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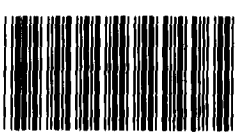
REPORT BY THE U.S.

General Accounting Office

Potential Exists For Defense To Improve Productivity In Maintenance Of Commercial-Type Vehicles

The Department of Defense can reduce the costs of maintaining its commercial vehicles by more effectively determining staff needs, and by improving procedures and controls to reduce repetitive repairs and vehicle out-of-service time.

Defense agreed to establish a task force to devise a plan for improving maintenance efficiency.



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JULY 11, 1983

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

OUNTING AND FINANCIAL
ANAGEMENT DIVISION

B-212127

The Honorable Lawrence J. Korb
Assistant Secretary of Defense (Manpower,
Reserve Affairs, and Logistics)

Dear Mr. Korb:

We reported in 1975 on the maintenance practices for commercial-type vehicles in three agencies: the General Services Administration (GSA), the Postal Service, and the Department of Defense. That report was entitled "Ways Of Increasing Productivity In The Maintenance Of Commercial-Type Vehicles" (LCD-75-421).

We reported then that large, unnecessary maintenance costs were being incurred for two interrelated reasons--(1) too many personnel were assigned to vehicle maintenance and (2) major maintenance problems, including high incidences of repetitive repairs, excessive vehicle time lost for repairs, and too frequent preventive maintenance, were widespread. The result was low productivity in commercial vehicle maintenance activities.

We have now completed a followup review at the three military services which showed that some improvement has occurred. In large part, however, the problems discussed in our 1975 report still persist. The most significant problems we noted are

--overstaffing,

--repetitive repairs, and

--excessive vehicle "downtime."

We believe from this and earlier reviews that the productivity of commercial vehicle maintenance operations can be much improved at little if any added cost. Key needs are application of commercial, "flat-rate," time standards in managing work and determining staff needs, clearer maintenance instructions, management information that pinpoints problems, and more aggressive management response to problems. Because the problems have persisted for so long despite repeated identification, a much stronger top management effort seems indicated.

We believe the problems merit top management attention because (a) the overall annual cost of vehicle operation and maintenance in the Federal Government has increased 50 percent to over $1 billion in the last 5 years and (b) the average annual operation and

maintenance cost per vehicle now exceeds $2,300, according to GSA figures. The Department of Defense has about 31 percent of the commercial vehicles and incurs about 33 percent of Federal expenditures for maintenance. Its three military services have about 330 motor pools in the United States where vehicles are maintained by Federal employees.

Our review was directed at evaluating the adequacy of each service's maintenance and staffing guidelines and management oversight. We administered testing at selected locations to see how these guidelines were being followed and with what results. In view of our past work and internal agency studies and audits, we limited our testing to six internal vehicle maintenance activities--two each in the Army, the Air Force, and the Navy. (See app. I for details on our scope and methodology.)

TOO MANY PERSONNEL ASSIGNED TO VEHICLE MAINTENANCE

Some degree of overstaffing was indicated at all six activities reviewed. We based our finding on (1) comparison of staffing among the activities, using vehicle-to-staff ratios we developed, and (2) agency staffing studies. Together, the six activities appeared to have up to 40 percent more staff than they needed.

Vehicle-to-staff levels varied considerably. The highest vehicle-to-staff ratio (at the Naval Amphibious Base) was three times more vehicles per staff person than the lowest ratio--27 vehicles per person compared to 9. (See app. II for details.) Yet, according to a Navy study which applied the Navy staffing standards, even the Amphibious Base was overstaffed by 15 percent.

We found differences in staffing levels for both mechanics and support staff. For example, one activity with 312 vehicles had three inspectors, while another with 355 vehicles had one inspector. The ratio of support staff to mechanics ranged from 18 to 61 percent. We observed conditions--such as a variance in the age and mix of vehicles maintained and the amount of work done on contract--that could justify some staffing differences, but not of the magnitude we observed. For example, the Amphibious Base has as many over-age vehicles as the others.

As in 1975, the Air Force continues to claim that its use of airmen mechanics necessitates higher staff levels. It states that airmen mechanics are less experienced (some being trainees) than the civilian mechanics the Army and Navy hire, and thus cannot be expected to be as efficient. Based on our review, we believe the Air Force expectations are low. Given the significant cost involved, we believe this is a matter that your office should examine.

Overstaffing results from inadequacies in agency staffing standards and the manner in which the standards are applied. The service's staffing methods produce very different results. For example, the Air Force's method will justify almost twice as many

personnel as the Navy's for comparable vehicles. Further, in applying the standards, the services did not consider the amount of repair work done on contract--which varied considerably. The Air Force and the Navy applied "handicap" factors to add staff for conditions such as over-age vehicles and excessive corrosion, and these factors were applied to all vehicles at the two Navy activities we reviewed. At Seymour Johnson, staffing standards were applied to vehicles repaired elsewhere.

All three services determine staff needs through some variation of vehicle-to-staff ratios; that is, a specified amount of staff or hours based on the number and type of vehicles or miles driven. While useful for comparing productivity, such ratios are rather imprecise for determining staffing levels. We continue to believe that agencies should follow commercial practice and determine staff needs by applying commercial, flat-rate, time standards, as discussed on page 5.

We estimate that the six activities reviewed had up to 95 more staff members than were needed. (See app. III for our analysis.) This could amount to as much as $1.7 million annually in added costs. The amount would be reduced to the extent that the airmen mechanics are truly less efficient. The potential savings throughout Defense by more appropriate staffing may be many times this amount, given the systemic weaknesses in staffing methods and the large number of maintenance activities. In fact, some savings have already been realized. Fort Bragg reduced its staffing by 30 percent after our review.

REPETITIVE REPAIRS AND LENGTHY MAINTENANCE DOWNTIME CONTINUE

Because more personnel are assigned to vehicle maintenance than are really needed, it would seem that required maintenance work should now be done promptly and be of high quality. This, however, is not always the case. We noted continuing problems with repetitive repairs and to a lesser degree with vehicle downtime.

Repetitive repairs

The incidence of repetitive repairs was substantial at all the activities we reviewed. Our sampling of 95 randomly selected vehicles showed that 45, or about 47 percent, were returned to the repair shop within a few days for the same problem. The percentage ranged from 40 to 52 percent at the six activities. Moreover, many vehicles had more than one instance of repeat repairs. For example:

--At Seymour Johnson, a backup light on a van was repaired three times within 105 days;

--At Fort Bragg, one vehicle had the front end aligned four times within 38 days.

Some rework is to be expected, but the rates we noted seem high. A high rate increases mechanic costs and lengthens vehicle downtime.

This condition appears to stem from an overall lack of emphasis on quality of repair work in agency guidance, and insufficient attention by activity supervisors to identify and correct the causes of repetitive repairs. Besides faulty work, probable causes of repetitive repairs are driver abuse, weather conditions, and aging or poor quality vehicles. These were not, but should be, documented so that appropriate corrective action can be taken. While prevention of repeat repairs was discussed in all but the Army's guidance, and was recognized as important by first-line supervisors, identification of the cause was not emphasized. Also, reporting on frequency of repair--which would indicate the extent of repeat repairs--is not required. The techniques used at the activities to identify repeat repairs were unreliable, and we noted only spot indications of corrective action. At commercial garages, the common corrective practice is to have mechanics redo faulty work without pay.

Vehicle downtime

A large amount of vehicle service time lost for maintenance (downtime) was reported or was evident from our analysis at three military activities. Service standards for acceptable downtime--which we consider high--were exceeded at one Army activity and both Navy activities we reviewed. For example, one Army activity reported downtime of up to 33 percent in one month during the year examined (the standard is 10 percent). Time lost for service is costly. It can create a need for extra backup vehicles and alternative transportation. Information on the causes of downtime and maintenance delays was sparse. The primary cause of maintenance delay cited by local supervisors was waiting for parts.

Lengthy maintenance time seems attributable to inadequate and unmet goals and lack of attention to the causes of delay. Each service has goals for, and requires reports on, the percentage of vehicles out of service or time lost for maintenance. But only the Air Force requires reporting of the cause. Moreover, the two Navy activities were not reporting downtime as required. The Army had a downtime standard of 10 percent at the sites we reviewed. The Air Force and the Navy had downtime standards of 10 and 7 percent, respectively. (The Navy subsequently adopted a 10-percent standard.) We believe these are high. A 10-percent standard effectively allows vehicles to be in the shop for maintenance one month a year, which translates into a need for 1 backup vehicle for every 12 vehicles. We believe few car owners would expect to have their cars in the garage for 30 days a year. A much lower goal seems possible; Langley AFB, for example, reported an average downtime of 5 percent during the year of our review. A lower goal would highlight management's concern for completing repairs quickly.

Because downtime is affected by how often vehicles are in the shop as well as by maintenance delays, we believe the services also

need goals for and measures of the turnaround time for completing repairs. The Postal Service and General Services Administration, for example, have such goals. The Postal Service goal is 1 day (excluding body work) and the GSA goal is 3 days. A 1-day goal, with reporting of the cause for vehicles in the shop more than 3 days, seems reasonable. We believe management needs information on both turnaround time and downtime during a given period to adequately assess the effect of delays on overall costs and on the size of the vehicle fleet.

MAINTENANCE PERFORMANCE CAN BE IMPROVED

We believe the services could resolve the problems identified in this and earlier reports by using (1) commercial, flat-rate, time standards in management and staffing, (2) better guidance for managing vehicle maintenance operations, (3) more aggressive management oversight to ensure compliance with the guidance, and (4)complete management information to pinpoint problem areas.

Application of flat-rate standards

As we stated in 1975, agencies need to follow commercial practice and apply commercial, flat-rate, time standards in determining manpower requirements and managing maintenance operations. Flat-rate standards provide the average time to complete a repair task, such as starter replacement, for different makes and types of vehicles. The standards can be used to determine staff requirements, schedule work, evaluate mechanic performance, measure and compare shop productivity, set charges for repairs, and base bonuses on performance--a common approach used by commercial garages to pay mechanics. This pay approach is being tested at a Navy activity with reportedly good results.

The Army and the Navy require that commercial, flat-rate standards be used to schedule work and assess performance, but not to determine staffing level. Regardless of the requirement, the Army activities we reviewed were not applying flat-rate standards; the Navy activities, while recording the time spent, did not appear to be using the information to assess performance. The Air Force does not require use of flat-rate standards. The reason it does not, according to officials, is because experience has shown the futility of requiring local inspectors to take the time to look up the standards for the many types of vehicles used. It takes too long and is not considered practical.

Our test of performance, made by comparing the actual time charged for making repairs with the commercial, flat-rate times, on a random sample of vehicles and tasks for a 1-year period indicated that repair time at the two Navy activities came close to the flat-rate times; the other services were less efficient. However, at commercial garages mechanics are expected to beat the standards and are commonly paid extra for doing so.

In our opinion, full application of commercial, flat-rate standards is essential to effective management of vehicle

maintenance operations. Without standards, there is no way of knowing whether staffing is proper and work is done efficiently. There are several commercial, flat rate standards available at a modest price. To provide for consistent application and comparison of productivity among shops, the Defense Department should select one for Department-wide use.

Better guidance

Agencies need better guidance on accepted procedures for the various maintenance functions, including vehicle inspection, scheduling and supervision of work, evaluation of mechanic and shop performance, identification and correction of staffing and maintenance problems, and reporting and analysis of management information about operations. The guidance should also address the application to these functions of such management tools as flat-rate time standards, work orders, repair logs, and vehicle records.

In this and earlier reviews we have found that the services' vehicle maintenance guidance is inconsistent in addressing these functions. Moreover, the guidance available often is not followed by local vehicle maintenance activities. This deficiency has persisted despite onsite reviews by intermediate management teams, which in some cases pointed it out.

Aggressive management oversight

The services' intermediate commands have primary responsibility for oversight of vehicle maintenance operations. Along with their agency management information system, these mid-level management organizations use periodic onsite reviews as their primary means of oversight. We noted that the reviews were largely ineffective; existing problems were often not identified or reported, and when identified were not corrected. In the Air Force and Army, the review scope was often narrow; it did not address determination of staff requirements, evaluation of performance, and local compliance with guidance. In the Navy, reviews were comprehensive but recommendations were considered advisory and often not acted on.

Comprehensive management information

We also noted that the data provided by each service's management information systems are neither adequate nor accurate enough to pinpoint problem areas for onsite review. (See app. IV for details on information needed versus what is reported.) Complete and accurate information is needed on maintenance costs, productivity, timeliness, and work quality--which none of the services fully receives. With this information, the intermediate management groups could select for onsite review those activities and areas where problems appear most severe, and thus maximize the cost effectiveness of the expensive onsite review process. To permit comparison, the Department should establish common performance indicators.

CONCLUSIONS AND RECOMMENDATIONS

From this review, and from our earlier work and that of the services, we believe the productivity of vehicle maintenance activities can be much improved with little if any added administrative expense. Costs and repair time can be decreased and quality of maintenance can be increased. The magnitude of Federal expenditures for vehicle support and the staffing and maintenance problems repeatedly identified indicate an opportunity to save several million dollars annually. Lasting improvement is possible, however, only through greater attention and interest by management at all levels.

We recommend that your office appoint a small, temporary task force of knowledgeable personnel from each service to jointly devise a plan to improve the productivity of commercial vehicle maintenance. The plan should, at a minimum, address the following.

--Use of commercial, flat-rate standards to schedule work, determine staff requirements, and measure and compare shop productivity. A single commercial standard should be selected for Department-wide use to permit comparison among activities.

--Management oversight by intermediate management organizations responsible for vehicle maintenance.

--Detection and reduction of repetitive repairs and downtime, and establishment of realistic goals for maintenance turnaround and standards for downtime.

--Improvement of management information, including establishment of common performance indicators and a practical mechanism for reporting these to the Office of the Secretary of Defense.

--Improvement of each service's vehicle maintenance guidance.

AGENCY COMMENTS

We discussed the report contents and recommendations in a joint meeting with responsible officials from your office and each of the services. While not necessarily agreeing with all points, the officials concurred that benefits could be realized from a joint effort and agreed to form a task force to examine the issues and work out a plan for improving commercial vehicle maintenance. Leadership from your office is, we believe, important to maximize the results of this positive effort. We urge you to appoint a strong, knowledgeable individual from your office to head the task force.

We are sending copies of this report to the Director, Office of Management and Budget, your Office of Inspector General, cognizant legislative committees, and interested congressmen.

Sincerely yours,

Brian L. Usilaner
Associate Director

OBJECTIVES, SCOPE, AND METHODOLOGY

We reviewed the maintenance and repair activities for commercial-type motor vehicles owned by the Department of Defense (including Army, Navy, and Air Force). We selected these agencies because they are among those we reviewed in 1975, they account for about 31 percent of the vehicles owned by the Government, and they have numerous motor pools in which the automotive mechanics are Federal employees. The Air Force has about 110 motor pools, the Army 84, and the Navy 135.

Our objectives were (1) to determine the adequacy of each agency's guidance and (2) to test at a limited number of activities how well the guidance was being followed and what results were being achieved. As a followup to our 1975 report, we looked specifically at staffing, repetitive repairs, downtime, and preventive maintenance.

Our selection of 6 maintenance activities, 2 in each service, was based on their proximity to one another and the similarity in vehicles they repair. Locations reviewed in each service are listed below. At each activity we obtained overall information on assigned staff, vehicle maintenance and repair costs, availability and use of labor-saving equipment, and the procedures used to manage, supervise, and accomplish the maintenance and repair work. We watched maintenance practices and selected a recent 1-week or 1-month period for examination of current workload data. For these periods we evaluated the procedures and controls that were used to ensure efficient labor utilization and performance. We also examined shop logs and selected a random sample of from 10 to 25 motor vehicles at each location. We reviewed the recent maintenance and repair history of these samples to determine the adequacy of scheduled and unscheduled work performance on the vehicles. Our onsite review was conducted during the 15-month period ending May 1982, and was performed in accordance with generally accepted auditing standards.

FEDERAL LOCATIONS REVIEWED

Department of Defense:

Office, Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics), Washington, D.C.

Air Force:

Office, Deputy Chief of Staff for Logistics and Engineering, Washington, D.C.

Tactical Air Command, Langley Air Force Base, Virginia.

Langley Air Force Base, Langley, Virginia.

Seymour Johnson Air Force Base, Goldsboro, North Carolina.

Army:

Office, Deputy Chief of Staff for Logistics, Washington, D.C.

Forces Command, Fort McPherson, Georgia.

Training and Doctrine Command, Fort Monroe, Virginia.

Headquarters XVIII Airborne Corps and Fort Bragg, North Carolina.

Fort Monroe, Virginia.

Navy:

Office, Deputy Chief of Naval Operations for Logistics, Director for Shore Activities, Planning and Programming Division, Washington, D.C.

Naval Facilities Engineering Command, Alexandria, Virginia.

Atlantic Division, Naval Facilities Engineering Command, Norfolk, Virginia.

Commander in Chief, Atlantic Fleet, Norfolk, Virginia.

Navy Public Works Center, Norfolk, Virginia.

Naval Amphibious Base, Little Creek, Norfolk, Virginia.

COMPARISON OF STAFFING LEVELS

(at time of onsite review)

	No. of vehicles maintained	No. of mechanics	No. of vehicles per mechanic	Total staff (note a)	No. of vehicles per staff	Percentage indirect staff of mechanics
Navy						
Norfolk Amphibious Base	355	11	32	13	27	18
Norfolk Public Works Center	1,580	77	21	92	17	19
Army						
Fort Bragg	795	36	22	b/44	18	22
Fort Monroe	112	6	19	8	14	33
Air Force						
Langley	329	23	14	37	9	61
Seymour Johnson	312	20	15	28	11	40

a/Compiled with the assistance of the shop supervisor. Available activity staffing figures did not show the number repairing commercial vehicles.

b/Staffing was reduced to 31 following our review; this would increase the vehicle-to-staff ratio to 26.

APPENDIX III

ESTIMATE OF EXCESS STAFF

(at time of onsite review)

Maintenance activity	Staff levels (note a)	Staff needed		Potential excess
		Number (note b)	Basis	
Naval Amphibious Base	13	11	Agency study	2
Navy Public Work Center	92	59	Amphibious Base	33
Fort Bragg	c/ 44	29	do.	c/ 15
Fort Monroe	8	4	do.	4
Langley	37	12	do.	25
Seymour Johnson	28	12	do.	16
Total	222	127		95

a/Includes military.

b/Using the vehicle-to-staff ratio for the Naval Amphibious Base, or agency staffing study, as indicated.

c/Reduced by 13 following our review.

TYPE OF MAINTENANCE MANAGEMENT INFORMATION NEEDED AND EXTENT TO WHICH REPORTED

Type of data	Reported above maintenance activity		
	Army	Navy	Air Force
Direct labor utilization rates	No	a/ No	a/ No
Labor productivity	No	b/ Yes	Yes
Vehicle maintenance cost per mile	c/ Yes	Yes	Yes
Vehicle maintenance cost	No	Yes	Yes
Timeliness:			
Downtime	c/ Yes	Yes	Yes
Time in the shop per visit	No	No	No
Frequency of repair rates	No	No	d/ No

a/Some labor utilization data are reported. Utilization of available direct labor is not reported.

b/Reporting required only by the Navy's Public Work Centers which have about 45 percent of the Navy's maintenance personnel.

c/Reported to the intermediate management level only.

d/Information shows extensive repeat repairs to individual vehicles.

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