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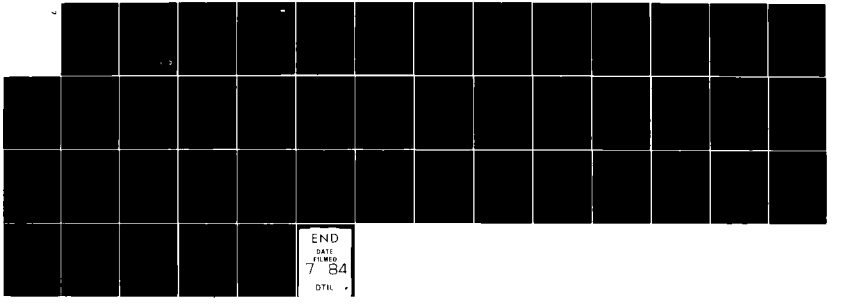

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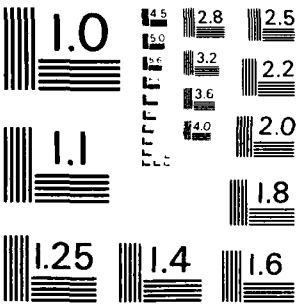

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RE-ORIENTING FIELD-LEVEL MAINTENANCE

January 1984

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PREFACE

This report examines the capability of the Military Departments to satisfy the wartime, field-level maintenance support requirements of mission-essential weapon systems. By field-level maintenance, we mean all maintenance tasks authorized to be performed outside designated depot-level activities. This report also recommends actions be taken by the Office of the Secretary of Defense necessary to improve weapon system support.

To aid in the examination, we draw upon the actual support being provided several weapon systems. These include three Air Force aircraft (A-10, C-5A, and F-16), three classes of Navy surface ships (DD-963 destroyers, FFG-7 guided missile frigates, and PHM-1 patrol, hydrofoil craft), and three Army equipment commodities (aircraft, with emphasis on AH-1S and UH-60A helicopters; combat vehicles, with emphasis on M-1 and M60A3 tanks; and air defense missiles, with emphasis on Improved HAWK). No Marine Corps systems are included in the analysis. As a result of their diversity in missions, operating environments, and support structures and practices, these systems provide a good cross section of weapon system support within the Department of Defense.

Executive Summary

RE-ORIENTING FIELD-LEVEL MAINTENANCE

In war, the Military Departments would have difficulty satisfying the field-level (organizational and intermediate) maintenance requirements of some mission-essential weapon systems. The current maintenance support for those systems has such a strong peacetime orientation that it cannot readily transition to wartime. For some systems, the peacetime support practices may not even be feasible in war.

In striving to meet peacetime readiness and efficiency objectives, the Military Departments often design their maintenance concepts or modify them during implementation in ways that restrict their capabilities to satisfy wartime requirements. For example, they establish, as the Navy has done with its support of weapons and electronics equipment aboard surface ships, dependence upon tenuous, long lines of supply for critical repair parts and spares. This support structure is highly vulnerable to disruption, directly reducing combat capability. They also assign, as the Army has done with its support of combat vehicles, the more complex intermediate-level repairs to civilians, thereby denying training opportunities to military mechanics. The consequence is that the support required for combat vehicles can be provided only in theaters having civilian-staffed facilities.

To correct these and other shortcomings, at least two changes are required in Department of Defense maintenance policy. First, field-level maintenance must be accorded more prominence; it now rates only passing reference. Second, wartime support capability must be made the cornerstone; it now yields that position to peacetime efficiency.

We recommend the Assistant Secretary of Defense (Manpower, Installations and Logistics), ASD(MI&L), issue a new directive on field-level maintenance. That directive should make clear that the objective of peacetime support is to prepare maintenance activities for anticipated wartime tasks. It should direct that field-level maintenance activities provide quick turnaround of inoperable systems, minimize the effort needed to transition from peacetime to wartime support, perform the same repairs in peacetime that are anticipated during wartime, and employ logistics procedures that are feasible in wartime. We are providing a draft of such a directive.

We also recommend the ASD(MI&L) call upon each of the Military Departments to re-assess its field-level maintenance capability with respect to its feasibility in war. We suggest that he ask each Department to respond on one issue: the Army on dependence upon civilian mechanics; the Navy on absence of forward repair capability for weapons and electronics equipment aboard surface ships; and the Air Force on reliance upon frequent and timely aerial resupply.

We believe that these recommendations, which can be pursued simultaneously, will restore attention to a neglected function and help correct an orientation that reduces wartime maintenance capability.

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1. CONCLUSIONS

The maintenance support concept for a weapon system prescribes how that system will be supported, where maintenance will be performed, and who will perform it. The Military Departments employ a variety of maintenance concepts that reflect differences in weapon systems, maintenance capabilities of using and supporting units, mobility requirements, and allowable downtimes. These concepts differ markedly both among the Departments and within them. The Army, for example, presently supports combat vehicles with four levels of maintenance, and aircraft and some air defense systems with three levels;[1] the Air Force predominantly uses three levels of support; and the Navy supports the weapons and electronics equipment aboard its surface ships with two levels. The Army performs more repairs in overseas theaters and makes greater use of civilian-staffed activities to perform field-level repairs than do the Air Force and the Navy. Finally, the Navy is the only Department, in peacetime, that makes extensive use of mobile support teams, primarily to augment the ship's force in supporting weapons and electronics equipment aboard surface ships.

When a weapon system is deployed to the field, its planned maintenance support plan is often modified to accommodate actual operating conditions (including geographical restrictions), the reliability and maintainability of the weapon system, and the logistics support (including training, technical data, spares, and test equipment) that was procured. Maintenance support plans are also modified in the field because of the pressure to meet readiness

[1]The Army is implementing a three-level maintenance concept for combat vehicles and other weapon systems which have been supported with four levels.

objectives and to operate within funding limitations.

The effectiveness of a support system can be measured qualitatively by applying several key criteria. To be effective, support must have a strong mission orientation, be adaptable to all theaters of operations, require few modifications to transition to war, provide quick and accurate information on the status of weapon systems and support resources, use redundant sources of maintenance support, and be exercised adequately in peacetime. Although all of the support systems examined satisfied one or more of these criteria, none met all of them.

Army support of combat vehicles is strongly influenced by peacetime considerations. Peacetime support focuses on operating within funding limits and meeting readiness goals at the expense of providing adequate attention to wartime capabilities and what must be done in peacetime to ensure that they are available when needed. Civilian-staffed activities, both in the Continental United States (CONUS) and overseas, currently perform the more complex intermediate repairs, such as major assemblies and components from combat vehicles. As a consequence, Army mechanics (including those from Reserve Components) are given little opportunity to develop the skills to perform those repairs. Yet, they will be the primary repair source in theaters of operations outside Western Europe and CONUS.

In the transition from peacetime to wartime, the Army will have to modify substantially the procedures that it follows in supporting combat vehicles. Its mechanics will have to assume more of the maintenance burden and intermediate maintenance units, particularly those from the Reserve Components, will have to support equipment they do not routinely support in peacetime. Furthermore, mobile support teams, formed from these same intermediate-level units, will be sent forward to perform tasks which, in some cases, they have

never performed. These and other modifications will make the transition from peace to war difficult.

The strength of the Army's maintenance support lies in its redundant sources of maintenance. In addition to performing its own primary mission repairs, each maintenance activity provides backup support to lower-level activities. This redundancy is not available in the other Military Departments.

Air Force support of A-10 and C-5A aircraft satisfies most of the criteria. However, sustaining these systems in forward-deployed areas during wartime is dependent on aerial resupply. In fact, much of the Air Force's peacetime readiness for these systems, particularly the C-5A, is achieved through its immediate access to airlift.

Support of naval surface ships also satisfies most of the criteria. The major Navy shortcoming is its tenuous support of weapons and electronics equipment aboard forward-deployed surface ships. Those weapons and equipment are supported only at two levels -- the ship's force, augmented by mobile support teams, and a depot. The Navy's deployable intermediate-maintenance activities (destroyer tenders and repair ships) do not have the required skills and test equipment to provide intermediate-level support. As a consequence, much of the key support for those weapons and electronics equipment must come from CONUS, with the attendant lack of responsiveness and timeliness.

One of the primary findings in applying the logistics criteria to evaluate support of fielded weapon systems is that whenever those criteria are not met, peacetime-oriented support systems result. The support systems that best satisfy the logistics criteria tend to be those that focus on supporting a single weapon system, operate in peacetime much as they will in wartime, and place maximum reliance upon military mechanics for field-level repairs.

Existing Department of Defense (DoD) policy on the planning for and performance of field-level maintenance places little emphasis on wartime support. That policy is very broad and provides little guidance to the Military Departments. It also makes only passing reference to wartime capability. As a consequence, it does not address numerous issues critical to wartime support of weapon systems, including: (1) the objective of field-level maintenance; (2) the transition from peacetime to wartime support; (3) the flexibility of the support structure to be effective in all types of theaters; (4) the information systems to effectively support wartime requirements; and (5) the tempo of peacetime operations needed to develop the required maintenance support preparedness. We believe that the absence of such policy contributes to the deficiencies observed in the maintenance support of the weapon systems examined. We also believe that DoD policy needs to directly state that a major objective of peacetime support is to prepare maintenance activities for anticipated wartime tasks.

2. MAINTENANCE SUPPORT WITHIN DOD

INTRODUCTION

This chapter provides an overview of maintenance support within the Military Departments. It defines maintenance support concept and illustrates, drawing upon the actual support provided several fielded weapon systems, some of the similarities and differences in support concepts as they have been implemented.

The systems used to illustrate the implemented concepts are listed in Table 2-1. They were selected to include a spectrum of technology, missions, and operating environments illustrative of the diversities facing the DoD in supporting its mission-essential weapon systems.

TABLE 2-1. SELECTED WEAPON SYSTEMS AND THEIR MISSIONS

MILITARY DEPARTMENT	WEAPON SYSTEM	MISSION
Army	M-60/M-1 Main Battle Tanks	Ground Combat
	Improved HAWK	Air Defense
	AH-1S Attack Helicopter	Close Air Support
	UH-60A Utility Helicopter	Tactical Transportation
Air Force	C-5A Transport	Strategic Airlift
	F-16 Tactical Fighter	Multimission (air-to-air and air-to ground)
	A-10 Tactical Fighter	Close Air Support
Navy	DD-963 Destroyer	Antisubmarine Warfare
	FFG-7 Guided Missile Frigate	Ocean Escort
	PHM-1 Hydrofoil	Coastal Patrol and Interdiction

DEFINITION

As stated in DoD Instruction (DoDI) 4151.12, "Policies Governing Maintenance Engineering Within the Department of Defense," June 19, 1968, equipment maintenance has two elements: maintenance engineering and maintenance production. Maintenance engineering develops maintenance support concepts, while maintenance production encompasses the performance of maintenance tasks.

Even though DoDI 4151.12 does not explicitly define maintenance support concept, it implies that a maintenance support concept describes the conditions under which a weapon system or end item is to be maintained and supported.[1] The concept considers such factors as equipment design, maintenance capability of using and supporting units, operational and maintenance environments, mobility requirements, and allowable downtime. It establishes what, where, and how to inspect, repair, and replace at each level of maintenance. It also establishes who will perform each of these maintenance tasks.

Some of the distinguishing elements of a maintenance support concept are (1) the levels of maintenance, (2) the locations of performing activities, (3) the types of maintenance tasks performed at each level, (4) the use of mobile support teams, and (5) the role of civilians in supporting maintenance. How each Military Department implements these elements is treated in the next section.

ELEMENTS OF SUPPORT

Levels of Maintenance

Most DoD weapon systems are supported at three levels of maintenance -- organizational, intermediate, and depot. Some systems, primarily Army, are supported at four levels, while many of the more technologically advanced components and assemblies are supported only at the organizational

[1] Several Military Department documents, in addition to DoDI 4151.12, are used as a basis for the definition and the factors considered.

and depot levels.

Recently updated Army doctrine specifies three categories (levels) of maintenance for most systems: unit, intermediate, and depot. Even though the intermediate capability is divided between activities supporting combat units (forward-intermediate maintenance) and activities supporting the supply system (rear-intermediate maintenance), this action brings the Army's maintenance structure more in align with those of the Navy and Air Force.

The number of maintenance levels for fielded Army systems is determined more by organizational assignment than by doctrine. Many weapon systems assigned to divisional units are supported by unit maintenance, at least two (and sometimes three) levels of intermediate maintenance, and a depot. The intermediate levels include the maintenance capability organic to the division as well as corps-level intermediate maintenance units and civilian-staffed maintenance activities (which perform less-than-depot repairs).[2] Many CONUS-based divisions do not have available the corps-level maintenance units; however, they receive substantial support from civilian-staffed post maintenance activities (which also perform less-than-depot repairs). Some of the Army weapon systems assigned to deployed nondivisional units (such as air defense) avoid at least one of the levels of intermediate maintenance, usually the corps-level backup.

Maintenance in the Air Force is primarily performed at three levels -- organizational, intermediate, and depot. Both the Strategic Air Command and Military Airlift Command employ the traditional base maintenance

[2]In contrast to the other Military Departments the Army depends heavily upon its Reserve Components for intermediate maintenance of Active Component equipment. Approximately 70 percent of the Army's maintenance capability at the corps level is in its Reserve Components. According to Army doctrine, the wartime responsibilities of many Reserve Component units is to perform repairs similar to those accomplished in the civilian-staffed activities during peacetime.

organization. Under this organization, organizational maintenance is provided by an organizational maintenance squadron with assistance from three intermediate maintenance squadrons. In contrast, the Tactical Air Forces use a Combat Oriented Maintenance Organization (COMO) for organizational and intermediate maintenance. Under the COMO concept, almost all on-equipment (or organizational) repairs are performed by one squadron (aircraft generation) and all off-equipment maintenance (intermediate) is performed by two squadrons (component repair and equipment maintenance). There are few, if any, differences between the support specified in Air Force regulations and that implemented to support airlift (C-5A) and tactical (A-10, F-16) aircraft.

Navy surface ships also are supported at three levels of maintenance. The ship's force performs organizational maintenance; destroyer tenders (ADs), repair ships (ARs), and shore intermediate maintenance activities (SIMAs) provide intermediate support; and weapon stations and shipyards perform most of the depot-level repairs. A shore-based, mobile logistics support group supplements the PHM-1 ship's force and also provides intermediate support.

The extent of organizational maintenance capability aboard each surface ship varies greatly by ship class. For example, the DD-963 class has extensive corrective maintenance capability down to subassembly repair. This is in marked contrast to the PHM-1 class, which has minimal organizational capability, limited primarily to safety and mission-critical repairs.

The ADs, ARs, and SIMAs perform most of the intermediate-level, hull, mechanical, and electrical repairs. They have little capability, however, to support the electronics equipment and weapons aboard surface ships. Most of these are supported at two levels of maintenance -- organizational and depot.

Table 2-2 summarizes the types of maintenance activities that perform each level of maintenance within the Military Departments.

TABLE 2-2. LEVELS OF MAINTENANCE AND PERFORMING ACTIVITIES

MAINTENANCE LEVEL	MILITARY DEPARTMENTS		
	ARMY	AIR FORCE	NAVY
Organizational	Operator Unit Maintenance Higher echelons as back-up	Aircraft Generation Squadron (COMO) Organizational Maintenance Squadron Supplemented by Intermediate Squadrons (Traditional Organization) Forward Operating Location Personnel Military Airlift Support Squadron	Ship's Force Mobile Technical Units
Intermediate	Forward Intermediate Rear Intermediate Civilian-staffed Repair Activities	Equipment Maintenance and Component Repair Squadrons (COMO) Field, Avionics and Munitions Maintenance Squadrons (Traditional Organization)	Tenders and Repair Ships Shore Intermediate Maintenance Activities CONUS Contractor Facilities (Commercial Industrial Support) Mobile Logistics Support Group (PHM-1)
Depot	CONUS Facilities Overseas Contractor Operated Facilities Mainz Army Depot	CONUS Facilities Overseas Contractor Operated Facilities	CONUS Facilities Overseas Contractor Operated Facilities Ship Repair Facilities (Pacific)

Locations of Performing Activities

The Military Departments share few similarities in terms of where maintenance of deployed weapon systems is performed.

The Army faces the biggest challenge in locating maintenance activities near the combat units being supported. For example, in Europe, organizational and intermediate maintenance facilities for the AH-1S Cobra and UH-60A Blackhawk helicopters are collocated. Backup intermediate maintenance may be provided by a corps intermediate maintenance unit located further

to the rear, and it may, in turn, be backed up by another more distant intermediate maintenance unit.

A similar situation exists for Army combat vehicles. All tank companies have the responsibility for organizational maintenance of assigned vehicles. They receive intermediate support from the division's maintenance battalion. The emphasis of that support is quick turnaround. If the maintenance battalion requires backup support, it then calls upon corps units (located further to the rear of divisional boundaries). Additional theater-level support is available as backup to corps units.

Organizational and intermediate maintenance facilities in the Air Force are usually collocated at the aircraft's home station. Two exceptions to this rule are support for A-10 aircraft at forward operating locations (aircraft are currently deployed to four such locations in Europe) and support for C-5As at transient bases worldwide. Maintenance support provided at these locations and bases is primarily organizational. If additional capabilities are required, they are normally made available from maintenance assets at the home station.

Organizational maintenance of Navy surface ships is organic to each ship. The tenders and repair ships, which are deployable, provide the only intermediate maintenance capability in forward areas. (Intermediate maintenance for the PHM-1 is also deployable; but it is housed in 67 shore-based vans.) With exception of support from mobile support teams, all other weapon system support must come either from CONUS activities or from ship repair facilities (located only in the Pacific).

Types of Maintenance Tasks Performed at Each Level

The Military Departments assign, for the most part, similar maintenance tasks to each level of maintenance.

Organizational maintenance in both the Army and Air Force is predominantly preventive maintenance and repair, and consists of removing and replacing components that do not require critical alignments. The FFG-7 class ships have similar capabilities, with the DD-963 class ships having some capability for subassembly repair.

In general, Army, Navy, and Air Force intermediate activities have extensive repair capabilities. In some cases, they repair by replacement; in others, they repair defective assemblies and subassemblies. Both the Army and Air Force have more capability for repair of electronics equipment at the intermediate level than does the Navy.

Use of Mobile Support Teams

The Military Departments differ greatly in the use of mobile support teams; the Navy makes the most use of these teams while the Air Force uses them the least.

Army doctrine calls for extensive use of mobile support teams (or field teams), comprised of intermediate-level mechanics, to assist forward combat units. If used as planned, these teams can reduce Army requirements for equipment evacuation and provide forward combat units with access to additional mechanics, repair parts (which are stocked only at higher levels), and test equipment (which is authorized only at higher levels). These teams are not used widely in peacetime because of shortages in test equipment, spare parts, and maintenance vehicles.

In contrast, the Navy makes extensive use of field teams during peacetime. It has established Mobile Technical Units (MOTUs) under fleet control to improve weapons and electronics equipment readiness. MOTU personnel do not provide access to additional parts or test equipment; they only temporarily augment the organizational capability of the ship's force. They

also teach informal short courses on operating and maintaining selected equipment.

Air Force field-level maintenance activities seldom require assistance for routine maintenance tasks. However, depot teams (both organic and contractor) are used to install system modifications, assist with repair of aircraft damaged through accidents, and perform repairs which are not authorized at the field level. Also, each Air Force depot has a combat logistics support squadron, trained in battle damage repair techniques, which, in time of war, could be positioned forward to aid field-level personnel.

Role of Civilians

The Military Departments differ greatly in their use of civilians in maintenance activities other than at CONUS depots.

The Army makes the greatest use of civilian mechanics for maintenance support.[3] All the major repair activities in Europe are staffed with civilians, including the specialized repair activities and the Mainz depot. These activities perform the more complex intermediate repairs accomplished within the theater. In CONUS, civilian-staffed, post maintenance organizations also perform the most complex intermediate repairs in support of the combat elements stationed at the post.

The Air Force uses very few civilians, and most of them are engineering technical service specialists who train base mechanics. The Navy also uses engineering technical service personnel, with many assigned to MOTUs.

[3]The Army's use of civilian-staffed activities, particularly in Europe, is driven by several factors. Among them are end-strength constraints, North Atlantic Treaty Organization (NATO) commitments, and Congressional pressures to maintain a high "tooth-to-tail" ratio.

SUMMARY

The Military Departments employ a wide variety of support concepts that are driven by equipment and mission requirements, available resources, and organizational structures. The implemented concepts have many characteristics in common, however. They are tailored to the equipment being supported and the operational needs of the combat forces; their primary objective is to keep systems and equipment ready in peacetime to perform wartime missions while operating within funding constraints; and they are based, primarily, upon three levels of maintenance, with comparable tasks assigned to each level.

The Military Departments differ significantly in their use of mobile support teams and civilians. While Army support doctrine calls for extensive use of mobile support teams, that doctrine is not fully implemented in peacetime; the Army is extremely dependent upon civilians to perform the more critical intermediate-level repair in support of both deployed forces and those stationed in CONUS. Both mobile support teams and civilian maintenance specialists have only minor roles in Air Force field-level maintenance. Within the Navy, MOTUs staffed partially by civilian engineering technical service personnel have a critical mission of augmenting the ship's force in support of weapons and electronics equipment.

In order to assess qualitatively how well the Military Departments current field-level maintenance support will satisfy wartime requirements, we applied several fundamental logistics criteria to fielded weapon systems. That assessment is presented in the next chapter.

3. ASSESSMENT OF MAINTENANCE SUPPORT

INTRODUCTION

This chapter provides a qualitative assessment of the maintenance support practices that the Military Departments are using. It draws extensively upon the support being given to the weapon systems listed in Table 2-1.

The effectiveness of different support concepts is difficult to measure directly since many factors contribute to the effectiveness of a concept. These factors include the compatibility between the planned support and the environment in which support must be provided, the maintainability and reliability of the weapon system, and the logistics support that is actually procured for the system (i.e., repair parts, spares, test equipment, and personnel training). Among the many measures of maintenance support effectiveness, equipment readiness is most often used. However, even that measure must be used with caution because it is influenced by equipment utilization rates, modifications to planned support, available resources, and accuracy of equipment status data.

In the absence of any universal measure of support effectiveness, we make extensive use of six criteria that we believe are fundamental to effective maintenance support.[1] They are:

- Mission Orientation. Support must be timely and efficient to meet military objectives;
- Flexibility. Support must be capable of satisfying mobility and dispersion requirements;

[1]These criteria are based upon the principles of logistics developed by Dr. James A. Huston in Sinews of War: Army Logistics 1775-1953, Washington, D.C., United States Government Printing Office, 1966.

- Knowledge. Accurate and timely information on support requirements and resources must be available to accommodate rapidly changing battlefield conditions;

- Consistency/Simplicity. Peacetime support procedures and organizations must be capable of transitioning to wartime without any major changes; those procedures also must be simple;

- Redundancy. Multiple sources of support must be available;

- Exercise. Support must be adequately exercised during peacetime.

By examining the degree to which actual maintenance support meets these criteria, we gain considerable insight into its strengths and weaknesses.

APPLICATION OF MAINTENANCE SUPPORT CRITERIA

Mission Orientation

Maintenance support is mission oriented when the focus of maintenance activity is on improving the combat capability of supported units. Mission orientation requires that support be both efficient and timely; arrangements that are efficient in peacetime but place support too far from the wartime consumers lack this characteristic.

Air Force support of the A-10 and C-5A aircraft is strongly mission oriented, with the forward support concentrated on flying an additional sortie (A-10) or moving an aircraft to the next station (C-5A). The structure of this support (highly skilled organizational mechanics and forward stockage of spare parts at those bases) and its responsiveness (one-day service for spares is common) overcome many of the problems inherent in supporting an aircraft away from its home station.

In contrast, Army combat vehicles and many of their key components are repaired primarily in the theater rear. The distances between the combat units and repair activities are not great, but the Army's support structure is not designed to rapidly evacuate end items, major assemblies, and components to these activities and then return them to forward areas. The Army also does not have the required transport capabilities to carry out such movements.

The Navy's support of weapons and electronics equipment aboard forward-deployed surface ships has deficiencies similar to those of Army's support of combat vehicles. In the Navy's case, however, the distances are much greater -- the repair activities are located in CONUS. The use of MOTUs partially offsets the effect of this distance.

Flexibility

Maintenance flexibility requires that support be both mobile and adaptable. It must be mobile to be responsive to the combat commander's needs anywhere in a theater, and it must be adaptable to be effective in all types of theaters.

Navy support of surface ships and Air Force support of A-10 aircraft provide the best illustrations of how this criterion is met. Field-level maintenance of DD-963 class ships is mobile: organizational maintenance is organic to the ship, intermediate maintenance is available from deployable tenders, and the highly flexible MOTUs augment the ship's force in support of weapons and electronics equipment. The Air Force's practice of supporting A-10s at dispersed, forward operating locations and providing intermediate-level maintenance at the main operating base has extensive flexibility. Both support structures can be adapted to conditions anywhere in the world.

The flexibility of Army's support of combat vehicles contrasts markedly with that of the Navy's support of surface ships and Air Force's support of A-10s. Even though current Army doctrine calls for forward-intermediate maintenance units to be highly mobile so they can support maneuver elements, the units lack the vehicles to be mobile. Furthermore, the maintenance support practiced during peacetime is structured around civilian-staffed activities performing the more complex intermediate-level repairs both in CONUS and Europe. That structure will have difficulty providing support in an

undeveloped theater of operations in which the local national infrastructure lacks the skills and facilities to provide similar support.

Knowledge

Maintenance knowledge focuses on the combat commander's need for quick and accurate information on the status of critical weapon systems, including:

- How many systems are available
- What spares are required
- Where those spares are located
- When additional systems will be available.

Without access to that type of information, the commander's capability to fight is greatly impaired.

Both the Air Force and the Navy have the capability to locate and shift critical and expensive spares laterally between bases or ships. The Army's 32nd Air Defense Command, which has theater-wide responsibilities in Europe, has also developed an adequate information capability on the Improved HAWK ground-to-air missile system. The command knows the status of all missiles daily and, therefore, can readily identify areas, such as spares, skills, and test equipment, that need improvement.

The situation is dramatically different within the traditional Army division/corps alignment. Aircraft and combat vehicle maintenance organizations do not communicate routinely with equivalent organizations for purposes of shifting maintenance resources to locations where they are more urgently needed. The Army structure is predicated upon vertical, not lateral, assistance. However, even within the vertical structure, accurate and timely information is not routinely available.

Consistency/Simplicity

Maintenance support is consistent when the procedures used in peacetime are identical (or nearly so) to those that would be used in wartime. It is simple when repair responsibilities and organizational relationships are clear; the transition to war should not be complicated by the installation of new support procedures.

The Air Force's support of A-10 and F-16 aircraft is both consistent with planned wartime support and simple in concept. In the event of war, the Air Force does not plan any changes in support responsibilities; the units that are currently supporting those aircraft will continue to support them. The support is also simple in terms of the number of locations at which maintenance is performed (one base, possibly others if aircraft are forward deployed, and a CONUS depot) and the procedures employed at those locations (clear maintenance responsibilities and minimal handling of components or modules repaired at higher levels).

The Navy also does not plan to change its field-level maintenance support of the DD-963, FFG-7, and PHM-1 classes of ships during wartime. The ADs, ARs, SIMAs, and MOTUs (along with the shore-based units for the PHM-1) will continue to provide the same support they are currently providing.

The situation in the Army is quite different, however. Many of the more complex intermediate-level repairs, including major assemblies, components, and black boxes, are being accomplished by civilians working in fixed facilities. In Europe, these facilities include specialized repair activities, equipment maintenance centers, the depot at Mainz, and contracted repair. In CONUS they are post maintenance shops located at most Army installations. During wartime, some of this civilian support may not be available in a developed theater and certainly will not be available in an

undeveloped theater. Army mechanics, primarily in Reserve Component units, will then have to perform many of the maintenance tasks which previously have been the responsibility of civilian mechanics.

Army support also lacks simplicity. It is based on extensive use of backup units that results in redundant inspections and lengthy processing of replacement spares and defective modules and assemblies. It is not uncommon for a malfunctioning aircraft component, for example, to be evacuated through three Army activities before an activity, operating out of a fixed facility, makes the final determination that the component is not operational and must be returned to a CONUS depot for repair.

Redundancy

A maintenance support system is redundant when combat units have access to several sources for maintenance. Whenever possible, multiple lines of communication should be established and exercised.

This criterion is not met by most of the maintenance support systems that meet the other criteria. Simplicity, efficiency, and responsiveness are best accomplished in peacetime through a vertical support structure with centralized intermediate maintenance and direct links to depots. Furthermore, deployed forces can be resupplied with airlift, often within a matter of hours. In wartime, however, the loss of the air lines of communication or a few key bases would severely restrict combat operations.

In contrast, many of the support systems that do not adequately meet most of the other criteria are more robust in wartime because they are based upon several layers of support. The Army's support of combat vehicles best illustrates this criterion. That support would not be as affected as Navy's support of surface ship weapons and electronics equipment or Air Force's support of the F-16 if, for example, airlift was not available.

Exercise

Effective maintenance support programs require that weapon systems be adequately exercised during peacetime so that support deficiencies can be identified and corrected.

The Air Force's support of A-10s in Europe best illustrates the application of this criterion. Those aircraft are flying an average of 36 hours per month, and their weapons are exercised on most sorties. In contrast, the Army's AH-1S helicopters in Europe, which have a mission similar to that of the A-10, are flown only 12 hours a month, and the weapons are exercised only once or twice a year. (Space and funding limitations also restrict the exercising of combat vehicles in Europe.)

The consequences of not adequately exercising weapon systems have a direct impact on the support structure for those systems -- mechanics are not trained, failure patterns are misleading, accurate repair parts requirements are not established, test equipment is not used, and ad hoc supply and maintenance procedures are established.

SUMMARY

The Air Force's support structure meets many of our criteria for effective maintenance support. It has a strong mission orientation; it can support aircraft at a variety of locations; it has the information needed to provide effective support; it is consistent and simple; and it is routinely exercised. Its primary weakness is that it is strongly dependent upon frequent and timely aerial resupply from CONUS.

The Navy's field-level maintenance support of surface ships satisfies some of the criteria, but it has serious shortcomings. The support of the ship itself (with the ship's force and intermediate activities) is extremely effective; it embodies most of the key characteristics. The support of the

weapons and electronics equipment aboard those ships, however, presents major problems. Weapons and electronics equipment are supported only at two levels -- organizational and depot -- with the MOTUs augmenting the ship's force in providing the organizational-level support. The ADs and ARs do not have the capability to assist in the support of weapons and electronics equipment. This support structure is extremely vulnerable to disruption, directly reducing combat capability.

In contrast to its support of air defense systems, the Army's support of aircraft and combat vehicles satisfies few of the criteria that we believe are fundamental to effective maintenance support. The primary weaknesses in Army support are the lack of flexibility, knowledge, consistency/ simplicity, and exercise. The strength of Army maintenance is its redundant capabilities.

Most of the complex intermediate-level repairs of combat vehicles are performed by civilians in fixed facilities. By itself, this is not a problem. However, the Army has grown so dependent upon this support that many of its mechanics are not trained to perform those repairs. As a consequence, the Army's flexibility is limited; it can provide the required support only in theaters of operations in which the civilian-staffed facilities are located. Because they do not have timely and accurate logistics knowledge, forward-deployed aircraft and tank battalions establish ad hoc procedures for tracking requisitions and picking up and delivering urgently needed repair parts and spares. These procedures will be difficult to continue using during wartime. In wartime the Army also will have to change support responsibilities (such as replacing civilian mechanics with military), thereby generating additional confusion in the transition to war. Finally, the Army is not adequately exercising its aircraft support structure. Without such exercise, what

appears to be an effective structure in peacetime may quickly disintegrate in wartime.

Having summarized maintenance support concepts and practices within the Military Departments and assessed how they meet six qualitative criteria in providing field-level maintenance support, we now look at DoD policy on such support, how it has affected those concepts and practices, and how it can most effectively stimulate the Military Departments to achieve the proper balance among peacetime efficiency, equipment readiness, and wartime capability.

4. EFFECTIVENESS OF DOD POLICY

This chapter summarizes existing DoD policies on field-level maintenance, assesses their adequacy for ensuring that the Military Departments can provide the required support during wartime, and identifies areas in which policy needs to be strengthened.

EXISTING POLICY

Much of DoD policy affecting the planning for and performance of field-level maintenance is contained in five DoD directives (DoDDs) and instructions:

- DoDD 1130.2 - Management and Control of Engineering and Technical Services
- DoDD 4151.1 - Use of Contractor and DoD Resources for Maintenance of Materiel
- DoDI 4151.12 - Policies Governing Maintenance Engineering Within the Department of Defense
- DoDD 4151.16 - DoD Equipment Maintenance Program
- DoDD 5000.39 - Acquisition and Management of Integrated Logistic Support for Systems and Equipment.

DoDD 1130.2 prescribes the role of engineering and technical service specialists and establishes criteria for their use. The primary feature of this directive is that Contractor Field Services are to be used when the provision of services by DoD personnel is impractical and when the Military Departments lack the skills. Furthermore, the use of Contractor Field Services is limited to 12 months after the Military Department achieves self-sufficiency in the use of the equipment or system.

DoDD 4151.1 provides guidance for using contractor and organic resources in maintaining DoD materiel. It requires that combat and direct combat

support activities provide direct (organizational and intermediate) maintenance support for assigned materiel to the maximum extent possible. The directive implies that contractor personnel may provide direct support if the Military Departments lack skilled maintenance personnel and if they will continue to provide that support during wartime in a combat zone. The directive also requires that initial plans for contractor and organic support of new systems be developed as part of the integrated logistic support (ILS) planning process.

DoDI 4151.12 defines maintenance engineering and prescribes the responsibilities of maintenance engineering activities. The responsibilities include the development of maintenance support concepts, the evaluation of concepts throughout the acquisition process, and the identification of the resources required to carry out the equipment maintenance support program.

DoDD 4151.16 sets forth objectives and policies for equipment maintenance programs within the Military Departments. It prescribes that equipment maintenance be oriented toward weapon and equipment end items as systems and be performed at the point of generation in order to meet readiness objectives and assure self-sufficiency of operating units. It also specifies that maintenance production operations be managed on the basis of total cost and oriented toward effective maintenance support at the least cost. The directive implies that interservice maintenance support should be used primarily at the depot level. Finally, the directive encourages the consolidation of maintenance activities as long as system readiness levels are maintained and contingency deployment commitments can be satisfied.

DoDD 5000.39 establishes policy and responsibility for ILS programs during the acquisition process and identifies maintenance as an element of ILS. It also specifies that ILS programs are to continue for the life of the system.

These maintenance directives and instructions do not constitute all DoD policy affecting field-level maintenance. They are supplemented by numerous supply and transportation directives and instructions, ranging from initial provisioning to transportation management.

ASSESSMENT OF POLICY

DoD policy governing the planning for and performance of field-level maintenance is extremely broad. Few of the directives and instructions provide explicit guidance and criteria for monitoring adherence to guidance.

Even though DoDD 1130.2 restricts Military Department use of Contractor Field Services to 12 months after achieving self-sufficiency, it fails to define self-sufficiency. As a consequence, the time restriction has little effect on the use of Contractor Field Services within the DoD.

The provisions of DoDD 4151.1 that address field-level maintenance are not always clear and fail to state what takes precedence. For example, the directive clearly states that direct maintenance is the responsibility of organic combat units. Later, in the same paragraph, it implies that contractor support of direct maintenance is permitted if the contractor commits to continue providing support during wartime. Whether organic or contractor support should take precedence, is unclear.

DoDD 4151.16, like DoDD 1130.2, also uses terms or expressions that are not defined and, therefore, are subject to many interpretations. Two such expressions are "oriented to weapon systems" and "self-sufficiency of operating units." Both are very general. Furthermore, the requirement to "perform repairs at the point of generation" is almost impossible to satisfy, particularly for a complex weapon system.

SHORTCOMINGS OF POLICY

The principal shortcoming of existing field-level maintenance policy is its failure to address wartime capability. Several directives and instructions mention wartime but usually as an aside. The most explicit statement occurs in DoDD 4151.1, and that addresses the use of contractor personnel in a combat zone.

By not focusing on wartime capability, DoD policy does not address numerous issues that are fundamental to supporting fielded weapon systems, including: (1) the objective of field-level maintenance; (2) the transition from peacetime to wartime support; (3) the flexibility of the support structure to be effective in all types of theaters; (4) the information systems to effectively support wartime requirements; and (5) the tempo of peacetime operations needed to support combat preparedness. DoD policy must clearly state that a major objective of peacetime maintenance support is to prepare maintenance activities for anticipated wartime tasks.

Many of these issues are already addressed from a supply-only perspective in DoDD 3110.3, "Requisite Characteristics for Wartime Readiness of DoD Supply Systems." That directive establishes criteria for supply system readiness for emergency or wartime conditions. Its objective is to ensure that DoD supply systems are capable of satisfying wartime requirements efficiently and responsively. DoD maintenance systems are in need of similar direction.

A secondary shortcoming of existing policy is that it addresses maintenance in isolation. ILS is not just an acquisition issue; it has application throughout the life cycle of a weapon system. Consequently, DoD maintenance policy must recognize that application. The provision of effective maintenance support is not just a "maintenance" responsibility; other functional areas, such as training, supply, transportation, and distribution, share in that responsibility.

We have developed some recommendations for action by the Assistant Secretary of Defense (Manpower, Installations and Logistics), ASD(MI&L), that constitute initial steps toward overcoming policy, concept, and implementation deficiencies in field-level maintenance support. The following chapter presents those recommendations.

5. RECOMMENDATIONS

The Military Departments will have difficulty satisfying the wartime, field-level maintenance requirements of some weapons systems. The current maintenance support for those systems has such a strong peacetime orientation that it cannot readily transition to war. They rely on CONUS depots, thereby establishing long lines of supply for critical repair parts and spares; they rely on a support structure available only in a developed theater; they employ maintenance support procedures that must be modified substantially to accommodate wartime conditions; and they focus on satisfying peacetime workloads, without adequately considering the training necessary to accomplish the full spectrum of wartime maintenance tasks. Many of these actions have been instituted to satisfy peacetime equipment readiness objectives and operate within funding constraints. While both of these goals are important, they cannot be sought without regard to wartime capability.

There is no easy way to balance peacetime efficiency and equipment readiness with wartime capabilities, but at least two changes in DoD maintenance policy are essential. Field-level maintenance must be accorded more prominence and wartime support capability must become the cornerstone. Current DoD policy on field-level maintenance primarily addresses peacetime readiness and efficiency, and makes only passing reference to wartime capability. We believe that these shortcomings need to be redressed and, given the importance of field-level maintenance, merit a new DoD directive.

We recommend that the ASD(MI&L) issue a new directive on field-level maintenance. That directive should clearly state that the objective of support is to prepare activities for wartime missions. Specifically, it should

direct that field-level maintenance activities stress quick turnaround of inoperable systems, perform the same repairs in peacetime that are anticipated during wartime, have the flexibility to be effective in multiple theaters of operation, minimize the effort needed to transition from peacetime to wartime support, and employ peacetime procedures that are feasible in wartime. It also should require that peacetime operating tempos for weapon systems be adequate to identify potential wartime support shortfalls. (A draft of a directive with these characteristics is provided in the appendix.)

We also recommend the ASD(MI&L) call upon each of the Military Departments to re-assess its field-level maintenance capability with respect to its feasibility in war. We suggest that he ask each Department to respond on one issue: the Army on dependence upon civilian mechanics; the Navy on absence of forward repair capability for weapons and electronics equipment aboard surface ships; the Air Force on reliance upon frequent and timely aerial resupply.

Following issuance of this directive, the ASD(MI&L) should stimulate implementation of its provisions. Visits to headquarters and field-level maintenance units can be a particularly effective way of providing that stimulus, especially if they are used to probe into current maintenance responsibilities, anticipated wartime missions, and what is required to transition from peacetime to wartime support. These visits will reaffirm his commitment to field-level maintenance and assist in bringing important issues to the forefront.

We believe that the above actions -- issuing new DoD policy on equipment maintenance, stimulating its implementation, and tasking the Military Departments to re-assess field-level maintenance capability in war -- will jointly provide the Military Departments with the momentum to achieve the

proper balance among peacetime efficiency, equipment readiness, and wartime capability.

APPENDIX

DRAFT DOD FIELD-LEVEL MAINTENANCE DIRECTIVE

SUBJECT: DoD Field-Level Maintenance

References:
(a) DoD Directive 4151.16, "DoD Equipment Maintenance Program," August 30, 1972
(b) DoD Directive 4151.1, "Use of Contractor and DoD Resources for Maintenance of Materiel," July 15, 1982
(c) DoD Directive 1130.2, "Management and Control of Engineering and Technical Services," June 18, 1979
(d) through (n), see Enclosure 1

A. PURPOSE

This Directive sets forth objectives, policy, and related criteria governing the use of DoD and contractor resources in satisfying DoD field-level (organizational and intermediate) equipment maintenance requirements, in consonance with the policy set forth in references (a) through (n), and delineates Military Department and Defense Agency responsibilities for assuring the accomplishment of such equipment maintenance.

B. APPLICABILITY AND SCOPE

The provisions of this Directive apply to the Military Departments and Defense Agencies having responsibilities for the maintenance of military equipment.

C. DEFINITIONS

Terms used in this Directive are defined in Enclosure 2.

D. OBJECTIVES

The objectives of this Directive are to ensure that, at minimum total cost, (1) the weapon and equipment end-item systems are operationally ready, (2) field-level maintenance personnel are trained to perform expected wartime tasks, (3) field-level maintenance organizations are equipped to accomplish anticipated wartime missions, and (4) the maintenance support structures of the Military Departments and Defense Agencies, consisting of organic and contract resources, are capable of meeting the sustainability objectives of combat elements in all theaters of operations.

E. POLICY

1. Maintenance support of military equipment is vital to the sustained application of military power. It is necessary, therefore, that the Military Departments and Defense Agencies provide an adequate program for maintenance of assigned equipment to effectively and efficiently meet sustained readiness

objectives in accordance with their responsibility for military missions. The elements of this maintenance program are:

a. Equipment maintenance shall be organized to support weapon and equipment end items as systems.

b. The primary objective of field-level maintenance activities shall be to minimize the amount of time during which weapon systems cannot perform their assigned missions; each activity shall use measures of effectiveness that indicate the degree to which this objective is met.

c. Military maintenance activities responsible for performance of field-level maintenance shall be capable of supporting the same systems and subsystems in peacetime as during military contingencies; they also shall be capable of satisfying their maintenance responsibilities in all theaters of operations.

d. To the extent feasible and economical, weapon systems shall be supported during peacetime following procedures that require little modification for use in wartime.

e. The peacetime operating tempo of weapon systems shall be adequate to provide the required maintenance training opportunities for mechanics with field-level maintenance responsibilities, to establish equipment failure patterns, and to identify potential wartime shortfalls in support.

2. The Military Departments and Defense Agencies shall be self-sufficient insofar as possible in providing field-level maintenance support of assigned mission-essential materiel. That support shall be provided at the point of generation by military personnel, wherever possible, to assure attainment of desired maintenance proficiency and established equipment readiness objectives.

3. The Military Departments and Defense Agencies, when unable to establish and sustain self-sufficiency in field-level maintenance of mission-essential materiel at the point of generation, shall perform that maintenance at other appropriate locations. The use of other sources, such as DoD civilian employees or contractual services, for such support shall be limited to short-term tasks to overcome specific deficiencies unless special arrangements are made to assure that support will continue during wartime.

F. PROCEDURES See Enclosure 3.

G. RESPONSIBILITIES

1. Each Military Department and Defense Agency shall:

a. Designate those weapon systems and equipment end items which are mission essential and publish lists of those systems and equipment including test equipment.

b. Submit annually to the Assistant Secretary of Defense (Manpower, Installations and Logistics), ASD(MI&L), a list of mission-essential weapon systems and equipment end items for which DoD civilians or

contractors routinely provide the field-level maintenance support and identify the organizations (and their locations) providing that support.

c. Determine, in coordination with other Military Departments and Defense Agencies, as appropriate, those workloads which can be most effectively and economically accomplished through interservice support arrangements.

d. Request deviation from the provisions of this Directive in those cases where there are peculiar circumstances or where there are other overriding considerations.

2. The ASD(MI&L) shall be responsible for:

a. Annual reviews of departmental maintenance programs concurrent with the budget reviews of departmental programs. Actions necessary to ensure the effective implementation of the policies intended by this Directive.

b. Final determination on all requests for deviation from the provisions of this Directive.

H. IMPLEMENTATION

Military Departments and Defense Agencies will:

1. Review applicable internal directives, regulations, and instructions, and revise them as necessary to comply with this Directive and integrate their support for field-level maintenance systems.

2. Analyze the guidance expressed herein and restate or expand it as necessary in adopting it for internal use.

3. Forward two (2) copies of each implementing document to the ASD(MI&L) within one hundred and twenty (120) days.

I. EFFECTIVE DATE

This Directive is effective immediately.

References (Continued)

(d) DoD Instruction 4151.12, "Policies Governing Maintenance Engineering Within the Department of Defense," June 19, 1968
(e) DoD Directive 4100.15, "Commercial and Industrial Activities," February 4, 1980
(f) DoD Directive 4000.19, "Interservice, Interdepartmental and Interagency Support," October 14, 1980
(g) DoD Directive 5000.39, "Acquisition and Management of Integrated Logistic Support for Systems and Equipment," January 17, 1980
(h) DoD Directive 4005.1, "DoD Industrial Preparedness Production Planning," July 28, 1972
(i) DoD Directive 5124.1, "Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics)," July 26, 1982
(j) DoD Instruction 7110.1, "DoD Budget Guidance," October 30, 1980
(k) DoD 4100.35-G, "Integrated Logistics Support Planning Guide for DoD Systems and Equipment," authorized by DoD Directive 4100.35, "Development of Integrated Logistics Support for Systems/Equipments," October 1, 1970
(l) DoD Instruction 7041.3, "Economic Analysis and Program Evaluation for Resource Management," October 18, 1972
(m) DoD Instruction 4100.33, "Operation of Commercial and Industrial-Type Activities," February 25, 1980
(n) DoD Directive 3110.3, "Requisite Characteristics for Wartime Readiness of DoD Supply Systems," November 7, 1960

DEFINITIONS

1. Contract Maintenance: Any maintenance performed under contract by commercial organizations (including original manufacturers).

2. Depot Maintenance: That maintenance which is the responsibility of and performed by designated maintenance activities to augment stocks of serviceable materiel and to support organizational maintenance and intermediate maintenance activities, by the use of more extensive shop facilities, equipment and personnel of higher technical skill than are available at the lower levels of maintenance. Its phases normally consist of inspection, test, repair, modification, alteration, modernization, conversion, overhaul, reclamation, or rebuild of parts, assemblies, subassemblies, components, equipment end items, and weapon systems; the manufacture of critical nonavailable parts; and the provision of technical assistance to intermediate maintenance organizations. Depot maintenance is normally accomplished in fixed shops, shipyards, and other shore-based facilities, or by depot field teams.

3. Equipment End Item: An instrument of combat or combat support employed in the accomplishment of military missions. It consists of a final combination of assemblies, parts, and materials which together perform a complete operational function and is ready for intended use, i.e., vehicle, aircraft, ship, tank, communication system.

4. Equipment Maintenance: The function of sustaining materiel in an operational status, restoring it to a serviceable condition or updating and upgrading its functional utility through modification.

5. Field-Level Maintenance: That maintenance performed outside designated DoD and contractor depot maintenance activities. It normally includes all organizational and intermediate maintenance

6. Intermediate Maintenance: That maintenance which is the responsibility of and performed by designated maintenance activities in support of using organizations. Its phases normally consist of calibration, repair or replacement of damaged or unserviceable parts, components or assemblies; the manufacture of critical nonavailable parts; and the provision of technical assistance to using organizations. Intermediate maintenance is normally accomplished in fixed or mobile shops, tenders, or shore-based repair facilities, or by mobile teams.

7. Interservice Maintenance Support: Maintenance, either recurring or nonrecurring, performed by one Military Department, Defense Agency or element thereof in support of another Military Department or Defense Agency.

8. Maintenance Capability: Availability of those resources, namely facilities, tools, test equipment, drawings, technical publications, trained maintenance personnel, engineering support and spare parts, required to carry out maintenance.

9. Maintenance Resources: Consists of personnel, materials, tools and equipment, facilities, technical data, and funds provided to carry out the equipment maintenance mission.

10. Maintenance Support Concept: A strategy for supporting a weapon system. It considers such factors as equipment design, maintenance capability of using and supporting units, operational and maintenance environments, mobility requirements, and allowable downtime. It specifies what, where, and how to inspect, repair, and replace at each level of maintenance, what is required, and who performs those tasks.

11. Materiel: Consists of all tangible items (including ships, tanks, self-propelled weapons, or aircraft, and related spares, repair parts, vehicles, and support equipment; but excluding real property, installations, and utilities) necessary to equip, operate, maintain and support military activities without distinction as to its application for administrative or combat purposes.

12. Mission-Essential Materiel: a. Materiel which is authorized and available to combat, combat support, combat service support, and combat readiness training forces to accomplish their assigned mission. b. For the purpose of sizing organic industrial facilities, that Service-designated materiel authorized to combat, combat support, combat service support, and combat readiness training forces and activities, including Reserve and National Guard activities, which is required to support approved emergency and/or war plans, and where the materiel is used to: (1) destroy the enemy or his capacity to continue war; (2) provide battlefield protection of personnel; (3) communicate under war conditions; (4) detect, locate, or maintain surveillance over the enemy; (5) provide combat transportation and support of men and materiel; and (6) support training functions, but is also suitable for use under emergency plans to meet purposes enumerated above.

13. Organic Maintenance: That maintenance performed by a Military Department or Defense Agency under military control utilizing government-owned or controlled facilities, tools, test equipment, spares, repair parts, and military or civilian personnel.

14. Organizational Maintenance: That maintenance which is the responsibility of and performed by a using organization on its assigned equipment. Its phases normally consist of inspecting, servicing, lubricating, adjusting, and replacing parts, minor assemblies, and subassemblies.

15. Weapon System: A final combination of subsystems, components, parts, and materials which make up an entity utilized in combat, either offensively or defensively, to destroy, injure, defeat, or threaten the enemy.

PROCEDURES

1. Within the policy statements of Section E:

a. Field-level maintenance of mission-essential materiel shall be accomplished by military personnel when required to assure a controlled source of equipment support of military operations under emergency or war conditions, and when essential:

(1) To retain or upgrade technical ability within the Military Department and Defense Agency to permit effective performance of the military mission, or

(2) To provide necessary experience and information on the military requirements, design specifications, performance evaluations, and the review and control of costs, or

(3) To develop the technical competency necessary to conduct analytical evaluations of maintenance criteria, specification and performance data that are necessary to assure improved performance of military equipment.

b. Contract maintenance has its principal applications in the following areas:

(1) For accomplishment of maintenance requirements in support of administrative elements when the military control and performance of such work is not required for military effectiveness, personnel training, or rotation and career development of personnel.

(2) For maintenance support of mission-essential materiel pending the attainment of organic capability or to accommodate peak workloads of a transitory nature.

(3) When required for an interim period to attain an earlier operational status for new military materiel.

(4) For accomplishment of analytical overhaul or modifications of new military materiel entering the inventory.

(5) When the extent or complexity of modifications or modernization work requires the inherent technical qualifications of the original manufacturer.

2. Support for new weapon systems shall be based upon the Integrated Logistics Support Plan (ILSP) developed in accordance with DoD Directive 5000.39 (reference g). The ILSP shall be the foundation upon which supply, maintenance, transportation, and logistics communications requirements are based. Special support arrangements (such as dedicated airlift and intensive supply management) shall be included in the ILSP whenever possible.

3. The Military Departments and Defense Agencies are encouraged to investigate and use innovative maintenance support concepts for new weapon systems as long as they are consistent with the provisions of this Directive.

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This study examines several maintenance support concepts employed by the Military Departments to support a variety of weapon systems. It uses six criteria to evaluate the wartime viability of each maintenance concept. To be effective in war, support must have a strong mission orientation, be adaptable to all theaters of operations, require few modifications to transition to war, provide quick, accurate and complete information on the status of systems and support resources, have available redundant sources of

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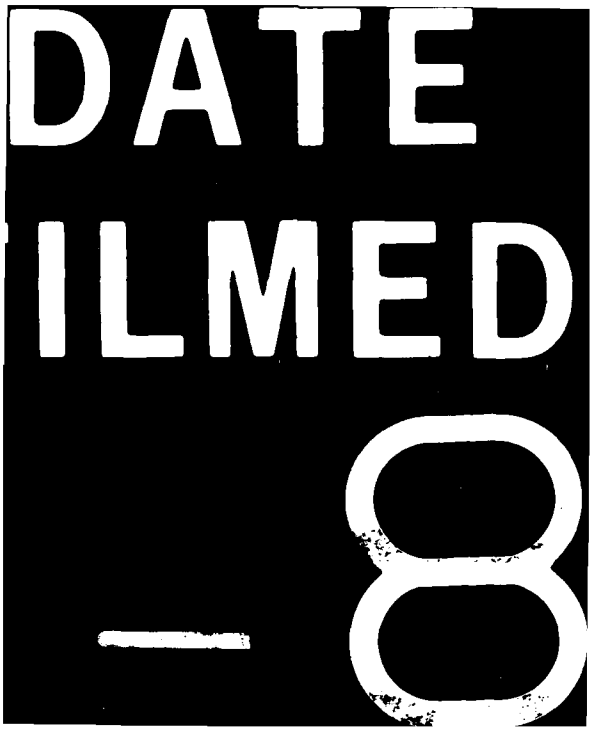
maintenance support, and be exercised adequately in peacetime.

Our primary conclusion is that, for a variety of reasons, some of the maintenance concepts employed now are not viable in war. As a first step to improving wartime maintenance, we recommend that the Assistant Secretary of Defense (Manpower, Installations and Logistics) issue a new policy directive on actions to be taken in peacetime to ensure wartime viability of maintenance support practices and procedures.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