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Report to the Secretary of the Army

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ARMY MAINTENANCE

Continuing Problems in Performing Maintenance at the User Level

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National Security and
International Affairs Division

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The Honorable John O Marsh, Jr.
The Secretary of the Army

Dear Mr Secretary

Army maintenance is a key ingredient in the readiness of U.S defense forces This report focuses on problems the Army continues to have in maintaining equipment at the user level

This report contains recommendations to you. As you know, 31 U.S C 236 requires the head of a federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs not later than 60 days after the date of the report. A written statement must also be submitted to the House and Senate Committees on Appropriations with an agency's first request for appropriations made more than 60 days after the date of the report

We are sending copies of this report to the Chairmen of the above Committees, the Secretary of Defense, the Director, Office of Management and Budget, and the Chairmen, House and Senate Committees on Armed Services

Sincerely yours,

Frank C Conahan
Assistant Comptroller General

Executive Summary

Purpose

Efficient, effective, and economical maintenance of equipment is essential to the readiness of U S defense forces Consequently, the Army devotes considerable resources to equipment maintenance, most of which is performed at the lowest organizational level—the user

In the past, Army efforts to provide reliable organizational maintenance efficiently and economically have been hampered by inadequate supervision, training, and resources, resulting in deficiencies in maintenance and reporting GAO undertook this review at units within 5 of the Army's 16 active divisions to determine whether the Army has increased the effectiveness and economy of its organizational maintenance program

Background

Force readiness is highly dependent upon the quality and timeliness of maintenance, the success of which is measured by how long equipment remains in operation and how quickly it can be restored to service The user is the foundation of the Army maintenance system, where equipment deficiencies should be detected early and corrected before more costly, time-consuming repairs are needed. Organizational efforts consist largely of minor repairs and preventive maintenance (such as inspections, lubrication, and cleaning) by equipment operators and mechanics The Army's Maintenance Management System provides for the preparation and management of equipment, forms, and records required to manage maintenance on, control the use of, and report deficiencies in, the equipment.

Results in Brief

The Army is not effectively maintaining its equipment to ensure maximum mission capability at the least cost A long-standing problem is poorly performed maintenance and repairs at the user level In addition, inadequate recordkeeping and reporting provide Army management a more optimistic picture of equipment condition and status than actually exists Ultimately, these conditions stem from inadequate supervision, training, and resource management at the local level, and insufficient monitoring of organizational maintenance operations by Army management

Principal Findings

Deficiencies in Equipment Often Not Detected

Operators are not detecting and reporting most of their equipment deficiencies. Though 82 to 93 percent of the vehicles at the sites reviewed were reported as ready for combat, 50 percent of those tested failed Inspector General and Maintenance Evaluation Teams inspections. At two installations, GAO found that operators did not detect as many as 81 and 93 percent, respectively, of all the defects in their vehicles, resulting in potentially greater maintenance costs, overstated equipment conditions, and inaccurate reports of condition and status.

Maintenance Inadequately Performed

Inadequate maintenance is creating many equipment failures, greater maintenance costs, and unnecessary downtime Much of this is due to the operators who frequently do not perform preventive maintenance of even the most routine nature

Training, Supervision, Resources

Optimal effectiveness of organizational maintenance is hindered by inadequate supervision, training, and resources. To illustrate, in Europe, 57 percent of the Army inspection reports cited a lack of preventive maintenance training for operators Inadequate supervision was also a major factor in poor maintenance performance Additionally, lack of repair parts was the cause for 42 to 79 percent of the downtime on selected equipment reported as not ready for combat Together, these deficiencies can cause ineffective and uneconomical maintenance, unnecessary downtime, and inefficiencies due to supply excesses and shortages.

Maintenance Records Inaccurate, Incomplete

Organizational maintenance records are being improperly maintained Of the 285 Army inspections analyzed by GAO, over half reported incomplete or inaccurate records of downtime or maintenance. Because these records are the basis for informing commanders of mission capability, inaccuracies distort assessments of actual equipment condition and organizational readiness

Diagnostic Equipment Not Used

Although the Army has purchased several million dollars worth of diagnostic equipment (and is buying more) to isolate and identify failures, organizational mechanics are not using it to troubleshoot vehicle failures. This equipment greatly increases the speed and accuracy with which a mechanic identifies defective components. Because this equipment is not regularly used, vehicle defects are often wrongly diagnosed at a cost in time, effort, and parts, while mechanics remain unfamiliar with diagnostic equipment and procedures regarded as essential to success on the future battlefield

Maintenance Monitoring Systems Impaired

Army managers lack sufficient visibility over monitoring the performance of organizational maintenance Because inspection results at the user level are not normally passed to higher command levels, these commands have insufficient information to systematically analyze and plan for effective user maintenance

Recommendations

To improve the quality of organizational maintenance, GAO recommends that the Secretary of the Army require commanders to ensure that (1) equipment operators and maintenance personnel are properly supervised and trained in the correct procedures and practices; (2) maintenance personnel are properly trained on and required to use testing and diagnostic equipment, and (3) equipment operators and maintenance personnel are held accountable for and evaluated on how well they perform their assigned duties

To address the deficiencies in the Army's maintenance monitoring system, GAO recommends that the Secretary of the Army direct (1) the Army Inspector General to determine why the Army has not corrected the long-standing maintenance problems identified by previous inspections and audits and (2) subordinate commands to summarize and provide maintenance data to their major commands to enable them to identify organizational maintenance problems and trends

Agency Comments and GAO's Evaluation

DOD agreed with all recommendations in GAO's draft report except for its recommendation that subordinate commands summarize and provide inspection results to the major commands for comparison to data contained in The Army's Maintenance Management System. (See app V) DOD was concerned that summarized inspection data would not provide meaningful information for comparison with the Maintenance Management System data because the inspections could have been performed

for varying reasons using varying criteria whereas The Maintenance Management System data is accumulated on a centralized basis using a standardized format.

However, DOD agreed that another indication other than The Maintenance Management System data is needed to better assess maintenance performance. DOD suggested that the commands be given the flexibility to determine the type of data and the format for reporting the data by their subordinate units.

GAO agreed with DOD's concern and modified its recommendation to reflect DOD's suggested alternative. Agency comments are discussed in detail in chapters 2 and 3

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Abbreviations

DCSLOG	Deputy Chief of Staff for Logistics
DOD	Department of Defense
GAO	U. S General Accounting Office
PMCS	Preventive Maintenance Checks and Services
TAMMS	The Army Maintenance Management System

Introduction

The Army spends several billion dollars annually for logistical maintenance and supply operations in order to carry out its responsibility for supporting and maintaining an operationally ready force that can perform its assigned combat missions. In doing so, it must operate high quality and timely equipment maintenance activities to keep or restore equipment to a mission-capable condition.

The Army has several levels of equipment maintenance. However, all maintenance starts at the lowest level—where the units that use the equipment perform preventive work and routine servicing Vehicle operator and crew preventive maintenance is the cornerstone of the entire maintenance system By identifying and correcting faults early, they can prevent more serious and costly deficiencies

Army Maintenance System

The Department of Defense sets overall policy, procedures, and responsibilities to guide military maintenance efforts. Its policy is to maintain weapons and equipment in a state of operational readiness consistent with the mission requirements of the operating, strategic, or tactical elements and at the least total cost consistent with readiness and sustainability goals.

Responsibility for overall management of Army maintenance activities is centered in the Army's Office of the Deputy Chief of Staff for Logistics (DCSLOG). DCSLOG is responsible for policy development and supervision of logistics organization, operations, and systems worldwide, including logistics readiness, planning, policies, and resource determination. Implementation is the responsibility of major commands—such as U.S. Forces Command and U.S. Army, Europe Additionally, DCSLOG is responsible for developing and supervising the Maintenance Assistance Instruction Team program. Major commanders are responsible for operating this program which helps units identify and resolve problems of maintenance, maintenance management, and associated repair parts within their units.

Maintenance and supply activities are monitored through Army inspections. Inspections can take a variety of forms and are conducted by various levels of command to (1) obtain firsthand information on the current status of maintenance and (2) ensure that personnel are properly performing their maintenance tasks. The most common inspections are those performed annually by the Army's Office of the Inspector General Some commands also have a Maintenance Evaluation Team which conducts inspections. The unit attempts to be at its best for these

announced inspections, and if deficiencies are found, the unit corrects them The units are also encouraged to use the local Maintenance Assistance Instruction Teams to help identify and correct maintenance-related problems.

While it is general Army policy to perform maintenance at the lowest authorized level, the basic purpose and orientation of all levels of equipment maintenance are to maintain equipment in a state of readiness to support the combat forces Although the Army is changing its maintenance system, at the time of our review the maintenance levels, in ascending order of difficulty, were as follows

- Organizational. Equipment operators and unit mechanics perform preventive maintenance, make minor repairs, and replace modules and parts
- Direct support Maintenance personnel diagnose and isolate equipment malfunctions, repair or replace defective items, perform light body repairs, and provide highly mobile maintenance support teams to help keep equipment working
- General support End items are overhauled, heavy body repairs are made to major equipment, components are repaired in support of the supply system and lower maintenance levels, and technical assistance is provided.
- Depot The life of equipment is extended through restorative maintenance

Army Maintenance at the User Level

Organizational maintenance is regarded as the foundation of the Army's maintenance system and is the responsibility of and performed by a using organization It supports the needs of the equipment user and normally consists of inspecting, lubricating, cleaning, and preserving equipment, making minor adjustments, and replacing easily accessible parts Maintenance success is measured by how well the equipment remains in operation and by how quickly it can be returned to service if it becomes inoperable

Through frequent preventive maintenance checks and servicing (PMCS), equipment operators and unit mechanics are to use systematic procedures to detect early signs of equipment failure and ensure that deficiencies are corrected before more costly and time-consuming repairs are needed. Operators are supposed to make certain preventive maintenance checks each time they use the equipment. Unit mechanics, assisted by the operators, also make preventive maintenance checks

quarterly, semiannually, and annually. These checks provide systematic care, inspection, and servicing to (1) prevent breakdown, (2) detect faults and failures, and (3) maintain needed equipment conditions. Additionally, mechanics perform corrective equipment maintenance consisting of adjustments, repairs, and replacements when operators report deficiencies.

Under The Army Maintenance Management System (TAMMS), operators record only those deficiencies that are beyond their capability to correct or for which they need parts. Unit mechanics record all deficiencies found, including those which must be referred to a higher maintenance level. When deficiencies prevent the equipment from being used for daily operations, the defects should be promptly reported to the unit commander so that he is constantly aware of the equipment's condition. TAMMS also provides for active Army units to report the condition status of assigned equipment to management on a monthly basis. Under TAMMS the Army also receives actual performance data for selected equipment under a sample data collection program.

Prior Audits

The Army's problems with maintenance performance, parts support, and reporting are not new The Army has a history of such problems, as pointed out by us, the Army Audit Agency, and other groups reviewing maintenance in past years. For instance, in a 1978 report[1] on organizational maintenance at three installations in the United States, we noted that

- maintenance had not been properly performed;
- equipment deficiencies were not properly recognized, corrected, and reported;
- planned on-the-job training programs had not been developed, and
- parts were not always available and sometimes were not correctly ordered

The Army Audit Agency found similar deficiencies in maintenance, supply, and reporting during numerous reviews of organizational maintenance at several stateside and overseas sites in 1982-84. Additionally, a 1983 Logistics System Program Review panel appointed by DCSLOG cited inadequate operator maintenance as the most serious maintenance problem in the Army

[1]The Key to Improving Maintenance of Army Equipment Commanders Must Motivate Their Personnel, LCD-78-428 (Dec 22, 1978)

Objectives, Scope, and Methodology

Our overall review objective was to determine whether the Army was effectively, efficiently, and economically performing equipment maintenance at the organizational level Our review was performed primarily at four Army installations in the United States and two major overseas activities in West Germany Our review covered 5 of the Army's 16 active divisions plus armored cavalry, artillery, and other non-divisional units. (See appendix I for a complete list of activities visited.) We interviewed Army officials and reviewed relevant documents including instructions, regulations, and directives, technical and field manuals; inspection and audit reports, management reports; and organizational procedures and practices for managing maintenance operations

We analyzed 285 inspection reports for the various commands and units we visited, including Corps-level command inspections and Inspector General results We also considered Maintenance Assistance Instruction Team summary data on inspections performed between October 1983 and December 1985 which covered more than 5,500 wheel and track vehicles (see photographs on pages 13 through 16 for some of the vehicles included in our work) assigned to 602 company-size units We also reviewed procedures for conducting inspections and accompanied the teams on selected inspection visits Because the Army bases maintenance effectiveness on equipment reported to be fully operational and ready for combat use, we also documented deficiencies identified by the inspectors that would remove the equipment from operation (i.e., "deadline" it).

To determine whether maintenance recordkeeping and reporting were accurate, reliable, and complete, we compared inspection results with equipment mission-capable rates as reported by the commands inspected We documented the management problems related to maintenance performance, scheduled services, parts supply, training, recordkeeping, and reporting We also reviewed maintenance failure and cost data from the Army's sample data collection program on towed and self-propelled howitzers

During site visits, we obtained comments from about 100 inspectors, officials, and maintenance personnel concerning the causes of organizational maintenance problems, as well as possible solutions We conducted an analysis of several units that inspectors had cited for their successful maintenance operations By comparing the results of this analysis to possible solutions, we were able to identify improvements in organizational maintenance that local commanders or higher commands could implement

We assessed the reliability of Army data essential to our review, including reported mission-capable figures and information obtained from sample data on howitzer maintenance failures. We did not assess the reliability of the cost data used to estimate the cost of maintenance actions or to attribute such costs to personnel-related failures. The cost data is not intended to be exact, but to provide a range of possible maintenance costs incurred Errors and inconsistencies found in the data were of relatively minor importance, so we considered the reported data to be reasonable and acceptable for our purposes. (See appendix II for further details on the reliability assessment.) Our review was conducted between February 1985 and August 1986 in accordance with generally accepted government auditing standards.

Figure 1.1: M-113A1 Personnel Carrier

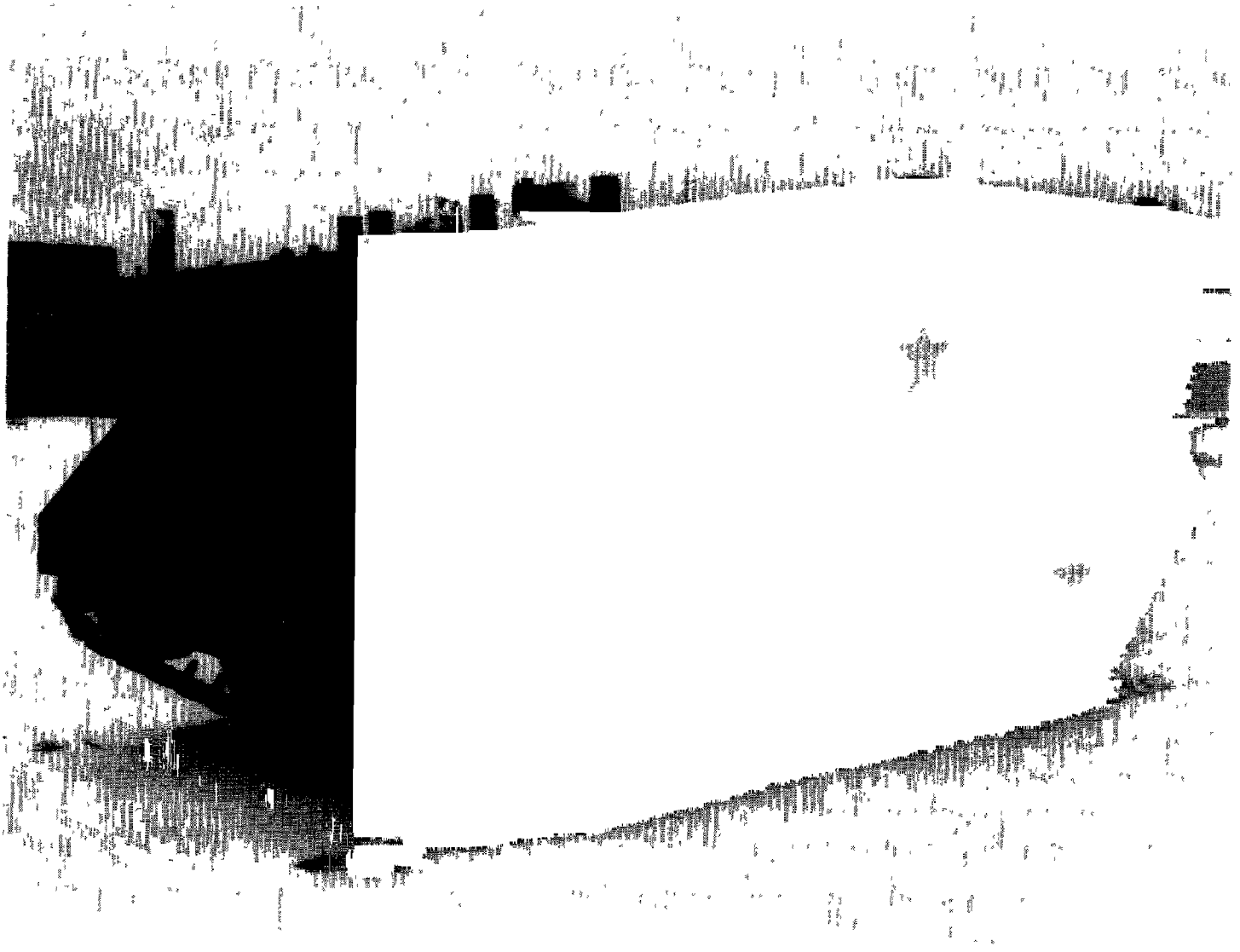


Figure 1.2: M-577 Armored Carrier Command Post, Generally Used by Battalion Hq and Higher in Combat Environment.

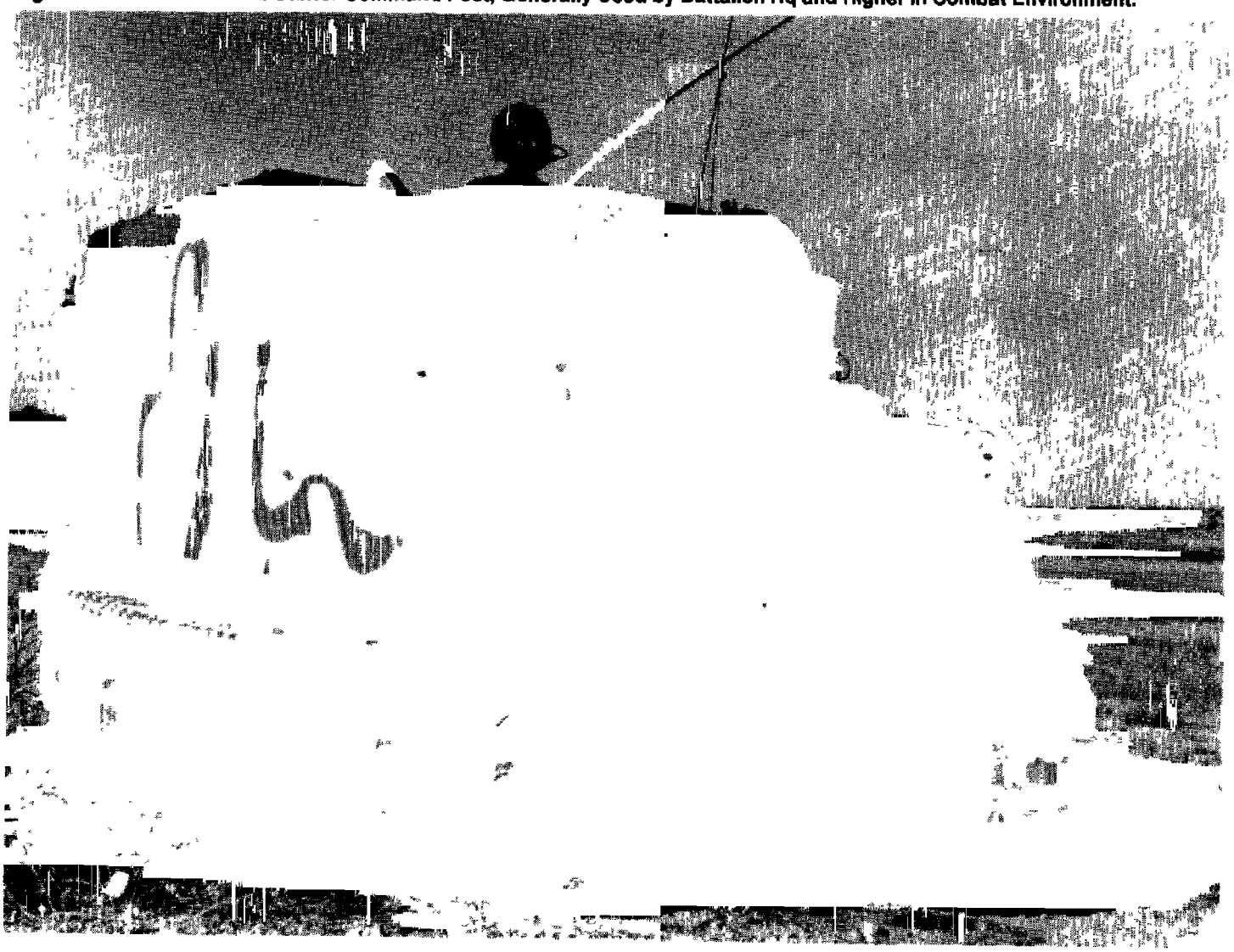
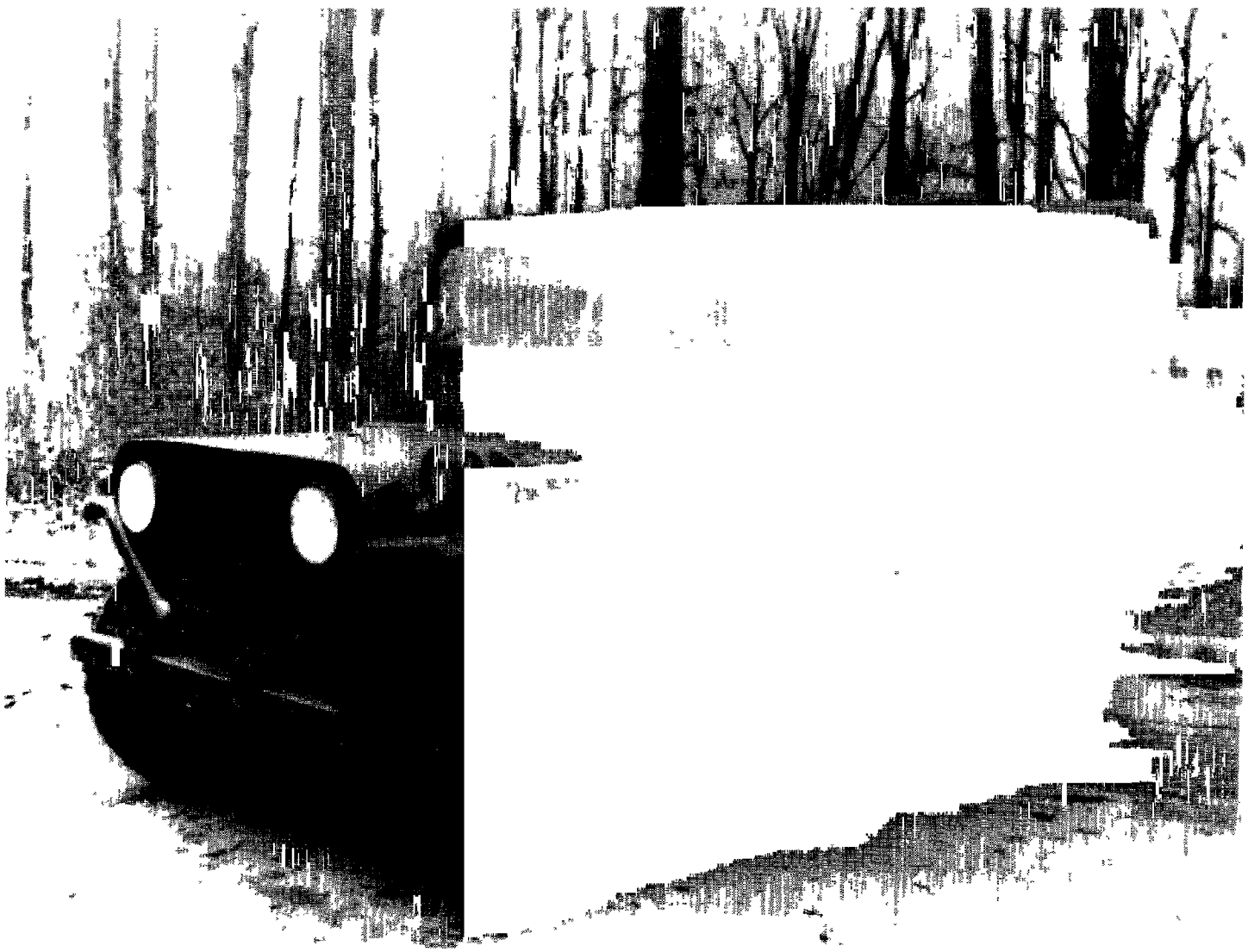


Figure 1.3: An M-60 Tank Operated During Reforger Training Exercises at the 7th Army Training Command.

Figure 1.4: An M-151 Hybrid Combustion 1/4 Ton Vehicle.



Improvements Needed in Organizational Maintenance to Increase Effectiveness and Equipment Availability

The success of combat forces depends to a large extent on the quality and timeliness of equipment maintenance Accordingly, the Army measures maintenance effectiveness largely by the percentage of vehicles that it reports as mission-capable Vehicles are classified as fully mission-capable if the unit commander judges them able to perform their combat mission. This decision is influenced by the type and extent of equipment faults found on the vehicles by operators and mechanics at the user level

Army inspection reports indicate that mission-capability rates may be overstated due to organizational personnel failing to identify critical deficiencies. The inspectors looked at 5,539 vehicles, of which 4,915 or 89 percent were assigned to five Army divisions. From December 1983 to December 1985, these five divisions reported that 82 to 93 percent of their wheel and track vehicles were fully mission-capable. During approximately the same period (October 1983 to December 1985) the Inspector General and Maintenance Evaluation Teams periodically inspected vehicles considered mission-capable at these sites and found that an average of 50 percent of the vehicles contained deficiencies which placed them in an inoperable status. Although the inspections reflect the status at a point in time, the magnitude of the wide-variance between the rates reported and those found during inspections indicate that maintenance problems are not being identified and reported.

The identified organizational maintenance problems stemmed primarily from the lack of command emphasis over supervision, training, and resource management Those noted were

- failure to properly detect and correct equipment deficiencies,
- improper maintenance performance, and
- insufficient use of diagnostic equipment

As a result of the Army's maintenance problems, its equipment availability is considerably less than it could be and maintenance costs are higher than necessary. Improperly performed preventive maintenance can have other undesirable effects as well. These include an increase in maintenance work load as poorly maintained vehicles experience more serious failures, a greater demand for parts as more vehicles experience such failures, and an increase in downtime as more deadlined vehicles await repairs and parts.

Moreover, these factors could have a serious negative interplay, each one contributing to a spiral of declining effectiveness For instance, a

decrease in training could mean that maintenance will be less effective, which in turn could result in more breakdowns and improper repairs, which could leave less time for training, and so on. This chapter addresses the maintenance performance problems by operators and organizational mechanics and suggests remedies to the situation.

Organizational Personnel Are Not Accurately Detecting and Correcting Equipment Deficiencies

Our analysis of inspection reports at four installations in the United States and two major activities overseas disclosed that units were not identifying equipment defects during operator PMCS, and were not always performing the PMCS prescribed for their vehicles As a result, many vehicles reported by the units as fully mission-capable contained deficiencies which placed them in an inoperable status upon inspection In addition, units often were not scheduling or performing periodic servicing as required, thereby increasing the likelihood of more costly corrective maintenance and lower equipment availability rates in the future This inadequate performance of organizational maintenance—along with inaccurate recordkeeping and reporting (see chapter 3)—accounted for the most numerous problems noted by the 285 Inspector General and Maintenance Evaluation Team inspection reports we analyzed (see table 2 1)

Table 2.1: Problems in Organizational Maintenance Noted Most Frequently in Inspection Reports[a]

	Number of reports citing problem	Percent of total reports
Daily PMCS not completed or recorded	181	64
Maintenance forms incomplete or inaccurate	149	52
Periodic servicing not scheduled or performed	100	35
Vehicle downtime not recorded or reported	97	34

[a]Based on 285 reports

Operators Are Not Identifying Defects Via PMCS

Our analysis of inspections performed during a 27-month period (from October 1983 to December 1985) included 5,539 wheel and track vehicles assigned to 602 company-size units. (See appendix III for the number and types of vehicles checked by the inspectors) About 90 percent, or 4,915 vehicles inspected were assigned to the five divisions reviewed which had previously reported that 82 to 93 percent of their vehicles were fully mission-capable However, the inspectors found that, on the average, 50 percent had deficiencies which made the vehicles

inoperable (see table 2.2). We could not determine the effect these deficiencies would have had on the reported mission-capable rates, because some vehicles classified as inoperable could be mission-capable

Moreover, with the exception of one site (see table 2.2, note b), the inspections were conducted on vehicles that the units had reported as fully mission-capable Any vehicles identified as inoperable by the inspectors, therefore, were in addition to those already identified by the units

Table 2.2: Total Vehicles Classified Inoperable by Inspectors at Five Sites

Inspected site[a]	Number vehicles inspected	Vehicles made inoperable upon inspection		Total inoperable defects
		Number	Percent	
A	1,105	617	56	1,040
B	1,320	508	39	734
C[b]	449	330	73	716
D[c]	•	•	•	•
E	466	248	53	483
F	2,199	1,067	49	1,636
Total	**5,539**	**2,770**	**50**	**4,609**

[a]Site A consists of a division and a brigade, site B, two divisions, C and F, a division each, and E, nondivisional units

[b]Inspectors also looked at some non-operational vehicles

[c]No detailed vehicle inspection data were maintained for site D

The problem with unit personnel not identifying maintenance defects is illustrated by the fact that at one site (table 2.3), less than 20 percent of the equipment problems found by inspectors had been identified by unit personnel.

Table 2.3: Comparison of Equipment Problems Found by Inspectors and by Unit Personnel (Site A)

Type of vehicle	Number of vehicles inspected	Total problems identified by		Percent
		Inspectors[a]	Personnel	
1/4 ton jeep	454	1,896	308	16
1-1/4 ton truck	352	1,741	358	21
2-1/2 ton truck	165	1,215	227	19
5-ton truck	96	519	110	21
Other	38	45	7	16
Total	**1,105**	**5,416**	**1,010**	**19**

[a]Includes problems identified by unit personnel

The results of inspections by the Inspector General of 17 units at a second installation from December 1983 through July 1984 showed similar PMCS performance. The inspections showed that unit personnel had identified only 7 percent of the total deficiencies found by the inspectors. These reports also showed that 67 and 52 percent, respectively, of the wheel and track vehicles had one or more faults.

When inspectors gave the units time to correct defects, the vehicles' operational status noticeably improved. For example, when the Inspector General at one location gave units 2 hours to correct defects, the number of operational vehicles increased from 51 to 83 percent. However, because most inspections cover only from 10 to 50 percent of a unit's vehicles, any defects on the remaining uninspected vehicles would remain undetected and uncorrected

Sample Data on Howitzer Failures Corroborates Inspection Findings of Poor Performance

The sample data collection program provides equipment manufacturers and Army managers actual performance data on specific types of equipment, including the towed and self-propelled howitzers. Organizational maintenance tasks required for the howitzer are similar to those for other Army vehicles According to contractor officials, the howitzer maintenance problems, which the sample data collection program has tracked over a period of about 5 to 9 years, typify the kinds and severity of Army maintenance problems[1] described in this review.

According to data collected, Army maintenance shops spend more time correcting failures than preventing them. The figures show that 53 to 70 percent of the maintenance performed on howitzers is corrective in nature (see table 2.4). In effect, the Army is reacting to howitzer equipment failures more often than it is working to prevent them.

Table 2.4: Preventive and Corrective Maintenance for Howitzers

Type of howitzer	Number of vehicles	Total maintenance hours performed	Percent of maintenance performed	
			Preventive	Corrective
M-198	68	16,354	30	70
M-109A2	64	24,177	42	58
M-109A3	44	20,725	40	60
M-110	75	63,843	47	53
Total	**251**	**125,099**	**43**	**57**

[1]See appendix IV for a list of common maintenance problems concerning howitzers

Army sample data collection results[2] disclosed that 37 to 47 percent of howitzer and M578 recovery vehicle failures are caused by improper preventive and corrective maintenance, carelessness, and operator error. Hardware—or equipment design—failures accounted for the rest. Such maintenance comprises a considerable part of the Army's cost for howitzer maintenance. Using maintenance costs accumulated on howitzers included in the Sample Data Collection program, we estimated that the Army spends at least $1.7 million annually (see table 2.5) for howitzer maintenance, and over $715 thousand is incurred on maintenance failures due to improper preventive and corrective maintenance practices, carelessness, and operator error. These costs are based on repair as opposed to replacement of the repairable items. The maintenance costs could be as much as $4.1 million annually, and the costs due to improper practices could be as much as $1.7 million annually if the parts were replaced rather than repaired.

Table 2.5: Estimated Additional Maintenance Costs Incurred Due to Improper Maintenance and Operational Practices[a] (Dollars in Thousands)

	Equipment types					
	M109	M110	M198	M102	M578	Total
Total vehicles in sample data collection program	108	75	68	18	32	**301**
Annual maintenance costs	$681	$791	$90	$31	$118	**$1,711**
Percent due to improper maintenance and use	43	41	42	32	42	•
Estimated additional costs due to improper practices	$294	$324	$38	$10	$49	**$715**

[a]Computed from data available in the Army's Sample Data Collection Program

Lack of Supervision, Training, and Resource Management Contributes to Inadequate Organizational Maintenance

Through analysis of inspection reports and discussions with maintenance and management officials, we concluded that first-line supervision, training, and resources (for example, parts and maintenance publications) were major factors in determining how well a unit performed organizational maintenance. We identified several units that inspectors cited for having effective organizational maintenance operations. We analyzed these successful operations to determine which elements were essential to an effective program, and then discussed our results with numerous maintenance officials and inspectors. From our analysis and discussions, the principal elements of effective organizational maintenance operations appeared to be

[2]See U.S. Army Armament, Munitions, and Chemical Command second semiannual management report for fiscal year 1984, titled AMCCOM Artillery Controlled Sample Data Collection (SDC) Program.

Supervision	• Emphasis by the local command on the importance of vehicle maintenance. • Thorough first-line supervision of operator PMCS
Training	• Sufficient operator and first-line supervisor PMCS training (both formal and on-the-job training)
Resources	• Sufficient parts, tools, publications, personnel, and time for maintenance activities

The absence of these elements could result in the maintenance performance problems the inspectors identified We found that inspection reports for units with organizational maintenance problems repeatedly cited deficiencies which could be attributed to these areas. Maintenance and management officials agreed that these elements are important factors in a unit's organizational maintenance performance. Since the successful units we reviewed covered a variety of unit types[3] and had employed these elements, we believe that units throughout the Army could benefit by application of the same elements.

Local Supervision of Maintenance Operations Is Cited

To perform work that meets standards, personnel must have clear instructions, adequate facilities, and necessary equipment and tools. It is equally important that they know what the work standards are and what constitutes acceptable work quality Ensuring that these needs are met is the responsibility of the supervisor.

The lack of supervision appears to be a continuing problem in organizational maintenance Previous GAO and Army Audit reports have cited the lack of supervision as a major contributing factor to ineffective maintenance at the organizational level. According to recent Army Audit reports, supervisors were frequently not on hand during scheduled maintenance workdays During our review, almost 85 percent of the officials we interviewed at installations in the United States considered the lack of supervision an important factor in the inadequate performance of PMCS Also, inspection reports by Inspector General and Maintenance Evaluation Teams of 45 units in Europe showed that lack of first-line supervision contributed to poor maintenance performance

[3]These included armor, field artillery, signal, engineering, aviation, maintenance, and cavalry units

Unit Personnel Not Receiving Sufficient Training

In organizational maintenance, the manager is responsible for training the people who work in the maintenance shops. The training of greatest importance is that which develops the technical skills of equipment operators, mechanics, and TAMMS and supply clerks; they are the people whose skills will most affect maintenance performance. Operators, especially, as the first line of defense against equipment failures, should be well-trained in vehicle operation and PMCS.

We visited two Army equipment maintenance schools and found that they do not teach operators and mechanics all the critical tasks, but only those needed to reach apprenticeship. Consequently, these people cannot perform at the desired job level (journeyman) immediately upon assignment to the field. The Army expects local commanders to fill the training gap between apprentice and journeyman through supervised on-the-job training and other local training programs. For example, since the Army provides no formal training (including PMCS) for operators of most wheeled vehicles, it relies upon unit and battalion commanders to provide this training. The Army teaches system mechanics only 16 percent of the critical tasks for the M60 tank, and 29 percent for the M1 tank—enough for apprenticeship. Unit commanders must provide the experience and on-the-job training needed to attain a more experienced level.

However, operators and mechanics do not appear to be receiving sufficient training at the local level. Inspection results at the sites reviewed indicated that operators lacked PMCS training. For example, at two sites inspectors found that unit personnel had identified only 7 and 19 percent of the vehicle defects identified by the inspectors. Forty-four percent of the inspection reports at all sites cited the units for improper scheduled servicing and corrective maintenance. Discussions with maintenance officials indicated that they fault the Army's training system for lack of proper training. Of the 41 maintenance and inspection officials we interviewed at U.S. sites, 59 percent cited insufficient formal training as a cause for PMCS non-performance. In Europe, 57 percent of the inspection reports cited insufficient PMCS training for operators.

Units Need to Improve Management of Repair Parts and Other Resources

Supply of parts is a very important element of effective maintenance and mission-capability rates. Without parts to replace defective components, maintenance can not be performed. Consequently, the Army provides basic guidance on managing the supply of parts at the organizational level—how to compute required levels, when and how much to order, which requisitioning priorities to use, and how to manage

stock levels However, many of the sites in our study were not effectively following this guidance Our analysis of the 285 inspection reports showed that improper parts supply practices were common among the units, contributing to the lack of timely, economical, and effective performance of organizational maintenance The most frequently occurring supply deficiencies for all six sites were as follows:

- Required parts not on hand. An inspection of one battalion disclosed that three of its companies had no parts on hand for 41 to 63 percent of the type of parts they were required to stock.
- Required parts not on order At one unit, inspectors found no repair parts on hand or only partial balances on hand for 18 different parts, and the items had not been reordered
- Abuse of the priority system for ordering parts. One unit exceeded Army criteria by using high-priority requests for 23 to 43 percent of its total part orders in 4 out of 6 months.
- Excess parts on hand One battalion was stocking over $100,000 worth of items, including expensive fire-control items not normally authorized at the organizational level. Officials responsible for monitoring the stock were unaware that the unit had the items.

Deficiencies in parts supply can increase downtime, decrease mission-capable time, and increase supply costs. Downtime due to unavailability of parts can be determined through equipment condition status reports consolidated by the Army Materiel Readiness Support Activity These reports show that 42 to 79 percent (see table 2.6) of total downtime on selected equipment for two major commands was because parts were lacking for necessary repairs.[4]

[4]We could not determine the extent of downtime due to not having the authorized parts on-hand versus the downtime attributed to parts the units were not authorized to stock

Table 2.6: Percent of Total Downtime Attributed to Lack of Parts for Selected Equipment (For Year Ending June 1985)

Vehicle	Major command	Range of downtime due to unavailability of parts (percent)
M1 tank	1	65–79
	2	64–75
M-109 howitzer	1	53–64
	2	52–72
M-113 armored personnel carrier	1	42–49
	2	70–73
2-1/2 ton truck	1	53–57
	2	57–59

The five divisions we reviewed had similar losses in operational time due to inadequate parts supply. For the 2 years ending in December 1985, these divisions reported over 1.5 million non-mission-capable days for all their ground equipment (including wheel and track vehicles) and missiles. Sixty-five percent of this downtime, or almost one million days, was attributed to lack of parts. These figures may well be understated, since the majority of equipment deficiencies were not identified and recorded.

Inspection reports and discussions with officials also disclosed that maintenance publications were frequently in short supply. Publications are a necessary reference for operators, mechanics, TAMMS, and supply clerks. Publications such as technical manuals, supply manuals, catalogs, and bulletins convey standards and specifications for maintenance, repair, parts supply, and inspections. Yet, inspection reports frequently showed that maintenance publications were missing, outdated, or not ordered.

Increased Use of Diagnostic Equipment Would Facilitate More Effective Organizational Maintenance

The Army has provided its units with 6,000 sets of diagnostic equipment, at costs exceeding $23 million, for use in troubleshooting vehicles. However, we found that these sets were used very little at the sites we visited In addition, we learned from inspection reports that the sets were not always properly calibrated, and personnel were not properly trained or supervised in their use Reasons given for the limited use at one activity were that the sets were too cumbersome and time-consuming to use and personnel did not know how to use them

An Army study[5] of maintenance at 5 installations found that the diagnostic sets were used to identify only 2 of 537 maintenance failures on 150 commercial utility cargo vehicles during a 6-month period. According to officials who were responsible for the study, the diagnostic sets had been used for less than 20 percent of the maintenance failures for which they were designed.

According to one inspection team chief, organizational mechanics do not receive adequate training in the use of diagnostic sets during their formal maintenance training at Army schools. Some mechanics increase their skills in this area through self-study and practical application, but most cannot or do not Moreover, most mid-level maintenance supervisors have never received formal training on current diagnostic sets, so they do not require their mechanics to use them. Instead, many still rely on repair by trial and error

Conclusions

The Army continues to have problems in performing preventive and corrective maintenance on its equipment at the user level, with operators and maintenance personnel not identifying and correcting vehicle deficiencies or performing periodic scheduled services. Principal reasons for these situations include the lack of command emphasis on supervision, training, and management of repair parts and other resources. Additionally, the Army is heavily reliant on the use of test, measurement, and diagnostic equipment to quickly diagnose a maintenance failure and replace the failed part or component to keep the equipment operational and minimize out-of-service time. Currently, the Army is making only limited use of the diagnostic equipment at the organizational level, relying instead on trial and error substitutions—a practice that is not only time-consuming but is also costly in terms of parts. The ultimate effects are a decrease in the mission capability of equipment as vehicles

[5]Logistic Management Analysis Summary for the Commercial Utility Cargo Vehicle (Sept 30, 1985)

are deadlined for repairs and parts, and maintenance costs are higher due to the more serious repairs required from the delay

Recommendations to the Secretary of the Army

We recommend that the Secretary of the Army reemphasize to commanders at all levels the importance of maintenance in supporting an effective combat force, and direct the commanders to ensure that

- equipment operators and maintenance personnel are properly supervised and trained in the correct procedures and practices;
- maintenance personnel are properly trained on and required to use test, measurement, and diagnostic equipment, and
- equipment operators and maintenance personnel are held accountable for and evaluated on how well they perform their assigned duties.

Agency Comments and Our Evaluation

DOD concurred with our recommendations and provided information on on-going and planned actions to implement them For example, with regard to the need to reemphasize the importance of maintenance, DOD stated that the Army had established the Chief of Staff Award for Maintenance These awards are presented annually to emphasize Army leadership's interest and emphasis on maintenance In addition, the Deputy Chief of Staff, Logistics conducts a world-wide maintenance conference every 2 years to discuss maintenance problems, concepts, and approaches. The next conference is scheduled for April 1987

In response to our recommendations that equipment operators and maintenance personnel be properly trained and supervised, DOD outlined several actions intended to increase the amount of training for these individuals. Furthermore, supervisors are to receive increased training, and Army regulations are being revised to more directly state maintenance duties and responsibilities. DOD also stated that additional training would be provided to supervisors on the use of test, measurement, and diagnostic equipment. In its opinion, this is the best way to ensure the proper use of such equipment by maintenance personnel.

In commenting on our last recommendation that operators and maintenance personnel should be held accountable for and evaluated on how well they perform their duties, DOD stated that appraisals and efficiency reports are now used to evaluate maintenance personnel in those cases when maintenance is a stated portion of an individual's duties. In those cases where maintenance is a collateral responsibility of officers, they are to be counseled by their raters on the importance of and their

responsibilities for effective equipment maintenance. In addition, the Chief of Staff, as part of his weekly newsletter will reemphasize the important role and responsibility that maintenance personnel and supervisors have toward keeping the forces combat ready.

DOD and the Army were responsive to our recommendations, and their on-going and planned actions should help correct the problems we identified We believe, and DOD and Army officials agree, that a key ingredient for improving maintenance responsiveness is command emphasis

Maintenance Reporting and Monitoring Should Be Improved to Provide Complete and Reliable Information

Improvements are needed in recording and reporting organizational maintenance data via TAMMS According to inspection reports, maintenance records were often inaccurate or incomplete, resulting in erroneous reports of equipment condition Consequently, fewer vehicles were available for operations than reported, resulting in overstated mission-capability rates for equipment

Inspector General and other command inspections, which have consistently reported the problems of organizational maintenance at individual units, should have served to alert Army management to the inadequate performance and reporting of organizational maintenance However, because these inspection results are not routinely reported above the battalion level, the scope and implications of organizational maintenance problems often remain obscure to higher management officials

Maintenance Records and Reports Are Often Inaccurate and Incomplete

Our analysis of 285 inspection reports for the six sites over a 27-month period identified numerous instances of the maintenance records

- showing daily PMCS improperly recorded or completed,
- failing to include all vehicle downtime, and
- failing to include all scheduled and performed maintenance servicing

As shown by our analysis of inspection reports for 5,539 wheel and track vehicles from October 1983 to December 1985, 50 percent, or 2,770 vehicles, had defects which made them unsuitable for operation. During this same period, the commands reported that 82 to 93 percent of their equipment was fully mission-capable—or conversely, that only 7 to 18 percent was unsuitable for operation These discrepancies occurred largely because the units were not thoroughly detecting and reporting PMCS deficiencies. (See table 2 2, for the condition of the equipment as found by the inspectors.)

Maintenance Monitoring Should Provide Management Complete and Accurate Information

Ideally, a good maintenance information system should alert managers to general trends and persistent problems with vehicle upkeep There should also be some means of cross-checking or monitoring the system's accuracy to ensure that decisions are based on reliable information TAMMS and command inspections can be used for such purposes

TAMMS provides management at all levels an indicator of the general effectiveness of equipment maintenance by reporting whether those vehicles that the units have inspected are mission-capable. TAMMS

prescribes the records and procedures to be used to control and manage Army equipment and maintenance. These include equipment operational, maintenance, and historical records such as (1) the Equipment Inspection and Maintenance Worksheet, (2) the Preventive Maintenance Schedule and Record, and (3) the Materiel Condition Status Report.

While the first two records are used predominately by the local level, the latter report—the Materiel Condition Status Report—is prepared for all levels This report provides unit commanders a worksheet for figuring equipment status and readiness Active Army units prepare this report monthly to inform commanders of the equipment status of their units, thereby enabling them to predict equipment availability The report provides an overall assessment of organizational maintenance effectiveness and also provides a tool to monitor important items that need considerable maintenance on a continuing basis Finally, this report is used in compiling the Unit Status Report, which gauges the overall readiness of Army units in equipment, personnel, and supply Army management can use this report to indicate the general maintenance effectiveness—which it does through the percentage of equipment reported as mission-capable

The Army monitors maintenance performance at the organizational level through a variety of inspections, the most common being annual inspections by its Inspector General. Most local Inspector General offices provide battalion and unit commanders formal reports of their inspections, detailing deficiencies on specific equipment Corps-level commands also use Maintenance Evaluation Teams to conduct inspections. However, in contrast to the Materiel Condition Status Reports, neither the Inspector General nor the Maintenance Evaluation Team reports are routinely given to command levels above battalion

TAMMS alone does not ensure the accuracy of a unit's mission-capable status, nor does it clearly indicate the general effectiveness of organizational maintenance or the existence of equipment problems TAMMS-generated status reports can be overstated, and, although inspections detect gaps between the reported status and the actual condition of equipment in individual units, the channel for informing Army headquarters and major commands of such gaps is not effectively used At present the Army does not require inspection results to be compiled and summarized for submission to upper management Consequently, managers may remain unaware of widespread problems in organizational maintenance, as they do not receive sufficient data to detect differences existing between reported and actual equipment condition.

Conclusions

Inadequate performance of organizational maintenance persists, in part, because of reporting and monitoring systems weaknesses As a result, the poor maintenance performance is not being reported to responsible Army management Though the Army can monitor maintenance through TAMMS and command inspections, recordkeeping errors, compounded by the manner in which the data are compiled and reported, greatly limit the management utility of TAMMS and inspections

While TAMMS reports show Army vehicles to be in a high state of readiness, Inspector General and other command inspections show otherwise. As a result, commanders and managers are assessing equipment status and making management decisions based on invalid, incomplete data Moreover, the Army's monitoring of equipment condition and status through its inspections does not routinely provide for submission of summary data needed by Army management to detect and correct substantial problems and trends in maintenance performance and equipment status

If higher level managers received periodic summaries of inspection reports—such as those regularly issued by the Inspector General and Maintenance Evaluation Teams—they could identify and monitor the existence, scope, and impact of the many problems in organizational maintenance Management would thereby be more assured of the availability of materiel and have a better basis for instituting corrective actions in organizational maintenance

Recommendations to the Secretary of the Army

We recommend that the Secretary of the Army

- direct the Army Inspector General to evaluate the causes of inadequate equipment status reporting and determine why the Army has not corrected the long-standing maintenance problems, and
- direct subordinate commands to summarize and provide maintenance data to major commands so as to identify organizational maintenance problems and trends.

Agency Comments and Our Evaluation

DOD concurred with our first recommendation and proposed actions that are responsive. To illustrate, DOD said that the basic causes for the maintenance problems seem to be the lack of compliance, interest, training, and supervision. The Army Inspector General will emphasize these problems to all of its Inspectors General In addition, inspection results will be furnished to the Department of Army Inspector General,

summarized, and provided annually to the Deputy Chief of Staff, Logistics.

DOD did not concur with a proposal in our draft report that the Secretary of the Army direct subordinate commands to summarize and provide their inspection results to their major commands for comparison with TAMMS data in order to identify organizational maintenance problems and trends, and develop corrective actions The intent of our proposal was to provide Army commanders at the major command level with a basis for comparing how their subordinate commands were carrying out their maintenance responsibilities, and to provide an indicator, in addition to TAMMS data, for identifying problem areas

DOD's concern was that summarizing the results of numerous inspections which may have been performed for varying reasons using varying criteria could not be directly correlated with the TAMMS data which is accumulated on a centralized basis using a standardized format. Furthermore, DOD was concerned that the voluminous number of inspections would inundate the commands with paperwork

DOD agreed, however, that another indicator besides TAMMS data was needed to better assess maintenance performance and suggested that a better approach would be for the commands to determine the type of maintenance data that should be summarized and forwarded to them by their subordinate commands

After considering DOD's comments, and in view of the actions DOD plans to take to implement our first recommendation, we agreed with DOD's suggested alternative. We revised the language of our recommendation accordingly

Activities Visited

Army Bases in the United States

- XVIII Airborne Corps, Fort Bragg, North Carolina
- III Corps, Fort Hood, Texas
- 1st Infantry Division, Fort Riley, Kansas
- III Corps Artillery, Fort Sill, Oklahoma
- Armor Center, Fort Knox, Kentucky
- Ordnance Center and School, Aberdeen Proving Grounds, Maryland

Army Activities in Europe

- V Corps Headquarters, Frankfurt, Germany
- 8th Infantry Division, Bad Kreuznach, Germany

Headquarters and Other Army Activities

- Office of the Deputy Chief of Staff for Logistics, Washington, D C
- Office of the Inspector General, Washington, D C
- Logistics Evaluation Agency, New Cumberland, Pennsylvania
- Army Materiel Command, Alexandria, Virginia
- Materiel Readiness Support Activity, Lexington, Kentucky
- Armament, Munitions and Chemical Command, Rock Island, Illinois
- Tank Automotive Command, Warren, Michigan

Reliability Assessment of Information Obtained From Two Computer Data Bases

Our review of Army organizational maintenance included the use of computerized data involving reports and data bases maintained by two Army materiel managers. The reports are as follows.

- Unit Equipment Status and Serviceability Report
- Equipment Historical Availability Trends.
- Reliability, Availability and Maintainability reports
- Maintenance cost reports

To ensure that the data used in our review were reasonable and accurate, we conducted reliability assessments of the two computerized data bases from which these four reports are derived The first two reports are generated from the Readiness Integrated Data Base maintained by the Materiel Readiness Support Activity and concern reported equipment condition and status. The latter two reports are prepared from the Artillery Sample Data Collection data base maintained by the Armament, Munitions and Chemical Command and concern procedural problems on howitzers and cost data associated with corrective maintenance.

Results and Conclusions

We assessed the reliability of input and output documents and internal processing controls for each of the data bases. Specifically, we

- identified the computer data to be used and its importance to the audit product,
- reviewed the procedures used to collect, record, and process the data, as well as internal controls,
- reviewed agency policy, procedures, and other documentation;
- interviewed agency officials, including a source data collector, computer programmer, and operator, as well as administration and review officials;
- administered questionnaires regarding the computer system, data flow, management and internal controls, and
- tested the reliability of a sample of source documents that included 1,440 computer entries for 24 source documents

Our assessment of the Sample Data Collection system did not include an evaluation of the reliability of the cost data used to expand reliability, availability, and maintainability data into a cost report. However, we did discuss the content of the cost report with agency officials and performed limited tests on the man-hour dollar rates used as a basis for the report.

We found that some of the procedures did not precisely follow generally accepted practices However, the differences would not materially alter the reliability of the four reports. Based on our assessment, we concluded that the input, processing, and output controls are adequate in the production of these four reports. Internal controls provide reasonable assurance that data are accurately and completely processed Consequently, we considered the reports reliable for the purposes of our review.

List of Track and Wheel Vehicles Included in Review by Equipment Type and Location[a]

Track vehicle	Vehicle location[b] A	B	C	E	F	Total
Tanks						
M-1	•	115	•	•	•	**115**
M-60	•	9	81	•	198	**288**
M-48/551	3	1	•	•	•	**4**
Total	**3**	**125**	**81**	**•**	**198**	**407**
Armored recovery vehicles						
M-578	•	2	2	2	23	**29**
M-88		21	12	•	31	**64**
Total	**•**	**23**	**14**	**2**	**54**	**93**
Armored carriers						
M-113	•	108	28	14	343	**493**
M 2/3	•	70	2	•	•	**72**
M-548	•	36	2	1	51	**90**
M-577	•	37	14	9	92	**152**
M-901	•	16	5	•	86	**107**
Total	**•**	**267**	**51**	**24**	**572**	**914**
Artillery vehicles						
M-106	•	8	3	1	40	**52**
M-109	•	46	12	•	42	**100**
M-110	•	11	•	•	7	**18**
M-125A2	•	•	2	•	•	**2**
Total	**•**	**65**	**17**	**1**	**89**	**172**
Air defense vehicles						
M-163	•	8	•	•	•	**8**
M-730	•	4	•	•	•	**4**
Total	**•**	**12**	**•**	**•**	**•**	**12**
Miscellaneous						
M-728	•	•	1	•	•	**1**
Total	**3**	**492**	**164**	**27**	**913**	**1,599**

	Vehicle location[b]					
Wheel vehicle	**A**	**B**	**C**	**E**	**F**	**Total**
Jeeps	454	169	85	74	393	**1,175**
Trucks						
1/2 ton	13	•	•	•	•	**13**
3/4 ton	4	75	8	75	39	**201**
1 1/4 ton	352	201	32	71	237	**893**
2 1/2 ton	165	240	105	147	428	**1,085**
5 ton	96	116	45	72	136	**465**
8 ton	1	20	6	•	53	**80**
10 ton	•	7	4	•	•	**11**
Total	**631**	**659**	**200**	**365**	**893**	**2,748**
Miscellaneous						
M-198 towed howitzers	17	•	•	•	•	**17**
Total	**1,102**	**828**	**285**	**439**	**1,286**	**3,940**
Total	**1,105**	**1,320**	**449**	**466**	**2,199**	**5,539**

[a]The Army inspections generally covered a 15 to 27 month period ranging from October 1983 to December 1985

[b]No detailed vehicle inspection data was maintained for location D

Common Problems and Their Causes for the M109-Series Howitzer

Problem	Cause
Batteries dead or damaged	Overused without recharge Power left on overnight Electrolyte not checked or corrected Posts or case damaged
Part assembly electrically shorted or mechanically seized	Internal corrosion from water forced in during high- pressure cleaning and then trapped
Fire control equipment (including cases) damaged	Rough handling
Part unnecessarily removed (i e not defective)	Troubleshooting incorrect or not performed
Idler/roadwheels damaged (e g elongated holes, bolts sheared), wheel/track fell off	Loose or improperly torqued attaching hardware
Starter motor burned out	Insuffic ent cool-down time allowed between start attempts
Radiator punctured, leaks	Radiator hit, dropped, etc (usually during power pack exchange)
Fan bearings or bevel gears fa led	Not lubricated per lubrication order
Rammer tray support cracked	Rammer not securely stowed when tube elevated, or round dropped on end of tray
Air filters torn or damaged	Beaten against object

Comments From the Assistant Secretary of Defense (Acquisition and Logistics)

ASSISTANT SECRETARY OF DEFENSE

WASHINGTON D C 20301 8000

ACQUISITION AND LOGISTICS

L/MD

FEB 2 3 1987

Mr. Frank C. Conahan
Assistant Comptroller General
National Security and
International Affairs Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Conahan:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "Army Maintenance: The Army Continues To Have Problems Performing Equipment Maintenance At The User Level," dated 15 December 1986 (GAO Code 393104), OSD Case 7186.

The DoD concurs with all the findings and recommendations with one exception: Recommendation 6 proposes that the Secretary of the Army direct Subordinate Commands to summarize and provide inspection results to Major Commands for use with The Army Maintenance Management System (TAMMS) data in identifying organizational maintenance problems and trends, and in taking the actions necessary to resolve them. Summarizing inspection results from the Armys' current decentralized system would not provide meaningful information. The inspections (in excess of 6,000 per organization) reflect widely varying interests and criteria. Other more meaningful and useful information is currently available to identify maintenance problems and trends at the Major Command level.

Unit maintenance is the cornerstone of the Army maintenance program. All other levels can be balanced and accomplished when unit level services and repairs are properly performed.

The Department agrees that improvement in Army organizational/unit maintenance programs is essential. The DoD responses to the findings and recommendations reflect a positive and aggressive program to effect corrections and improvements.

Specific DoD comments relating to each of the draft report findings and recommendations are enclosed.

Sincerely,

Thomas P. Christie

for the
Assistant Secretary of Defense
(Acquisition and Logistics)

Enclosure

(GAO CODE 393104) OSD CASE 7186

"ARMY MAINTENANCE: THE ARMY CONTINUES TO HAVE PROBLEMS PERFORMING EQUIPMENT MAINTENANCE AT THE USER LEVEL

DEPARTMENT OF DEFENSE RESPONSE

* * * * *

FINDINGS

- FINDING A: Army Maintenance. The GAO observed that efficient, effective, and economical maintenance is essential to the readiness of U.S. defense forces, and a major Army responsibility is supporting and maintaining an operationally ready force. The GAO further observed that the Army must depend on quality and timely equipment maintenance to keep or restore material to a mission capable condition. The GAO also observed that the Army spends several billions of dollars annually for logistical maintenance and supply operations. The GAO reported that responsibility for overall management of Army maintenance is centered in the Office of the Deputy Chief of Staff for Logistics (DCSLOG), which develops policy, while maintenance implementation is the responsibility of major commands. The GAO found that maintenance and supply activities are monitored through Army inspections conducted by various levels of command. While the most common inspections are those conducted annually by the Army Inspector General, the GAO learned some commands also have a Maintenance Evaluation Team that conducts inspections. In addition, the GAO found that units are also encouraged to use the local Maintenance Assistance Instruction Teams. (p. 2, pp. 8-10/GAO Draft Report)

  Now pp 2, 8-9

  DoD RESPONSE: Concur. Unit level maintenance is the cornerstone of the maintenance program.

- FINDING B: Maintenance At The User Level. The GAO observed that organizational maintenance is the foundation of the Army's maintenance system. The GAO reported that maintenance success is measured by how well the equipment remains in operation and how quickly it can be returned to service. The GAO further reported that through preventive maintenance checks and services (PMCS), equipment operators and unit mechanics use systematic procedures to detect early signs of equipment failure and ensure that deficiencies are corrected before more costly and time-consuming repairs are needed. The GAO also reported that under the Army Maintenance Management System (TAMMS), operators record only those deficiencies beyond their capability to correct or for which they need parts, while unit mechanics record

Enclosure

all deficiencies found. The GAO found that the Army is in the process of changing its maintenance system, and a key element is the forward-support maintenance concept. According to the GAO, the objective of the new concept is to minimize maintenance turn around time. The GAO concluded, however, that the forward maintenance concept will not materially affect the problems it identified. In addition, the GAO concluded that vehicle operator and crew preventative maintenance is the cornerstone of the entire maintenance system and that by identifying and correcting faults early, they can prevent more serious and costly deficiencies. (pp. 8-12/GAO Draft Report)

Now pp 9-10

DoD RESPONSE: Concur. Forward support doctrine is a concept to quickly return an item to use which has suffered damage or breakdown. The concept primarily applies to support maintenance rather than to unit level maintenance.

- FINDING C: Prior Audits. The GAO noted that prior audits by the GAO, the Army Audit Agency, and other groups indicate that the Army's problems with maintenance performance, parts support and reporting are not new. The GAO specifically referred to its December 22, 1978 report, "The Key To Improving Maintenance Of Army Equipment: Commanders Must Motivate Their Personnel." The GAO observed that in the prior report it had found (1) maintenance had not been properly performed, (2) equipment deficiencies were not properly recognized, corrected and reported, (3) planned on-the-job training programs had not been developed, and (4) parts were not always available and sometimes were not correctly ordered. The GAO had also previously recommended that personnel needed better supervision, training and motivation. The GAO noted that the Army Audit Agency had found similar deficiencies in maintenance, supply and reporting during numerous reviews of organizational maintenance during the period 1982 through 1984. In addition, the GAO reported that a 1983 Logistics System Program Review Panel cited inadequate operator maintenance as the most serious maintenance problem in the Army. Despite the prior program review and the findings in the earlier reports, the GAO concluded that the Army continues to have problems in performing preventative and corrective maintenance on its equipment at the user level. (pp. 12-13, p. 30/GAO Draft Report)

Now pp 10, 27

DoD RESPONSE: Concur. Unit maintenance will always need to compete for resources and command emphasis. The current condition will, however, be improved. During the period covered by the GAO report, many initiatives have been taken to improve unit level maintenance. The Maintenance

Management Improvement Program (MMIP) was established to provide for the exchange of maintenance information, problems and solutions, between maintenance managers in a systematic manner. Department of the Army (DA) Pamphlet 750-1, "Organizational Maintenance Guide for Leaders," was revised to provide more specific guidance on how to establish and supervise a good unit level program. The US Army Ordnance Center and School organized a Unit Level Maintenance Staff Office (ULMSO). Under this charter the ULMSO is the single focal point in developing solutions for problems associated with ground support maintenance at the unit level. In 1985, a pamphlet, "Functional Users Guide for Motor Pool Operations" was published to provide guidance for operation of motor pools. Guides for the Battalion Maintenance Officer are now being developed.

- FINDING D: Mission Capability Rates Overstated. The GAO found that Army inspection reports indicate that mission-capability rates may be overstated due to organizational personnel failing to identify critical deficiencies. The GAO reported that, for instance, from October 1983 to November 1985, Army inspectors looked at 4,915 vehicles assigned to five divisions and found an average of 50 percent of the vehicles reported as mission capable contained deficiencies that placed them in inoperable status. During this same period, however, the divisions had reported that 82 to 93 percent of their wheel and track vehicles were fully mission-capable. The GAO concluded that as a result of the Army's maintenance problems, its equipment availability is considerably less than it is reported to be or it could be, and maintenance costs are higher than necessary. The GAO also concluded that other effects of poor maintenance are (1) increased maintenance workload, (2) greater demand for parts, and (3) an increase in downtime. (pp. 16-17, p. 30/GAO Draft Report)

Now pp 18-19, 27-28

DoD RESPONSE: Concur. The DoD agrees that rates may be overstated. The direct equation of maintenance inspections and readiness rates, however, is not correct. A maintenance deficiency may not cause an item to be not mission capable. The deficiency may be immediately corrected and thus not require a not mission capable day to be recorded. Maintenance emphasis is often placed on correction of the mission ready items at the expense of other maintenance work. Thus the status of maintenance may degrade before a drop in readiness rates.

- FINDING E: Organizational Personnel Not Detecting And Correcting Deficiencies. The GAO found that, at the four installations in the U.S. and the two major activities it visited overseas, units were not identifying equipment defects during operator Preventive Maintenance Checks and Services (PMCS). The GAO further found that operators were not always performing the PMCS prescribed for their specific

vehicles. In addition, the GAO found that units often were not scheduling or performing periodic servicing, as required. The GAO observed that inadequate performance of organizational maintenance (along with inaccurate recordkeeping and reporting) accounted for the greatest number of citations in the Inspector General and Maintenance Evaluation Team inspection reports analyzed by the GAO. The GAO also found that at one site, less than 20 percent of the equipment problems found by inspectors had been identified by unit personnel. At a second site, the GAO reported that inspections of 17 units by the Inspector General (from December 1983 through July 1984) showed that unit personnel had identified only 7 percent of the total deficiencies found. The GAO concluded that operators are not detecting and reporting most of their equipment deficiencies, and are not performing periodic scheduled services. (p. 3, pp. 17-21, p. 30/GAO Draft Report)

Now pp 3, 19-21

DoD RESPONSE: Concur. This situation is symptomatic of the need to improve training and supervision addressed in other findings, and will resolve itself as problems of training, supervision, and command emphasis are solved.

- FINDING F: Data On Howitzer Failures. The GAO noted that the sample data collection program provides actual performance data on specific equipment to developers and Army managers. The GAO reported that, according to contractor officials, Howitzer maintenance problems (tracked by the sample data collection program over a period of 5 to 9 years) typify the kinds and severity of Army maintenance problems found by the GAO. The GAO observed that according to data collected, 53 to 70 percent of maintenance is corrective, thus Army maintenance shops spend more time correcting failures than preventing them. The GAO further observed that according to this data, a large portion of Howitzer and M578 recovery vehicle failures is caused by improper preventative and corrective maintenance. The GAO estimated that of the $1.7 million the Army spends for Howitzer maintenance annually, $715,000 is incurred on failures due to improper preventative and corrective maintenance practices, carelessness and operator error. (p. 3, pp. 21-23/GAO Draft Report)

Now pp 21-22

DoD RESPONSE: Concur. Some clarification is appropriate, however. The GAO states that 53 to 70 percent of maintenance is corrective rather than preventive. It implies that spending more time correcting than preventing is not desirable, which is theoretically correct. It should be recognized however, that the Army must train with its equipment and thus it will require repairs. The Department nonetheless des agree that it is desirable to eliminate and prevent any maintenance that is not necessary or cost effective. Many hours of preventive servicing have been saved, for example, by changing oil on the basis of analysis

rather than time/miles. This has changed the ratio of corrective to preventive time. Optimum ratios are not, however established for Army equipment.

- FINDING G: Unit Personnel Not Receiving Sufficient Training. Through analysis of inspection reports and discussions with maintenance and management officials, the GAO found that training was a major factor in determining how well a unit performed organizational maintenance. The GAO also found that sufficient operator and first-line supervisor PMCS training were essential in those units conducting effective training, and that the absence of such training could result in maintenance performance problems observed by inspectors. The GAO found that personnel effectiveness is largely determined by the training they received. The GAO reported that the two Army equipment maintenance schools it visited did not teach operators and mechanics all critical tasks. The GAO found that, instead, only those tasks needed to reach apprenticeship were taught and, consequently, these people cannot perform at the journeyman level upon reaching the field. The GAO reported that the Army provides no formal training (including PMCS) for operators of most wheeled vehicles, and teaches systems mechanics for only 16 percent of the critical tasks for the M60 tanks and 29 percent for the MI tank. In addition, the GAO found that operators and mechanics do not appear to be receiving sufficient training at the local level. Of the maintenance and inspection officials the GAO interviewed, 59 percent of those located in the U.S. cited insufficient formal training as a cause for PMCS non-performance. In Europe, 57 percent of the inspection reports cited insufficient PMCS training for operators. The GAO concluded that units throughout the Army could benefit by receiving sufficient training. The GAO further concluded that lack of command emphasis on training contributes to the Army's continuing maintenance problems, (p. 3, pp. 23-26, p.30/GAO Draft Report)

Now p 3, pp 22-24, 27

- DoD RESPONSE: Concur. The Army did make a conscious decision to train to the entry level rather than to the journeyman level. Additional schooling is expensive and would result in an increase to the requirement for student spaces. There would also be a loss of On-the-Job-Training time in the units, and time used to maintain equipment. To further enhance operators skills, unit level maintenance courses have integrated the Basic Knowledge and Skills (BK&S) concept into the training base. Training now is nine hours in duration, and is being increased to fourteen hours between now and FY 1988. Based on the experience gained from the Master Diagnostician program, the Army is now moving to increase the Basic Non-commissioned Officer course class time to pick up additional maintenance expertise. To enhance training in units, the Unit Maintenance Management System was published in 1984. It provides the unit level

commander with a program of instruction, which allows training by level of involvement, for unit personnel.

- FINDING H: Lack Of Supervision. As with training, the GAO found that first-line supervision, as well as emphasis by the local command on the importance of vehicle maintenance, was a major factor in successful maintenance. The GAO observed that, to perform the required maintenance work so as to meet standards, personnel must have clear instructions, adequate facilities, and necessary equipment and tools. The GAO further observed it is equally important that personnel know what the work standards are and what constitutes acceptable work quality, and this is the responsibility of the supervisor. The GAO found, however, that lack of supervision appears to be a continuing problem in organizational maintenance. The GAO noted that, according to recent Army Audit reports, supervisors were frequently not on hand during scheduled maintenance work days. The GAO reported that 85 percent of the personnel it interviewed at U.S. installations considered lack of supervision an important factor in the inadequate performance of PMCS. The GAO concluded that units throughout the Army could benefit by the application of adequate supervision of maintenance. The GAO also concluded that the lack of command emphasis on supervision is a primary reason the Army continues to have problems in performing organizational maintenance. (pp. 23-25, p. 30/GAO Draft Report)

Now pp 22-23, 27

DoD RESPONSE: Concur. Line supervisors must be more knowlegeable and supportive of operator maintenance. Many units now have programs training supervisors. A pamphlet on how to do unit level maintenance has been published. Also, the Army has consolidated maintenance references into the "Unit Maintenance Management UPDATE" to provide a single source document. Other training improvements are described in the response to Finding G above. In addition, AR 750-1 is being changed to use language that is more direct and positive in stating maintenance duties, responsibilities, and supervision.

- FINDING I: Improved Management Of Resources Needed. The GAO found that the availability of resources, such as parts, is a major factor in the success of organizational maintenance. As with training and supervision, the GAO observed that sufficient parts, tools, publications, personnel and time for maintenance activities constitute effective maintenance operations. The GAO found, however, that ineffective parts management routinely showed up in deficiencies cited in inspections. While the Army provides guidance on managing parts at the organizational level, the GAO found that many sites were not effectively following this guidance and improper parts supply practices were common. The GAO reported that the most frequently occurring

supply deficiencies at the six sites it visited were (1) required parts not on hand, (2) required parts not on order, (3) abuse of the priority system for ordering parts, and (4) excess parts on hand. According to the GAO, recent reports showed that 42 to 79 percent of the downtime on selected equipment for two major commands was due to lack of parts. The GAO observed that the five divisions under review reported over 1.5 million non-mission-capable days for all their ground equipment, of which 65 percent was attributed to lack of spare parts. The GAO concluded that units throughout the Army could benefit from effective management of resources, such as spare parts. The GAO also concluded that the lack of adequate resource management was a principal reason the Army continues to have problems performing organizational maintenance. (pp. 23-30/GAO Draft Report)

Now pp 24-27

DoD RESPONSE: Concur. Additional effort on training, compliance, and supervision is needed. The automated Unit Level Logistics System (ULLS), now being fielded, will improve accuracy and visibility of supply support of maintenance. Outputs include: stock status reports; automatic replenishment requests; maintenance status of equipment; automated correlation between "deadlined for parts" and "parts on requisition" and summary reports showing trends by type and end items of equipment. Other programs, such as Prescribed Load List (PLL) clerk certification, are now improving standards of training in repair parts supply. In addition training of the unit level repair parts clerk is accomplished at the Quartermaster School. Since 1983 the course of instruction was expanded from 8 weeks to 10 weeks and 2 days. One hundred percent of the critical tasks are taught in the course. The minimum criteria for passing was raised to 85 percent, the highest in the school.

- FINDING J: Diagnostic Equipment Not Used. The GAO observed that in the future, effective Army maintenance will hinge on the implementation of the planned forward-support maintenance concept. The GAO described that a key element of this concept is the heavy reliance placed on use of test, measurement, and diagnostic equipment to quickly diagnose a maintenance failure. According to the GAO, the objective is to replace the failed part or component to keep the equipment operational and minimize out-of-service time. While the Army has provided its units with 6,000 diagnostic sets at costs exceeding $23 million, the GAO reported that these sets were used very little. In addition, the GAO found inspection reports indicated that the sets were not always properly calibrated and personnel were not properly trained or supervised in their use. The GAO also cited a September Army study, which showed that diagnostic sets were used to identify only 2 of 537 maintenance failures on 150 commercial vehicles at five installations. The GAO noted that, according to one inspection team chief, organizational mechanics do not receive adequate training in the use of

diagnostics at Army schools. The GAO also found that most mid-level maintenance supervisors have never received formal training on current diagnostic sets. The GAO concluded that, instead of using diagnostics, the organizational level still relies on trial and error--a practice that is not only time consuming but is also costly in terms of parts. (pp. 29-31/GAO Draft Report)

Now p 27

DoD RESPONSE: Concur. Training and increased emphasis is needed in the area. The Army has been working on several issues. Progress has been made in simplifying new test equipment and procedures. Efforts to improve skills and confidence at the supervisory level resulted in a Master Diagnostician training program. It has been so successful that the additional training in test and diagnostic procedures will be made part of all (E6) Basic NCO courses for ground maintenance occupational specialties. Having NCOs skilled in using TMDE will increase their supervisory abilities and troubleshooting techniques.

- FINDING K: Maintenance Records and Reports Are Often Incomplete. The GAO noted that according to the inspection reports it reviewed, maintenance records were often inaccurate or incomplete, resulting in erroneous reports of equipment condition. According to the GAO, these inaccurate or incomplete records meant that fewer vehicles were available for operations than reported--ie., mission-capability rates for equipment were overstated. Also, the GAO analysis of 285 inspection reports for the six sites it studied over a 27-month period identified numerous instances of maintenance records which indicated (1) PMCS completed, although it had not actually been performed and (2) failure to include all vehicle downtime shown on the Preventive Maintenance Schedule and Record on the Material Condition and Status Report. The GAO found that the discrepancies between command reports and the results of inspections (discussed in Finding D above) occurred largely because units were not thoroughly detecting and reporting PMCS deficiencies. The GAO concluded that inadequate performance of organizational maintenance persists, at least in part, because of reporting and monitoring system weaknesses. The GAO also concluded that, although the Army can monitor maintenance through the TAMMS and command inspections, recordkeeping errors, compounded by the manner in which the data are compiled and reported, greatly limit the utility of TAMMS and inspections to have the necessary impact on management. (pp. 32-33, p. 35/GAO Draft Report)

Now pp 30-32

DoD RESPONSE: Concur. A system for uniformly evaluating maintenance is needed. Maintenance compliance inspections are needed to correctly and uniformly determine maintenance status. They also serve as a motivating factor to improve maintenance quality. This issue will be examined

by the World Wide Maintenance Conference in April 1987, and in other forums. A decision on policy for maintenance compliance inspections will be made by 30 July 1987.

- FINDING L: Maintenance Monitoring Should Provide Management With Complete and Accurate Information. The GAO observed that, ideally, a good maintenance information system should alert managers to general trends and persistent problems with vehicle upkeep. The GAO noted there should also be some means of cross-checking or monitoring the system's accuracy to ensure that decisions are based on reliable information. The GAO found that TAMMS and command inspections can be used for such purposes. The GAO noted that TAMMS prescribes the records and procedures to be used to control and manage Army equipment and maintenance. These include equipment operational, maintenance, and historical records such as (1) the Equipment Inspection and Maintenance Schedule and Worksheet, (2) the Preventative Maintenance Schedule and Record, and (3) the Material Condition Status Report. The GAO found that, while the first two records are used predominately by the local level, the latter report--the Material Condition Status Report--is prepared for all levels. The GAO further found that, while the Army monitors maintenance performance at the organizational level through inspections, neither the individual inspection report nor a summary of the data is routinely given to command levels above battalion. The GAO concluded that, even though TAMMS reports show Army vehicles to be in a high state of readiness, Inspector General and other command inspections show otherwise and, as a result, commanders and managers are assessing equipment status and making management decisions based on invalid, incomplete data. The GAO further concluded that if higher level managers received periodic summaries of inspection reports--such as those regularly issued by the Inspector General and Maintenance Evaluation Teams--the reliability of TAMMS could be monitored over a broad base and the existence, scope, and impact of the many problems in organizational maintenance identified. The GAO observed that management would thereby be more assured of the availability of material and have a better basis for instituting corrective action in organizational maintenance. (pp. 32-35/GAO Draft Report)

Now pp 30-32

DoD RESPONSE: Concur. Complete and adequate maintenance monitoring requires valid comparison of unit maintenance program/status against standards or other units. Care must be used, however, not to confuse equipment readiness reporting with maintenance status. There are elements in TAMMS that may be used as maintenance indicators; for example, the turn around time of support maintenance and the frequency and severity of support necessary to comparable units. Local inspection teams, summaries and trends provided by Maintenance Assistance and

Instruction Teams (MAIT) and Command Logistics Review Teams (CLRT) also provide program indicators. The pending automation of maintenance forms and records under the Unit Level Logistics System (ULLS) and the Standard Army Maintenance System (SAMS1 and SAMS2) will greatly improve maintenance management. The ADP systems will validate trends, indicate common faults, and evaluate the status of equipment maintenance in a more timely, accurate and uniform manner.

RECOMMENDATIONS

Now p 28

- RECOMMENDATION 1: The GAO recommended that the Secretary of the Army reemphasize to commanders at all levels the importance of maintenance in supporting an effective combat force. (p. 31/GAO Draft Report)

  DoD RESPONSE: Concur. The Chief of Staff Army Award for Maintenance Excellence was established in 1982 to emphasis maintenance and demonstrate the interest of Army leadership. Additional measures will be reviewed in the April conference.

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- RECOMMENDATION 2: The GAO recommended that the Secretary of the Army reemphasize to commanders at all levels the need to ensure that equipment operators and maintenance personnel are properly supervised and trained in the correct procedures and practices. (p. 31/GAO Draft Report)

  DoD RESPONSE: Concur. Improvement in training and supervision accomplished and planned has been discussed (See Findings G & H). The reinstatement of standardized compliance inspection may provide the solution.

Now p 28

- RECOMMENDATION 3: The GAO recommended that the Secretary of the Army reemphasize to commanders at all levels the need to ensure that maintenance personnel are properly trained on and required to use test, measurement, and diagnostic equipment. (p. 31/GAO Draft Report)

  DoD RESPONSE: Concur. Training to provide proficiency and confidence in supervising NCOs, is the best way to insure proper use of TMDE. (See DoD response to Finding J).

Now p 28

- RECOMMENDATION 4: The GAO recommended that the Secretary of the Army reemphasize to commanders at all levels the need to ensure that equipment operators and maintenance personnel are held accountable for and evaluated on how well they perform their assigned duties. (p. 31/GAO Draft Report)

- DoD RESPONSE: Concur Use of performance appraisals and efficiency reports in connection with maintenance of equipment is now required in cases where maintenance is a stated portion of an individuals duties. It will also be reemphasized where it is an implied, or collateral, responsibility. Maintenance responsibilities should be covered, when appropriate, during the required counseling of officers by their raters using the Officer Evaluation Report Support Form.

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- RECOMMENDATION 5: The GAO recommended that the Secretary of the Army direct the Army Inspector General to evaluate the causes of inadequate equipment reporting and determine why the Army has not corrected the long-standing maintenance problems (p. 36/GAO Draft Report)

DoD RESPONSE: Concur. The basic causes seem to be compliance, interest, training, and supervision, as indicated by the proceeding recommendations. The Department of the Army Inspector General (DAIG) will make this subject an item of special emphasis for IGs worldwide. The results of their inspections will be furnished to the DAIG, summarized, and provided to the DCSLOG annually. Logistic system changes are the purview of the DCSLOG.

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- RECOMMENDATION 6: The GAO recommended that the Secretary of the Army direct subordinate commands to summarize and provide inspection results to major commands for use with TAMMS data in identifying organizational maintenance problems and trends, and taking action necessary to resolve them. (p. 36/GAO Draft Report)

DoD RESPONSE: Nonconcur. Summarizing inspection results from the current decentralized system would not provide meaningful information. The inspections reflect widely varying interests and criteria. Other information to identify maintenance problems and trends is now available to the major commands. Summarized TAMMS data is available from the Army Materiel Command (AMC). For example; the Materiel Readiness Support Activity (MRSA) maintains the Readiness Integrated Data Base (RIDB), complied from Equipment Readiness Reports. This provides on line capability to compare units by equipment readiness as well as comparing readiness by system. MRSA has the capability to draw Sample Data Collection (SDC) data from the AMC commodity commands. Standard SDC management reports normally show the top 20 repair parts by frequency, and the top 20 by total dollar value. This provides an excellent highlighting of current problems.

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