

Maintenance: Past and Present

by Martin Reuss, Ph.D.

Maintenance doctrine today continues to emphasize the importance of forward support.

Weaknesses in logistics operations have generally been traced to shortcomings in the transportation network or lack of proper planning in the production and distribution of supplies. Yet, in many ways, maintenance critically influences the other functional areas of logistics and affects the ability of any force to accomplish its mission. Past maintenance organization and doctrine, therefore, can give valuable insight into our present logistics system.

A functional reason why maintenance has not been given greater attention is that it did not become a problem of critical proportions until the advent of the internal combustion engine. It was the introduction of motor vehicles into the Army that forced significant changes. When motor vehicle responsibilities were transferred from the Quartermaster Corps to the Ordnance Corps over 35 years ago, the Corps was faced with developing principles of maintenance that would be broad enough to cover a variety of equipment and yet specific enough to address logistics problems.

The primary logistics problem was the lack of standardization in vehicle manufacturing. The Army was forced to buy vehicles from the lowest bidder. The automobile industry, Congress, and a significant number of Army officers were against any attempt by the Quartermaster Corps to get into the automobile business. Consequently, mechanics had to deal with a great many different models of basically the same vehicle.

This contributed to the second critical factor affecting maintenance: repair parts. By 1935, there were over 360 different vehicle models owned by the Army. This many models in the inventory required the procurement and distribution of nearly a million items of repair parts. The problem of repair parts was made more acute by the fact that, unlike most items of artillery and infantry, vehicles were subjected to constant and often heavy use,

thus requiring greater maintenance. This is equally true today.

The third and final factor was simply inexperience. With only a little more than 20 years of experience in motor vehicle maintenance, it was inevitable that mistakes and mishandling would occur. In fact, repair parts management and lack of standardization remained problems in both the Korean and Vietnam wars.

World War II did, however, teach the U.S. Army valuable logistics lessons, many of which were later confirmed in Korea. These lessons proved as applicable to sophisticated missiles and target surveillance equipment as to motor vehicles. One of the most important lessons learned was the necessity of repairing essential items as far forward as possible. While it is the instinct of every soldier during wartime not to give up his equipment but to search for a replacement from whatever source available, pre-World War II motor vehicle doctrine had stressed the concept of "unit replacement." This meant that, except for minor repairs, major subunits of motor vehicles were to be sent to the rear before being repaired.

By 1953, ordnance doctrine had drastically reoriented this concept. Repair parts frequently used were to be placed in the forward areas. Heavy or depot support echelons were to store parts not heavily demanded. Maintenance and supply were to be accomplished at the lowest possible logistics echelon, that is, in the most forward position.

Within 4 years, this doctrine had been accepted by the entire Army. Army Regulation 750-5 dated 1957 stated that "Repairs are performed in the lowest echelon of maintenance consistent with the nature of the repair, authorized repair parts, tools and test equipment, time available, skill of personnel, and the tactical situation." Field Manual 100-1 dated 1959 went even fur-

ther: "maintenance support . . . will be pushed forward aggressively to provide maximum service and responsiveness." Finally, the 1969 edition of Field Manual 38-5 bluntly announced, "Repairs will be accomplished on site whenever feasible." Today the principle of repair in the forward areas remains very much a part of Army doctrine; most recently it has been articulated in Field Manual 54-10, February 1977, which specifies "Maintenance operations must be conducted as far forward as practicable. . . ."

Cannibalization—the removal of serviceable items from one item of equipment for use on another—is an issue closely related to forward support. Undoubtedly soldiers in combat have always cannibalized unusable equipment in order to make their own operable. However, the technique was not systematically applied by United States troops until World War I. Even then, most reclamation activities were conducted in the rear depots. Before World War II, the fourth echelon (fixed shop) was assigned reclamation responsibility for motor vehicles.

This echelon more or less corresponds with our general support level in today's Army. During and after World War II, the practice of cannibalization increased at the organizational level. Nevertheless, Army regulations and field manuals generally stressed that cannibalization was *not* to be practiced except under certain circumstances.

Today, however, in the aftermath of the Vietnam war and the 1973 Mideast war, the importance of cannibalization at all levels except depot is stressed. Field Manual 54-10 notes that we must use the equipment that we have effectively because replacement may not be possible; supervised battlefield cannibalization may be used when parts are not available from the supply system and an item of equipment can be repaired using parts from other unserviceable equipment.

The Ordnance Corps learned other lessons from World War II besides the importance of forward support. Two important lessons learned were that a single source of supply should be established wherever possible and that units must be assigned to a specific geographical area. By establishing a single source of supply, the Corps allowed users to come to the same direct support unit for the repair and supply of major items of materiel. The assignment of area responsibility insured that combat service support units would provide service to user units operating within a specified area as well as their assigned "customer" unit. This principle also gave maintenance organizations certain responsibilities for the provision of security in the rear area.

Ordnance logistics doctrine was characterized by six principal points that could be remembered by the acronym SIRSAM: Single source of service; Indivisibility of supply and maintenance; Repair parts—fast moving forward, slow moving in the rear; Segregate and inspect serviceables and unserviceables—same priority; Area responsibility within assigned mission; and Maintenance and supply at lowest logistics echelon—most forward position.

Some parts of the ordnance doctrine were implemented by organizational changes that occurred in the Army in the 1960's. The general thrust of the changes was to remove the restrictions and reduce inefficiency that arose from an organization based on branch of service, rather than function.

Under the old system, vertical technical organizations operated under the control of special staff officers at Army headquarters. This meant, for example, that the quartermaster of the field army had two roles. First, he was a staff officer; second, he was an operator, controlling depots and groups. Moreover, he supervised such operations as salvage, graves registration, and the maintenance of the quartermaster equipment. The problem for the force commander was that he had to supervise several of these technical chains of command, and user units dealt with several relatively autonomous technical service direct support maintenance and supply companies.

The Army of the fifties and sixties required greater flexibility than this logistics system could provide. Technological advances made the battlefield more complex and more demanding on the force commander. It was vital that support units be designed to provide adequate logistics capability and, at the same time, reduce the force commander's span of control so that he could devote himself to the tactical mission. In short, "one-stop service" needed to be provided to users, and support units had to be capable of accommodating varying force structures and combat environments.

What was needed was a unified support command. The idea was first tested in early 1960 in the 7th United States Army in Europe. After further refinement, it was incorporated into a concept known as ROAD, Reorganization Objective Army Divisions. Two Active Army divisions, the 1st Armored at Fort Hood and the 5th Infantry (Mechanized) at Fort Carson, were organized in accordance with the ROAD concept in February 1962. Meanwhile, a study had begun that involved the evaluation and restructuring of the combat service support structure for the entire field army and used the ROAD concept. This study eventually became known as Com-



□ Current doctrine specifies that maintenance be conducted as far forward as practicable.

bat Service to the Army (COSTAR).

The basic concept of phase II of COSTAR, known simply as COSTAR II, was the establishment of a field army support command, which was to be responsible for combat service support, other than personnel replacement and construction, for the Army in the field. It was the ROAD concept expanded to the entire field army.

Under COSTAR II, the maintenance system, like the supply system, was designed to provide a single source of support to each organizational level, thus institutionalizing ordnance doctrine for all combat service support units. Division support commands and direct support groups performed direct support maintenance, while the maintenance battalions of the general support groups furnished general support maintenance other than medical and missile maintenance. The corps area general support maintenance structure included one division direct support maintenance company per supported division to accommodate overflow maintenance requirements for the division.

Another study following COSTAR, TASTA-70 (The Administrative Support Theater Army—1970), made further changes in maintenance functions by using decentralized automated data processing equipment in the corps and Army service area. The TASTA-70 concepts applied to the area from the rear of the division to the rear of the communications zone, and it provided a link with support systems in the United States.

After various modifications were introduced, the revised TASTA-70 called for the integration of supply and maintenance functions with the combat service support command headquarters echelons and control centers. It also provided for the designation of the supply and maintenance command of the theater army support command as the materiel command. At various headquarters, the separate assistant chiefs of staff for supply and maintenance were combined to form an assistant chief of staff for materiel. All these changes were an affirmation of the ordnance principle of the indivisibility of supply and maintenance.

The final major development in maintenance organi-

zation resulted from the Echelons Above Division Study, which was approved in May 1973. As a result of this study, the corps got its own corps support command (COSCOM). It provides centralized management of supplies, maintenance, and movement.

A concept presently being evaluated, restructured general support, recommends the establishment of weapon-system-oriented general support battalions and companies, which will put emphasis on forward support. The units, focusing on the most significant weapon systems and commodity groups, would operate under the weapon systems management of the COSCOM materiel management center. One commander would be concerned with a single family of weapon systems and have increased weapon systems resources. If this concept is realized, it will be a direct result of the growing attention to the importance of forward support.

Although much has been done to streamline the logistics pipeline, much can still be done to improve the performance of those entrusted with the Army's equipment. It is a sad fact that easily 30 percent of the damage done to equipment in each of the 20th century wars in which the Army has participated has been the result of misuse and negligence on the part of the operator. Although operators are taught preventive maintenance, few practice it. In November 1943, Lieutenant General Lesley J. McNair, commander of the Army Ground Forces, identified some of the actions necessary to correct this deficiency. A partial list of these actions is given in the chart on the right.

There is little question that command emphasis and intensive operator training need to be accentuated in the Army. Operators must become aware that they are the first link in the logistics system. Although the various echelons of maintenance have been replaced by the organizational, direct support, general support, and depot levels, the operator still remains the "first echelon." If the operator does his work properly, then the load is taken off the mechanic at the organizational level, and the entire logistics system can work more smoothly.

Logistics doctrine must make this clear. Then logisticians, like combat developers, will find that improved training might well be a necessary alternative to improved materiel and that doctrine means nothing unless consistently practiced. **ALOG**

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Lieutenant General Lesley J. McNair's Preventive Maintenance Checklist

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- ✓ More command and officer supervision of maintenance.
- ✓ Thorough and constant first and second echelon maintenance in order to save third and fourth echelon maintenance with the resulting inevitable delays.
- ✓ Drivers and equipment operators to be trained not only in operation but in first echelon maintenance as well.
- ✓ Vehicles to be operated only by the assigned driver so far as practicable (AR 850-15, para 16).
- ✓ Adequate time, distributed reasonably, to be allotted for preventive maintenance.
- ✓ Adequate supply of field manuals, technical manuals, instructions, lubrication charts, together with explanation and supervision of their use.