. Replenishment is based on a reorder point. Automated systems may use the "use-one, order-one" concept. Each shop stock list is reviewed at least quarterly. Items are deleted from stockage because of the following:

- When they fail to receive at least one demand in a 180-day control period.
- Unless they support seasonal requirements and demand is anticipated.
- Unless they support requirements peculiar to nonstandard equipment.

FACILITATING WORKFLOW THROUGH FIELD SITE SELECTION AND LAYOUT

4-167. 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. Some compromise must be made because of the need to defend the area (see Chapter 10). Field environments seldom permit a unit to operate under ideal conditions. The layout must be tailored to the terrain, tactical situation, proximity of supported units, and type and amount of equipment supported.

Site Selection

4-168. When selecting a field site for maintenance support operations, consider the following criteria. The area should include the following:

- Be reasonably flat with good drainage.
- Be firm enough to permit parking and movement of heavy vehicles and equipment.
- Be accessible to supported units.

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 defense and mission support capabilities.

Layout

4-169. The following are the principles for laying out the company area:

- Locate:
  - Work sections within ready access to the external road network and to each other.
  - Supply storage areas close to a road to permit easy access for trucks.
  - The Service Section within easy access of all Maintenance Shops.
  - Recovery elements in the vicinity of the Base Maintenance Platoon to facilitate support and movement of vehicles.
  - The Maintenance Control Section, Inspection Section, Shop Supply, and SSA near the entrance to the company area.
- Ensure:
  - Maintenance areas provide vehicle dispersion and positions where control and security are possible.
  - The area is capable of being defended, using the terrain's natural defense characteristics to augment the Defense Plan and unit capabilities.

The company area should be reasonably flat, provide good drainage, and contain firm soil for movement of heavy vehicles. Use terrain features to enhance unit defense.

Area Requirements

4-170. Area requirements depend on the style and tempo of combat, which influence the following:

- Workload.
- Security requirements.
- The ASL volume carried.
- The commander's willingness to risk.
- Evacuation policy.
- Size of the workload backlog permitted.

Consider the following situations:

- In a desert environment, an enemy that possesses great indirect fire capability or that attains air parity may require the unit to maintain greater dispersion.
- Military operations in urban terrain (MOUT) operations or an enemy in close terrain, one that relies on infiltrating unit perimeters, or one that possesses few indirect-fire weapons may mandate a smaller company area than prescribed by Army doctrine. Figure 4-9 shows a sample Maintenance Company layout.

NOTE: Under most conditions, the planning area provides enough dispersion to operate without serious degradation of unit efficiency and without significant vulnerability to insurgent attacks.

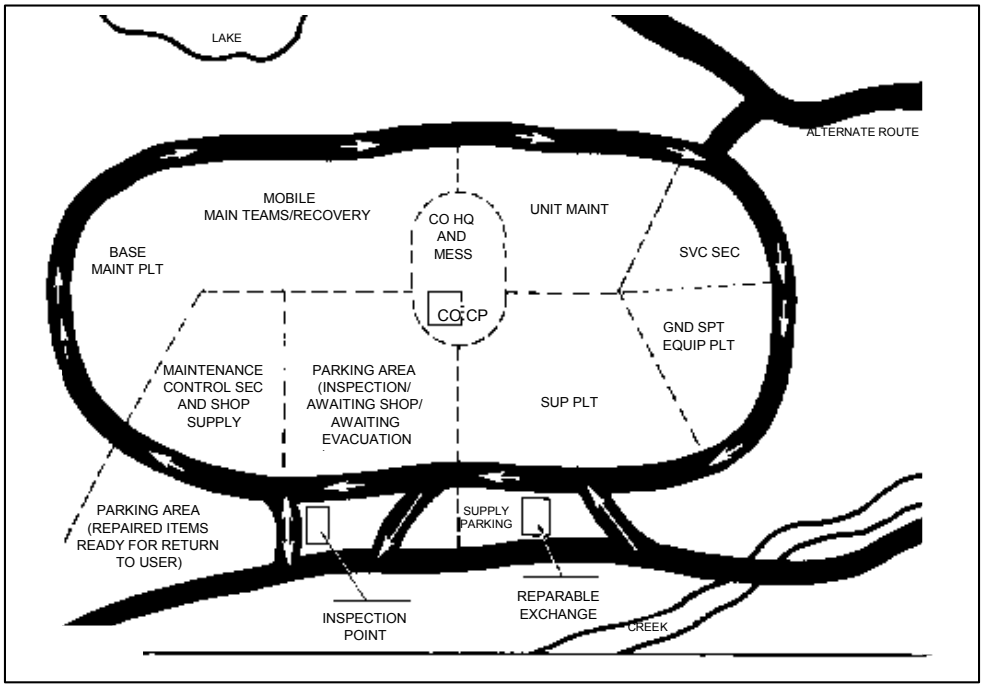


Figure 4-9. Sample Maintenance Company Layout

UNIT INTERNAL MANAGEMENT

4-171. DS Maintenance unit internal management operations include the following:

- Unit administration.
- Personnel management.
- Inspections.
- Unit dining facility operation.
- Movement and defensive operations.
- Unit security, including physical security and OPSEC.
- Safety.
- Training.
- Communications.
- Rear operations (see Chapter 10).
- Unit maintenance and supply operations.

4-172. Many of the aforementioned operations become routine, either by their nature or the commander's decision. SOPs can be prepared for these operations, which facilitate positive internal unit management and relieve the commander of repeated planning and issuing of directives for operations that follow an established pattern. The commander can then concentrate on operations that require planning and directing as requirements develop. One of the most complicated unit missions is Self Defense (Force Protection). Force protection constantly changes with the threat environment. Maintenance organizations operating as part of a base or in a remote location must ensure adequate force protection if continuity of customer support is to be assured in the AO. Additional information about the establishment of Force Protection can be found in Chapter 10.