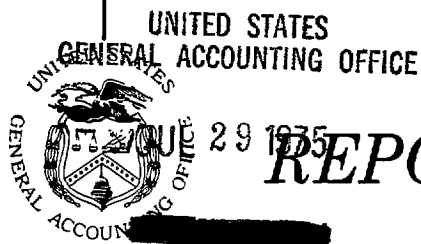


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JUL 29 1975

REPORT TO THE CONGRESS



Productivity Of Military Below-Depot Maintenance-- Repairs Less Complex Than Provided At Depots-- Can Be Improved

Department of Defense

The military services have not used their below-depot maintenance capabilities as effectively as possible. They have not taken full advantage of opportunities to reduce their underused capacities through consolidations.

This report presents several recommendations and suggestions for improving the productivity of below-depot maintenance facilities.

**BY THE COMPTROLLER GENERAL
OF THE UNITED STATES**

LCD-75-422

JULY 29, 1975

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-163762

To the President of the Senate and the
Speaker of the House of Representatives

This report shows that productivity of Department of Defense below-depot maintenance can be improved.

We made this review to evaluate how effectively the military services have used their extensive below-depot maintenance resources. Our review was made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Director, Office of Management and Budget; the Secretary of Defense; and the Secretaries of the Army, Navy, and Air Force.

James A. Stacks

Comptroller General
of the United States

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ABBREVIATIONS

DOD	Department of Defense
GAO	General Accounting Office

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

PRODUCTIVITY OF MILITARY
BELOW-DEPOT MAINTENANCE--
REPAIRS LESS COMPLEX THAN
PROVIDED AT DEPOTS--CAN
BE IMPROVED
Department of Defense

D I G E S T

The cost of the military services' below-depot maintenance--repairs less complex than provided at depots--is estimated to be about \$13 billion a year. This could be reduced if mechanics were used more productively and if duplicate capabilities were eliminated. The Congress should be aware of Department of Defense actions to reduce this cost.

USE OF PERSONNEL

Mechanics were not used as productively as possible because the military services' management information systems did not provide adequate controls over the accuracy of data, proper use of labor standards, or complete accounting of staff-hours. (See p. 3.)

Because the information systems tracked only the productive staff-hours, management did not know how many hours were spent on activities other than maintenance. (See p. 9.) And because labor standards were not used, managers did not know that productivity was low. (See p. 11.)

REDUNDANT CAPABILITIES

To maintain defense readiness and mobility, combat and combat-support units are encouraged to become as self-sufficient as possible in making their own repairs. This discourages potential economies through consolidation of maintenance requirements and resources of the various units. (See p. 16.)

Although the military services have made some efforts to consolidate maintenance, much duplication--both within and between the services--remains. As a result, equipment,

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skills, and overhead personnel are needlessly duplicated and much equipment is underused. (See pp. 16 to 34.)

WAYS TO IMPROVE BELOW-DEPOT MAINTENANCE

The Department of Defense can do several things to improve productivity without compromising defense readiness, such as:

- Validate maintenance requirements to arrive at realistic estimates of the personnel and equipment needed in military emergencies. (See p. 38.)
- Consolidate, eliminate, or place in reserve those capabilities which exceed peacetime and emergency requirements. (See p. 39.)
- Rely on peacetime staffing levels to expand maintenance capabilities rapidly by working longer hours in a mobilization. (See p. 43.)
- Rely on Reserve personnel to quickly replace mobilized personnel. This would allow peacetime staffing to be reduced and to be used more productively. (See p 43.)
- Reallocate maintenance workloads to insure the productive use of resources which exceed peacetime requirements but which are necessary for mobilization. (See p. 45.)

Realizing the potential savings from these actions depends largely on making sure that total force requirements and resources receive priority over those of the individual services.

RECOMMENDATIONS

The Secretary of Defense should:

- Instruct the military services to (1) establish adequate controls over the accuracy of reported productivity data, (2) require that all available staff-hours be tracked and summarized, and (3) require that engineered or other independently developed labor standards be used, when practicable, to evaluate performance.

--Encourage the military services to consolidate their maintenance programs in order to maximize the use of their limited resources and to simultaneously achieve the desired readiness for national emergencies.

AGENCY COMMENTS

The Department of Defense agreed that below-depot management information systems should be improved and is taking corrective actions. The Department also said it would continue to encourage consolidated maintenance where it would not adversely affect readiness. (See app. I and pp. 14 and 35.)

CHAPTER 1

INTRODUCTION

The military services must keep their aircraft, vehicles, weapons, and support equipment--valued at over \$100 billion--up to date and combat ready. This requires large expenditures and a tremendous maintenance effort, ranging from simple servicing and lubrications to major equipment modifications and overhauls. Department of Defense (DOD) annual maintenance costs are estimated to be as high as \$20 billion. Although the actual cost of below-depot maintenance cannot be readily determined because of the way costs are accumulated, it has been estimated to be about two-thirds of the total maintenance cost.

Each service has adopted a multilevel approach which places maintenance responsibility at different levels, depending on the type and complexity of work. The maintenance levels are generally structured as follows:

- Organizational level. Maintenance at this level is normally the responsibility of, and is done by, the units or organizations to which military equipment is assigned. Tasks assigned to these equipment users include inspecting, servicing, and lubricating equipment as well as adjusting, removing, and replacing parts, minor assemblies, and subassemblies. Work beyond these activities' capabilities is usually forwarded to intermediate-level activities.
- Intermediate level. Maintenance at this level is normally a user-command or base-level responsibility and is done by designated activities for direct support of user organizations. Assigned work includes calibrating, repairing, or replacing damaged or unserviceable parts, components, or assemblies; modifying material; and providing technical assistance to user organizations.
- Depot level. Depot-level maintenance is done by designated industrial-type activities. The services' depots are generally responsible for making major overhauls, modifications, and repairs to end-items

and components which are then returned to the supply systems. Depots also manufacture parts not otherwise available in the supply system and use their more extensive shop facilities, equipment, and higher skilled personnel to support the lower level activities.

Because organizational- and intermediate-level maintenance activities directly support combat and combat-support units, they are staffed primarily with military personnel. Depots, in contrast, are generally fixed activities and employ a predominantly civilian work force.

The multilevel maintenance approach generally provides for doing maintenance at the lowest level having the required capability. Also, the services' combat and combat-support units are encouraged to become self-sufficient in providing organizational and intermediate maintenance for their assigned weapons and equipment. As a result, a large share of the total maintenance workload--both in terms of items processed and costs incurred--is done below the depot level.

CHAPTER 2

NEED TO IMPROVE USE OF MANPOWER

Military personnel costs account for over half of the total defense expenditures. Because of rising personnel costs under the All-Volunteer Army concept, budgetary constraints, and reduced staffing levels, the services are coming under increased pressures to use these personnel as effectively as possible.

In his "Annual Defense Department Report for FY 1975," the Secretary of Defense recognized these pressures and emphasized the need to promote productivity and to effectively use military personnel. However, because of weaknesses in the services' below-depot management information systems, this was not done and management appeared to have no reasonable basis for determining how many personnel were needed for equipment maintenance below the depot level.

NEED FOR BETTER MANAGEMENT VISIBILITY

The key to productivity improvements is an effective information system which gives management the data needed to identify and correct problem areas. A decrease in the staff-hours used for each unit of desired output is generally accepted as an indication of productivity improvement. Therefore, to improve productivity, an information system should help maintenance managers answer the following questions.

- What was the productivity during the base period?
In other words, how many staff-hours were used? And how many maintenance tasks were done?
- How many staff-hours should be required to do a given task? Or, to what degree can effective management result in productivity improvements?
- What was the productivity during the test period?
Did management actions achieve the desired result?

Certain management tools should be built into the information system to provide the visibility needed to answer

these questions. First, the system must have controls over the accuracy of data in the system. Second, the system must include a staff-hour accounting system which tracks all available staff-hours, both productive and nonproductive. Third, independently developed labor standards must be used. Such standards indicate the time an experienced mechanic needs to do a task effectively, at a normal pace, and in a predetermined manner, allowing adequate time for fatigue and personal needs. Besides helping to control productivity, labor standards can be used to schedule workloads. And finally, an information system should provide comparisons and summaries of data, so that the data will be readily available to management. For example, by comparing a labor standard with the reported actual time to do a task, management can determine the reasonableness of the actual time.

The military services generally had systems which used the tools described above to provide depot-level managers with the information required to assess and improve the productivity of their civilian workers. However, the systems in use at military-staffed below-depot activities did not provide managers with such visibility. The systems did not provide data on the uses made of much of mechanics' available time, and when productive time was tracked, the accuracy of the reported data was not adequately controlled. As a result, data on productivity was often overstated. Also, because the systems did not track all staff-hours, many hours were spent on unauthorized or questionable diversions without management's full knowledge. Very few labor standards were used in the below-depot information systems, and those that were used were based primarily on the average staff-hours used to do a task in the past. Since past productivity was no more visible than today's productivity, using past average staff-hours as a standard for judging performance is questionable.

Air Force system

The Maintenance Data Collection System was the primary source of management information in use at the Air Force activities visited. Data entered into the system included:

- The identity of all items received for scheduled or unscheduled maintenance and, if unscheduled, the indicated malfunction.

- Information on whether the items were retained for maintenance or sent to a higher level, including the reasons for sending them to a higher level (e.g., unauthorized repair, lack of repair parts, or lack of required skills).
- The types of repairs needed on all retained items (e.g., test and check, remove and replace, or repair).
- Estimates of the standard times needed to complete the indicated repairs.
- The dates that the items were received and processed.
- Actual staff-hours charged for the repairs.

Although the Air Force system was designed to provide managers with much useful data, it had several shortcomings in controlling productivity. For example, because the system tracked only staff-hours actually charged to maintenance, managers of activities we visited did not know the uses made of about 50 percent of the direct staff-hours assigned to them. Also, because the system was used primarily for planning and scheduling work, it did not give managers summary data comparing the actual hours charged with the indicated standard hours. Further, data on actual staff-hours was inaccurate and unreliable because it was not adequately controlled. Finally, the estimates of standard hours were mostly based on average hours recorded in the past rather than independent and engineered estimates of the time it should take to do the work. These standards were used to schedule production rather than to control productivity.

Navy system

Managers of the Navy aircraft maintenance activities we visited relied on the Maintenance and Material Management Information System to schedule below-depot maintenance and to report the productivity of assigned personnel. This system was very similar in function and purpose to the Air Force system--it used the same type of input data, with one exception; produced the same types of management reports; and had the same shortcomings. The one exception was that the Navy system, besides using practically no standards, normally did not even include data on the estimated

staff-hours to complete repairs. Because of the Navy system's shortcomings, below-depot maintenance managers at the locations we visited did not know the uses made of over 43 percent of the direct staff-hours assigned to them.

Army system

The Army's Maintenance Management System was the primary source of management data at the Army's below-depot activities. This system generally provided useful management data for determining and evaluating work backlogs, items processed, disposition of items received, and repair turnaround times--in much the same way as did the Air Force and Navy systems.

The portion of the Army system covering maintenance activities staffed primarily by civilian workers provided for a complete accounting of all available staff-hours. However, because this subsystem was usually not required at the military-staffed activities visited, managers did not know how 73 percent of the direct staff-hours assigned had actually been spent. The Army system also did not provide data on accumulated hours charged to actual maintenance work. The Army's intermediate maintenance activities had some labor standards but did not use them to evaluate mechanics' performance or the reasonableness of staff-hours expended. One activity instead used standards to arrive at the number of hours to report as actually expended.

INACCURATE REPORTING ON PRODUCTIVITY

Adequate provision for controlling the accuracy of data is a fundamental consideration in designing a management information system. However, the services' systems for reporting productivity had no such provision, nor did they adequately control the methods used to compute productivity. Many activities reported their productive hours in total, without reference to the specific jobs that had been done. And some hours reported as productive were not actually spent doing work.

The following data, based on an 8-hour day and a 5-day week, was computed for some of the maintenance activities we visited.

<u>Activities</u>	<u>Average monthly staff-hours</u>			<u>Direct staff-hours used as percent of</u>	
	<u>Total assigned</u>	<u>Direct assigned</u>	<u>Direct used on jobs</u>	<u>Direct assigned</u>	<u>Total assigned</u>
	Army	146,007	94,958	25,377	27
Navy	252,699	178,049	101,711	57	40
Air Force	462,410	338,192	168,896	50	37

As shown above, less than half of the assigned staff-hours were reported as productively used on maintenance tasks. Although these figures appear quite low, we believe they are overstated. Because the services' staff-hour accounting systems were not complete, we could not always identify the causes for overstated productivity. But the reported productivity at many of the activities was questionable because it considerably exceeded the average for all units. In some cases, reported productive hours were even higher than the reported available hours. For example:

--One activity at McClellan Air Force Base, California, reported that its mechanics and supervisors did productive maintenance tasks 119 percent of the time during the 6 months ended March 1974. Although one official argued that the overstatement was attributed primarily to a failure to include overtime in the computation of available hours, others said that recorded maintenance hours were inflated because of several reporting inaccuracies. If overtime had been the only explanation for the inflated amounts--taking only 1 month--every mechanic and supervisor in the shop would have had to work at least 9.2 hours each calendar day of the month, including weekends and a holiday, plus whatever time was required for lunch, coffeebreaks, leave, training, standby, and other nonproductive activities. This does not seem likely.

--A shop at Alameda Naval Air Station, California, had three direct-labor employees. On 1 day they charged 81.1 staff-hours to direct labor, or 27 hours for each man. The men had worked on 18 lifevests during

the day and, as part of the test procedure, had inflated the vests for 4 hours to see if they leaked. In computing the 81.1 hours charged as productive work, 72 hours represented the time the 18 vests were inflated. Since the three employees put in an 8-hour day, the maximum direct labor was 24 hours, and 81.1 hours was clearly erroneous.

Several activities included staff-hours for overtime, on-the-job training, and reservists on active duty in their productive time but excluded these hours from their total available time. For example, a representative of one maintenance squadron at McClellan Air Force Base told us reported labor-hours were inflated by including hours spent in on-the-job training. When a task took a mechanic 2 hours to complete and when another man was training on the task, the staff-hours of both were recorded as productive but only the mechanic's hours were included in the available time.

Besides being inaccurate, much of the data reported could not be relied on for comparing productivity among maintenance shops because the shops used different computation methods. At Fort Bragg, North Carolina, for example, different units of the same command computed available maintenance hours in the following ways.

- Unit 1. Total number of authorized mechanics and supervisors (enlisted) multiplied by 8 hours a day.
- Unit 2. Total mechanics available for work at the shop multiplied by 6 hours a day. (We were told that mechanics spent the first 2 hours each day on administration and physical training.)
- Unit 3. Total mechanics assigned multiplied by 8 hours a day.
- Unit 4. Total mechanics available for work at the shop multiplied by 5.6 hours a day. (The 5.6-hour figure was derived from an outdated Army regulation and represented available time after reductions for leave, company duties, training, etc.)

Unit 5. Total mechanics available for work at the shop multiplied by 8 hours a day.

At Moffett Field Naval Air Station, California, most of the intermediate maintenance shops we visited charged 8 hours a day as productive labor for each mechanic, even though the mechanics were not available for work the full 8 hours. This practice, along with others, resulted in these shops' overstating their productive hours by an estimated 25 percent.

As a final example, the manager of one intermediate shop at Oceana Naval Air Station, Virginia, told us he expected his mechanics to report all of their time in the shop as productive because he believed productive time included all activities, such as work, cleanup, and coffeebreaks. Other shops charged productive hours differently.

UNAUTHORIZED OR QUESTIONABLE
USE OF AVAILABLE PERSONNEL

If maintenance managers are to maximize their manpower resources, they must be able to identify nonproductive staff-hours (both authorized and unauthorized) and to control those which are unreasonable.

Authorized diversions from productive maintenance work include such activities as leave, athletics and recreation, military duties, and training. The Air Force expects authorized diversions to consume about 14 percent of assigned staff-hours. The Army and Navy apparently do not have formal objectives for authorized-diversion time. However, officials at some Army activities followed an outdated Army publication which suggested that authorized diversions would normally use 30 percent of assigned staff-hours.

Some military mechanics' time must necessarily be devoted to activities other than maintenance. But because the services' information systems tracked only those staff-hours reported as productive, management did not know how many or where the remaining staff-hours were used.

The services' incomplete staff-hour reporting systems made it impractical and frequently impossible for us to determine what maintenance personnel were doing when not

doing maintenance. Some of the unaccounted-for time was no doubt being put to good use, perhaps even on maintenance-related requirements. Records of one maintenance company at Fort Hood, Texas, for example, showed that about 40 percent of assigned staff-hours were charged to productive work. Responsible officials said that some of the nonmaintenance time was spent on maintenance of organizational equipment, fielding of contact teams to assist other units in doing maintenance, and mandatory training and field exercises. The records did not show what portion of assigned hours was represented by such activities.

Other parts of the unaccounted-for time were not put to such good use. At several of the shops visited, personnel were idle and little work was being done. Even certain authorized diversions, which did not appear to enhance mechanics' development, accounted for many lost staff-hours. For example:

--At one of Fort Bragg's maintenance activities, 84 percent of the mechanics' assigned time (based on an 8-hour workday) was diverted from productive maintenance work. The largest part--47 percent--of this time was estimated to have been for temporary non-maintenance duties, including lifeguard duty, work in the commissary and the crafts shop, and base-cleaning details.

--Supervisors of 11 shops at the Alameda intermediate maintenance department estimated that their mechanics, constituting 50 percent of the department's direct-labor force, were given an average of 20 hours' special liberty each month.

Many staff-hours were also lost to such unauthorized diversions as starting work late, taking extended lunch periods, and stopping work early. At the intermediate maintenance departments of both Moffett and Alameda Naval Air Stations, such practices reduced the mechanics' work-days by an estimated 25 percent.

COMPARISON OF ACTUAL
AND STANDARD REPAIR TIMES

To determine how productively those hours that were not diverted from maintenance were spent, we developed labor standards¹ with the assistance of standards officials and technicians at the Alameda Naval Air Rework Facility and the Sacramento Air Logistics Center, both in California. By applying these standards to 788 intermediate maintenance tasks done at McClellan Air Force Base, we found that work which took 8,534 staff-hours should have taken only 3,749 hours.

McClellan Air Force Base
November 1973 to April 1974

	Number of mainte- nance tasks	Actual staff- hours : reported	Standard staff- hours	Percent above standard
Field mainte- nance:				
Engine shop	427	6,301	2,450	157
Propeller shop	117	598	293	105
Avionics mainte- nance:				
Radio shop	46	271	146	86
Radar shop	<u>198</u>	<u>1,364</u>	<u>861</u>	<u>58</u>
Total	<u>788</u>	<u>8,534</u>	<u>^a3,749</u>	<u>128</u>

^aDoes not add due to rounding.

Alameda Naval Air Station also exceeded the standards. Work reported to have taken 9,502 staff-hours should have taken only 2,895 staff-hours.

¹Standards were developed only for tasks for which the actual work content, methods, and environment could be accurately identified and evaluated.

Alameda Naval Air Station
July 1973 to April 1974

	Number of mainte- nance tasks	Actual staff- hours reported	Standard staff- hours	Percent above standard
Engine shop	69	7,864	1,561	404
Tire shop (note a)	<u>354</u>	<u>1,638</u>	<u>1,334</u>	<u>23</u>
Total	<u>423</u>	<u>9,502</u>	<u>2,895</u>	<u>228</u>

^a November 1973 to April 1974.

At one of Alameda's intermediate maintenance shops, we compared the standard and actual times to tear down and build up J-57 (P-10) engines from July 1973 through April 1974, as follows:

- For each of the 33 engines that were torn down, an average of 96.5 staff-hours was charged, compared with the standard of 18.2 hours. The hours charged ranged from 40 to 296. In months when three or fewer engines were torn down, an average of 125 staff-hours was charged to each engine; when four or more engines were torn down in a month, the average hours charged for each engine dropped to 73.
- For each of the 36 engines that were built up, an average of 130 staff-hours was charged, compared with the standard of 26.69 hours. The hours charged ranged from 11 to 980. When three or fewer engines were built up in a month, an average of 173 hours was charged; when four or more engines were built up in a month, an average of 103 hours was charged.
- Combining the tearing-down and building-up tasks, we found that an average of 154 staff-hours was charged to each engine in those months when six or fewer of these tasks were done, as opposed to an average of only 87 hours in those months when seven or more tasks were done.

Our comparison shows that the staff-hours available to tear down and build up engines apparently were a major determinant of the number of hours charged to each maintenance task. In other words, the work expanded to fit the time available.

Because the services generally did not use labor standards, management lacked one of its most basic tools for controlling productivity. If standards had been used, management could have identified excessive repair times, as we did in our limited sample, and taken appropriate corrective action.

CONCLUSIONS

The services' below-depot management information systems did not enable managers to effectively control the productivity of assigned personnel because:

- They generally accounted only for hours mechanics spent on assigned maintenance tasks. The remaining unaccounted-for hours represented a large part of the total hours available.
- They did not provide adequate controls over the accuracy of the productive hours reported, and many assigned maintenance hours were used for questionable or unauthorized diversions.
- They generally did not provide for comparing reported labor hours with engineered labor standards to evaluate mechanics' performance.

We believe that, because of these weaknesses, maintenance personnel are not being productively used and that managers have no effective basis for assessing and improving existing productivity. We also question whether managers have a reasonable basis for determining how many personnel are or will be needed to satisfy maintenance requirements. If managers' information on how long it takes or should take to do a maintenance task is inaccurate, how can they project how many staff-hours and personnel will be needed in the future? And if managers do not know how many assigned hours are not spent on maintenance, how can they determine

how many hours should be assigned? Better reporting on maintenance would enable managers to readily answer these questions and would likely improve overall productivity.

RECOMMENDATIONS

We recommend that the Secretary of Defense require the military services to improve their below-depot management information systems by:

- Establishing adequate controls over the accuracy of reported productivity data. These controls should include uniform procedures to be followed in computing both available time and productive time.
- Requiring that all available staff-hours be tracked and summarized so that management has easy access to the data and can take any necessary corrective action.
- Requiring that engineered or other independently developed labor standards be used, when practicable, to evaluate mechanics' performance.

AGENCY COMMENTS

In a May 14, 1975, letter (see app. I), DOD said it generally agreed that the productivity of below-depot maintenance activities needed to be improved. DOD also agreed that existing cost documentation for below-depot maintenance management was insufficient. DOD has therefore endorsed the Air Force development and test of a base-level cost accounting system which will identify both direct and indirect staff-hours and which will relate costs to weapon systems and subsystems by mission, design, and series. The system was scheduled for use on Air Force aircraft systems starting July 1, 1975, and DOD expects that its successful implementation will be followed by the initiation of similar systems in the other military services. The Air Force accounting system has not yet been approved by the Comptroller General but will be submitted to GAO for evaluation at the end of fiscal year 1976.

DOD stated that the use of engineered and other labor standards, as called for by DOD policy, would be emphasized and would become more meaningful as accurate information on actual performance becomes available. DOD concurred in the

need for accurate data on productivity and said implementation of the Air Force's new system was a first step toward this goal.

The Air Force's new system, in our opinion, should help to improve below-depot aircraft maintenance by making productivity more visible to Air Force management. The other services should be required to develop similar systems. Through accurate data on how mechanics spend their time and through the effective use of labor standards, the services would have the proper tools for evaluating and improving productivity.

CHAPTER 3

MAINTENANCE REDUNDANCIES WITHIN AND BETWEEN SERVICES

Each of the military services' combat and combat-support units is encouraged to become as self-sufficient as possible in providing for below-depot maintenance, to insure that weapon and equipment readiness is maintained and that operational commitments, including contingency deployments, can be satisfied. Strict adherence to this philosophy would insure that each combat unit would be able to satisfy its organizational and intermediate maintenance needs no matter where it was deployed. However, this philosophy inhibits the potential economies from consolidating units' maintenance requirements and resources. Recognizing this inherent weakness, DOD has instructed the military services to take advantage of consolidation opportunities which offer savings without degrading unit readiness.

The Army, Navy, and Air Force have each made some efforts to consolidate their maintenance resources, but many major redundancies, both within and between services, remain.

AIR FORCE

Aircraft squadrons are the basic combat units in the Air Force's aviation program. Each squadron generally consists of a given number of aircraft of the same model, such as C-130s or B-52s. The squadrons, in turn, are administratively combined to form wings which generally consist of a number of squadrons of a particular type of aircraft, such as bombers, fighters, or cargo carriers.

Air Force Manual 66-1 generally provides that the activities which are assigned military equipment, and the commands to which they are attached, be responsible for satisfying their below-depot maintenance. It requires, with certain exceptions, that each major command satisfy the organizational and intermediate aircraft maintenance needs of all of its activities by using a standardized organization under one chief of maintenance at each base. Therefore each command which has aircraft assigned at a given base frequently has its own maintenance capability at that base.

Efforts to consolidate

Consolidated maintenance for each command at a base became effective October 1, 1972. Air Force officials said that the policy, by limiting the number of autonomous maintenance groups at each base to the number of major command wings stationed at the base,¹ eliminated much of the previously duplicated maintenance capability.

The Air Force also provided for consolidating some jet engine intermediate maintenance by allowing different units using the same engines to establish regional, or "queen bee," maintenance facilities as long as such facilities were determined to be cost advantageous and did not degrade readiness. Although these facilities have helped to reduce maintenance redundancies, their full potential has not been realized because intraservice and interservice coordination of jet engine maintenance is lacking. (See p. 30.)

Maintenance redundancies at Air Force bases

Although the Air Force has consolidated each wing's maintenance activities at a base, duplicated capability continues to exist because many bases have more than one command and therefore more than one wing. Aircraft and equipment assigned to collocated commands are often different types, but the basic aircraft operating systems and structures are similar. Therefore the below-depot maintenance organizations on many bases have common basic skills and equipment, much of which is underused.

At Davis-Monthan Air Force Base, Arizona, for example, the Strategic Air Command and the Tactical Air Command have separate below-depot maintenance organizations. The former command primarily flies the U-2; the latter primarily flies the A-7D. But some aircraft--the DC-130, the T-33, and the CH-3 helicopter--are common to both commands. The commands operate separate radar, radio, navigation, and instrument shops--even in the same building--that are assigned a total of about \$6 million worth of support equipment. By comparing assigned equipment items costing over \$2,000 each, we

¹If two or more aircraft wings of the same major command are stationed at one base, they are not required to consolidate their maintenance functions.

identified 87 items, having a total value of about \$425,000, which were common to both commands. Of these items, 70 per cent were used less than 20 percent of the shop time.

Such equipment redundancy and underutilization could be reduced if the Strategic Air Command and the Tactical Air Command jointly operated these shops, as they do their machine shops and wheel and tire shops. According to command officials, these joint operations have worked well--the wheel and tire shops reduced equipment requirements by \$16,000.

McClellan Air Force Base has a similar situation. Four commands, plus the depot, provide below-depot maintenance. Although the capabilities of the commands' maintenance organizations vary, the organizations have many common maintenance functions. Overhead functions, including workload planning, programing, and analysis, are an example. The approximate number of duplicated overhead personnel assigned at the beginning of 1974 follows.

	MAC (note a)	ADC (note b)	AFLC (note c)	AFRES (note d)	Total
Chief of maintenance	47	78	16	16	157
Organizational main- tenance	14	22	5	4	45
Field maintenance	12	50	1	5	68
Avionics maintenance	<u>9</u>	<u>47</u>	<u>-</u>	<u>1</u>	<u>57</u>
Total maintenance overhead per- sonnel	<u>82</u>	<u>197</u>	<u>22</u>	<u>26</u>	<u>327</u>

^aMilitary Airlift Command.

^bAerospace Defense Command.

^cAir Force Logistics Command--excludes the depot.

^dAir Force Reserve--includes full-time technicians only.

Other examples of redundancies at McClellan follow.

- All four commands had radio, radar, and instrument shops. Of 73 items, valued at \$375,000, which were common to the shops, 75 percent were used less than 20 percent of the shop time.
- Two of the commands had machine and metal-processing shops with total assigned equipment valued at \$297,000. The other two commands used the depot shops. Depot officials said that the depot had the capacity to take on the total workload of the commands operating their own shops and that part of the workload could possibly be handled without increased staffing.
- Three of the commands relied on the depot wheel and tire shop for their requirements. The other command, however, operated its own shop with \$82,000 worth of equipment. Depot officials said the depot could take on this command's workload, probably without increasing its staffing.

At Langley Air Force Base, Virginia, three major activities separately maintain powered and nonpowered aerospace ground equipment, including generators, platforms, jacks, and air compressors. This equipment, which is used to support flight preparations and maintenance requirements, is similar for the various types of Air Force aircraft. As a result, maintenance capabilities were duplicated.

The three maintenance activities at Langley, which were within 1.5 miles of each other, maintained 278 powered and 365 nonpowered equipment items valued at \$2.9 million. Comparing specific items of equipment assigned to each activity, we found that 342 units of equipment, or 53 percent of the total powered and nonpowered assets, were common to at least two of the three activities. Although use of the equipment was not routinely reported, occasional hour-meter readings were taken for some items at the beginning and end of specific periods for maintenance scheduling.

On the basis of this limited information, items common to two of the activities were used as follows:

<u>Type of equipment</u>	<u>Air Defense Command activity</u>		<u>Tactical Air Command activity</u>	
	<u>Number of units</u>	<u>Percent used</u>	<u>Number of units</u>	<u>Percent used</u>
Electric generator (MD-3)	4	18.3	9	27.6
Light cart (NF-2)	9	28.6	6	20.7
Air conditioner (MA-3)	5	12.2	1	0.3
Cabin pressure tester (MB-1)	1	0.0	1	0.0
Jet air starter (MC-11)	17	21.9	1	7.0

Better use of the equipment would likely result if the three activities consolidated, since they could pool their equipment and store that which they did not need in peacetime. Even though not all the ground equipment being maintained was common to at least two of the activities, the shop equipment used to maintain it was. The shop equipment included ordinary grinders, drill presses, workbenches, and hoists. Further, mechanics' skills were common to all three activities. According to shop supervisors, powered-equipment mechanics are trained to maintain any piece of powered aerospace ground equipment. Similarly, non-powered-equipment mechanics can maintain any nonpowered aerospace ground equipment. Although the capability existed, mechanics were not exchanged among the different maintenance activities.

Maintenance of aerospace ground equipment, particularly at Langley, offers an excellent opportunity for savings through consolidation because of (1) the proximity of the activities, (2) the commonality and underutilization of the equipment, and (3) the commonality of the mechanics' skills.

NAVY

Navy squadrons and wings are organized similarly to those of the Air Force, as described on page 16. The squadrons which form a wing can be either stationed with the

headquarters of the wing at a naval air station or individually detached and deployed to an aircraft carrier or to a satellite operations base.

Efforts to consolidate

The Navy has consolidated all intermediate aircraft maintenance activities at designated maintenance departments, both ashore and afloat. Each shore and ship station therefore has only one intermediate maintenance activity supporting all assigned units or squadrons. Although personnel trained to do intermediate maintenance continue to be attached to each squadron, they are assigned to the consolidated maintenance department at each air station or ship where the squadron is located.

Like the Air Force, the Navy has tried to limit the development of new engine maintenance capabilities. The Navy's "three-degree" program identifies and rates by degrees the existing engine maintenance capabilities. User activities are required to ship their engines to the nearest activity having the required capability rather than develop their own.

Redundancies in Navy organizational maintenance

Although the Navy has consolidated its intermediate aircraft maintenance activities, each Navy squadron continues to be responsible for doing organizational maintenance on only its assigned aircraft. Each squadron's organizational maintenance department is therefore assigned the manpower, facilities, and equipment to meet this responsibility. As a result, the squadrons--often in the same hangers--have many maintenance personnel assigned to duplicate overhead functions and have duplicate equipment.

Some of the equipment assigned to organizational maintenance departments is needed to satisfy particular functional requirements rather than frequently recurring maintenance requirements. Therefore the squadrons have many identical items of equipment which are infrequently used, as follows:

--Of \$1.36 million worth of equipment assigned to 6 of the 11 squadrons at Lemoore Naval Air Station,

California, 86 percent was used less than 10 percent of the normal shop time. Four squadrons, for example, had identical radar test sets, each valued at \$30,900. One squadron used its test set an average of 4.5 hours a day, and the other three squadrons used theirs for an average combined total of only 1 hour a day.

--Our review of \$1.12 million worth of equipment assigned to 4 of the 13 squadrons at Oceana Naval Air Station showed that 70 percent was used less than 10 percent of the time.

As in the case of equipment, many personnel are assigned to each squadron to satisfy the same particular maintenance functions. For example, at Lemoore each squadron had its own overhead organization, including maintenance officers and personnel assigned to quality assurance, maintenance control, and other functions. As shown below, the consolidated intermediate maintenance department was able to support all the squadrons assigned to the base with only 48 overhead personnel, or about 13 percent of its total personnel. In contrast, 6 of the 11 squadrons normally on station used 174, or over 21 percent, of their personnel for overhead functions.

	<u>Six squadrons</u>	<u>Intermediate maintenance department</u>
Maintenance officers	^a 50	7
Maintenance control	39	3
Quality assurance	41	8
Material control	28	11
Data analysis	6	3
Maintenance admin- istration	<u>10</u>	<u>16</u>
Total	<u>174</u>	<u>48</u>

^aIncludes approximately 35 pilots who had some maintenance duties in addition to their flight duties.

If the squadrons were to consolidate their organizational maintenance as they did their intermediate maintenance, they could reduce the existing redundancies in over-

head personnel and maintenance equipment. The Navy completed a detailed study in December 1973 on consolidating maintenance for shore-stationed patrol aircraft squadrons at Moffett Field Naval Air Station. The study team concluded that consolidation would be feasible and that the greatest advantage would come from a full consolidation of organizational and intermediate maintenance activities under one maintenance wing. The team reported that a consolidated maintenance wing would be justified for economic reasons alone but that greater savings could be realized in the long term from other aspects of consolidation, such as improved products, reduced equipment wear, improved aircraft availability, and improved morale.

The study recommended that the consolidated-maintenance-wing concept be tried. The Navy was evaluating the study conclusions and recommendations at the end of our review.

Redundancy in Navy maintenance of ground support equipment

The Navy's consolidated aircraft intermediate maintenance does not include all maintenance on aircraft ground support equipment. Therefore some activities which maintain such equipment operate separately at the same base and in the same geographical area.

At the Norfolk Naval Air Station, Virginia, at least three activities did intermediate maintenance on ground support equipment.

- The intermediate maintenance department maintained approximately 1,180 units valued at over \$3 million. The direct labor and material cost of this maintenance for the 6 months ended February 1974 was estimated at \$215,000, or 18 percent of the department's total cost.
- The Naval Air Rework Facility maintained about 650 units. During fiscal year 1974 the estimated direct cost for this maintenance was \$350,000.
- Aircraft carrier personnel maintained their own ground support equipment when in port at the air station. An average of two carriers was there at all times.

In addition to these activities, the intermediate maintenance department at the Oceana Naval Air Station (within 20 miles of the Norfolk station) maintained about 1,060 units valued at more than \$5 million. The direct maintenance cost for the 6 months ended February 1974 was estimated at about \$275,000, or 8 percent of the department's total cost.

A similar situation existed in northern California, where the intermediate maintenance department, the Naval Air Rework Facility, the public works center, and carrier personnel all maintained ground support equipment at the Alameda Naval Air Station; about 40 miles away, the Moffett Field maintenance department did similar work.

Although the activities in the Norfolk area operated separately, they maintained duplicate types of ground support equipment. In a comparison which excluded the aircraft carriers, we found that, of 443 specifically identified units of equipment, 298, or 67 percent, were maintained by at least 2 of the 3 activities. Much of this equipment was underused. Beginning and ending hour-meter readings were reported monthly for some items the Oceana and Norfolk maintenance departments maintained. Using the limited information available, we computed the following use rates based on a 24-hour day.

<u>Type of equipment</u>	<u>Oceana (note a)</u>		<u>Norfolk (note b)</u>	
	<u>Number of units</u>	<u>Percent used</u>	<u>Number of units</u>	<u>Percent used</u>
Mobile power plants	56	6.9	48	6.6
Air conditioners	5	2.5	6	2.1
Tow tractors	58	8.1	42	8.3
Hydraulic test stands	34	1.1	20	3.8
Jet starters (air)	3	11.0	(c)	(c)
Air compressors	(c)	(c)	9	1.7
Total	<u>156</u>	6.0	<u>125</u>	6.0

^aBased on data for September 1973 through February 1974.

^bBased on data for February 1974. Earlier data was judged too inaccurate since it contained numerous negative and above-maximum-possible readings.

^cNot available.

As was the case with Air Force maintenance of aerospace ground equipment, ground support maintenance activities used similar shop equipment and interchangeable mechanic skills. We identified over 200 pieces of shop equipment, such as battery chargers, drill presses, jack stands, and degreasers, which at least two of the facilities in the Norfolk area used. Also, although some ground support equipment mechanics had repair specialties, all of them could repair all types of ground support equipment. Such commonality of equipment and skills makes maintenance of ground support equipment at nearby activities another good candidate for consolidation.

ARMY

The Army classifies its maintenance levels differently from the other services. Although organizational and depot maintenance are classified essentially the same as in the other services, between these two levels the Army includes

--direct-support maintenance, which is a combination of both organizational and intermediate maintenance as classified by the other services, and

--general-support maintenance, which is the intermediate maintenance beyond the capabilities of direct-support units.

Efforts to consolidate

The Army has made some efforts to consolidate its intermediate maintenance. By regionally consolidating intermediate aircraft maintenance at certain activities, the need for units with few assigned aircraft to develop their own maintenance capabilities has been reduced.

Also the director of industrial operations at each base in the continental United States has been made responsible for coordinating the direct- and general-support maintenance of all organizations at the base. This coordination appears to have resulted in some individual consolidations. For example, in 1963 Fort Ord, California, consolidated all of its general- and direct-support maintenance on military and commercial vehicles under its primarily civilian-staffed Material Maintenance Division. Although the consolidation

was interrupted for 2 years, it was reestablished in January 1973. Comparing calendar year 1973 consolidated operations with those of the prior year, Fort Ord reported:

- A 10 percent reduction in maintenance staff-hours.
- A \$136,445 savings in personnel costs.
- A \$125,961, or 25-percent, reduction in maintenance costs.
- A 5-percent reduction in average vehicle downtime.
- A reduction in the inventory of repair parts and supplies from about \$86,500 to \$27,500.

As a result of a Fort Hood consolidation in February 1974, approximately 160 of one activity's 270 military personnel were assigned to work with about 500 civilian employees of another activity in doing general-support maintenance on military equipment and vehicles. Two other activities separately provided general- and direct-support maintenance on commercial vehicles. Fort Hood officials cited establishment of a local repair capability and improved training and use of resources as their reasons for consolidating. Also, since consolidating, the activity has put 16 of its 18 mobile maintenance vans containing duplicate equipment, tools, and supplies into administrative storage for use during training exercises or mobilization.

Redundant capabilities in vehicle maintenance

Army activities which do intermediate vehicle maintenance are normally categorized according to whether they do general- or direct-support maintenance, or both, and whether the vehicles are of military or commercial design. Although some of these activities had been consolidated at the bases visited, others had not and continued instead to use their own personnel, equipment, and facilities to separately maintain vehicles of like design.

At Fort Bragg, for example, two activities did general-support maintenance on military-design vehicles. One was manned by military personnel and the other--the Material

Maintenance Division--was manned by civilians. Many separate activities provided the organizational and direct-support maintenance for these vehicles. We visited the two general-support activities, as well as two civilian-manned activities which provided direct support for commercial vehicles. The two direct-support activities usually contracted for general support of their vehicles; they occasionally sent their vehicles to the Material Maintenance Division.

The four activities visited maintained a total of about 14,000 vehicles. Although they had mechanics with similar skills and repaired similar vehicles, each activity had its own complete set of shops, equipment, mechanics, and overhead personnel. The number of vehicle maintenance personnel and the fiscal year 1974 vehicle maintenance costs at the activities appear below.

<u>Activity</u>	<u>Indirect labor personnel</u>	<u>Direct labor personnel</u>	<u>Type of personnel</u>	<u>In-house costs</u>	<u>Contract costs for general support</u>
Material Maintenance Division (general support)	8	85	Civilian	\$1,566,979	\$ 9,948
General support	4	65	Military	621,393	-
Direct support	^a 17	^a 84	Civilian	777,947	76,909
Direct support	3	17	Civilian	417,922	60,190

^aTotals exclude 12 direct and 6 indirect military personnel assigned primarily as drivers.

The situation shown in the table above offers good potential for consolidation. Fort Ord, as shown on page 25, sets a good example of the savings to be achieved by consolidating general- and direct-support activities under the Material Maintenance Division.

Fort Bragg officials were generally opposed to consolidating their vehicle maintenance activities, even though they had made no studies of the matter. They were opposed to consolidating the two general-support activities because of mobilization and field-training requirements. However,

Material Maintenance Division officials said their mechanics could do both general- and direct-support maintenance on any vehicle of commercial or military design. They also said that mechanics in the direct-support activities could be qualified to work on military vehicles after a short period of on-the-job training. We were told the Army was replacing military-design trucks and jeeps with those of commercial design. After this is done the four activities visited will be maintaining identical types of vehicles.

Redundancies such as these, in our opinion, are especially questionable in view of the low productivity discussed in chapter 2. Fort Bragg, for example, could have been much more productive if all the mechanics in the military-manned general-support activity had been assigned to maintenance. During a 32-week period in fiscal year 1974, these mechanics were assigned to housekeeping and other nonmaintenance functions about 47 percent of the time. As a result, only about 16 percent of assigned maintenance staff-hours were spent on maintenance. During that same period the Material Maintenance Division's work backlog ranged from 27 to 120 staff-days. Since Fort Bragg had military mechanics available and maintenance work to be done, the military mechanics could have done the work.

Military personnel are obviously assigned to a unit because they will be needed in wartime. We believe the mere fact that they are assigned necessitates using their skills in peacetime before civilians are hired or services are obtained by commercial contracts.

Redundancy in Army, Army Reserve,
and Army National Guard maintenance

The Army Reserve, Army National Guard, and Active Army have their own systems for below-depot maintenance of often-similar equipment at often-nearby activities. As a result, maintenance capabilities are duplicated.

Army Reserve equipment needing organizational maintenance beyond the capability of the using unit is sent to support activities located according to types of equipment and density of units being supported. These activities, staffed by full-time reservists, send most equipment need-

ing intermediate maintenance to designated Active Army installations.

Army National Guard units send nonaircraft equipment to centrally located organizational maintenance activities staffed by full-time National Guardsmen. If the maintenance work is beyond the capabilities of these activities, they send the equipment to National Guard intermediate maintenance activities. National Guard aircraft maintenance is handled by National Guard aviation-support facilities and transportation aircraft repair shops.

In California alone, the Army Reserve operates 12 organizational maintenance activities; the National Guard operates 40. Most of these activities are concentrated in the San Francisco and Los Angeles areas, but they operate independently and send equipment in different directions for intermediate maintenance. For example, the Reserve organizational activity in San Jose sends equipment to the Presidio of San Francisco, about 50 miles northwest; the neighboring Guard activity sends similar equipment to Stockton, about 70 miles northeast. The Reserve organization activity in Fresno sends equipment to Fort Ord, about 150 miles west; the Guard activity in Fresno sends equipment to Stockton, about 125 miles northwest.

Since much of the equipment repaired by nearby Guard and Reserve shops is similar, the need for having so many independent shops and for sending equipment from the same location to locations in different directions is questionable. Some shops with similar capabilities operated at the same installation in California, as shown in the following examples.

--At the Los Alamitos Naval Air Station, the Army Reserve and Army National Guard had adjacent aircraft maintenance facilities. For the most part these facilities supported the same types of aircraft but did not jointly use shops or equipment.

--At Hamilton Air Force Base, the Active Army and the Army Reserve, as well as the Air Force Reserve, operated independent aircraft maintenance facilities. Although only a few of the aircraft types were simi-

lar, these facilities did some of the same types of work, primarily servicing and inspecting, and used the same types of petroleum, oil, and lubricants. However, each facility used its own trucks and people. Officials of the Army facilities said some of their work could be consolidated with the work of each other and with that of the Air Force. As of May 1975, we had received no word that steps had been taken to consolidate.

The Army recognized redundancies such as those cited above during a study completed in mid-1972. The study concluded that a single maintenance and logistical system was needed to serve the Active Army, the Army Reserve, and the Army National Guard and that such a system would result in dollar savings and in increased efficiency and equipment readiness.

One opportunity for consolidation cited in the report was at an installation which had five separate Army, Army Reserve, and Army National Guard maintenance activities with common functions. The Army estimated that, by consolidating these activities, it could save \$419,000 annually. Although the study recognized possible command, funding, and political problems, it recommended that consolidation be further studied. At the time of our review, consolidation had not occurred.

INTERSERVICE DUPLICATION OF MAINTENANCE CAPABILITIES

The preceding sections of this chapter set forth examples of redundant capabilities within each service. The redundancies shown--although costly in terms of each service's skills, equipment, and facilities--become even more costly when all the services' capabilities are viewed together.

The consolidations that have taken place apparently have not considered either the capabilities or the requirements of the other services. The Air Force's queen-bee program (see p. 17) and the Navy's three-degree program (see p. 21), for example, were established to reduce requirements and costs by consolidating jet engine maintenance at centrally located activities. Although these programs appear

to have eliminated many redundancies within each service, they were not coordinated to eliminate redundancies between the two services. Furthermore:

--Major commands within the Active Air Force operate consolidated jet engine intermediate maintenance facilities independently of one another.

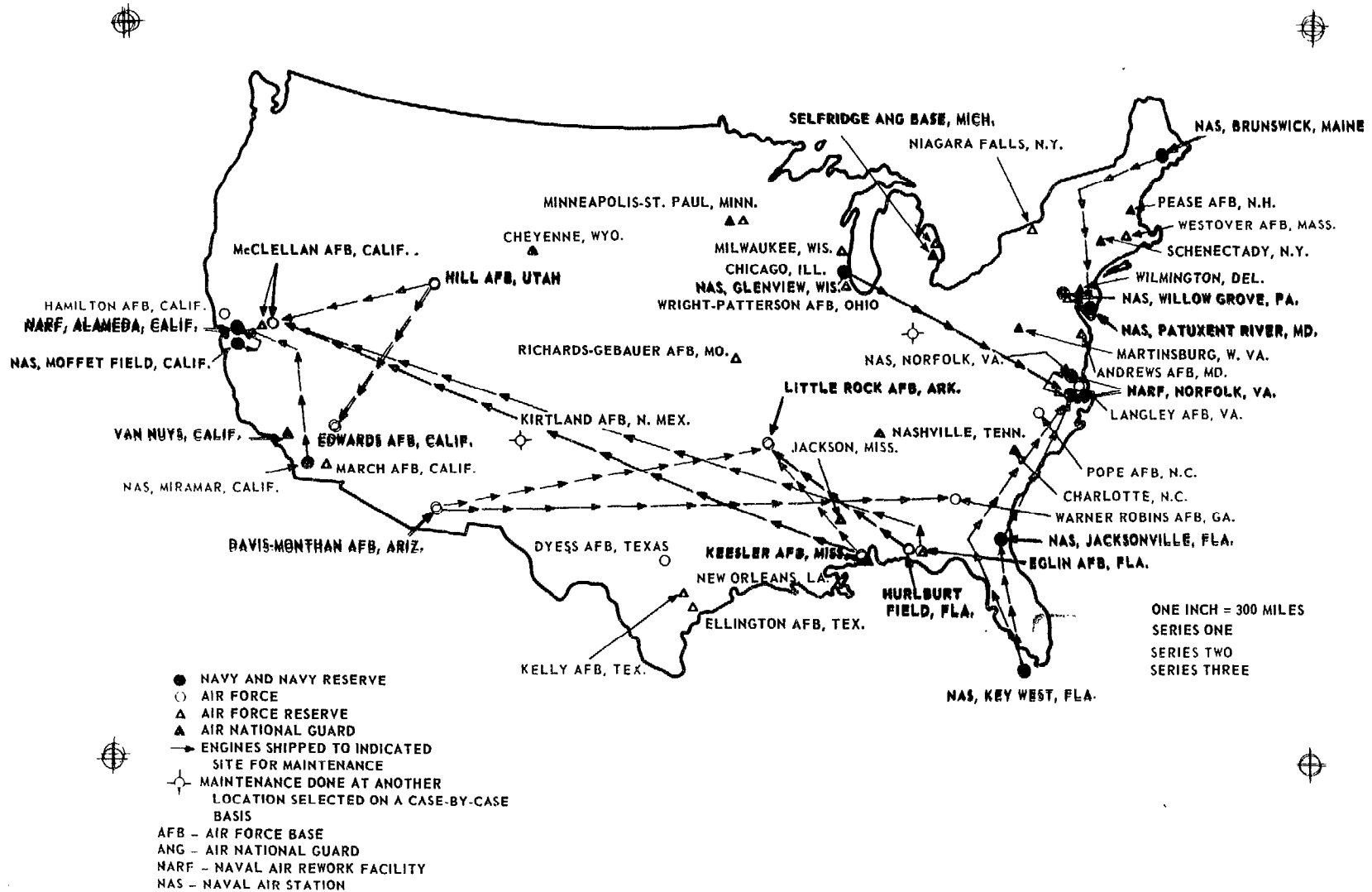
--The Air Force Reserve and Air National Guard are not included in the active commands' programs; instead, Reserve and Guard sites have their own capabilities for jet engine intermediate maintenance.

Eliminating as many redundancies as possible in jet engine intermediate maintenance is especially important because of its high cost, both in terms of staff-hours consumed and support equipment required. For example, the Strategic Air Command at Mather Air Force Base, California, normally uses an estimated 23,000 staff-hours a year to remove and install accessories on the approximately 165 engines being supported. One item of support equipment alone--a test stand--costs \$125,000.

A look at the maintenance of only one engine--the T-56--shows the many interservice redundancies. The T-56 is a turboprop jet engine used on the Air Force's C-130 and the Navy's C-130, C-2, E-2, and P-3 aircraft. Although several different models of the engine are used on these aircraft, manufacturer representatives told us that models within the T-56's three basic series were similar and could be considered compatible for maintenance.

The map overlays following this page show, by series, the locations of activities which use T-56 engines and the various sites where the engines are maintained. Some engines are shipped long distances to consolidation points even though compatible capabilities of another service or command are nearby. Other T-56 engines are separately maintained at two or more nearby sites. The number of sites concentrated in particular areas of the country is a good indication that T-56 maintenance could be effectively consolidated regionally.

JET ENGINE INTERMEDIATE MAINTENANCE SITES
FOR THE T-56 ENGINE



The following examples, drawn from the overlays, highlight some of the redundancies.

Series 1 of the T-56

- The east coast had eight separate jet engine maintenance sites within a 250-mile radius: two operated by the Navy, two by the Air Force Reserve, and four by the Air National Guard.
- The Strategic Air Command shipped engines about 1,000 miles from Arizona to a Tactical Air Command queen bee in Arkansas; two other maintenance sites were less than 500 miles away. These two sites were about 100 miles apart in southern California and were independently operated by the Air National Guard and the Air Force Systems Command.
- The Air National Guard and the Air Force Reserve each maintained a separate maintenance site in the Wilmington, Delaware, area and in the Minneapolis-St. Paul, Minnesota, area.

Series 2 of the T-56

- The Strategic Air Command shipped engines about 1,500 miles east from Arizona to Georgia; the Military Airlift Command shipped engines about 2,000 miles west from Mississippi to California. The Air Force Reserve was located at the same base in Mississippi and had its own capability to overhaul these engines.
- The queen bee at McClellan Air Force Base had an anticipated annual workload of 100 engines, including those shipped from Mississippi. The Air Force Reserve at McClellan had a separate capability to support its annual maintenance requirement of three or four engines.
- One Air Force Reserve and two Navy sites near one another in the San Francisco area were not consolidated; similarly, one Air Force and two Navy sites within a few miles of each other in the Norfolk area were not consolidated.

Series 3 of the T-56

- The Military Airlift Command shipped engines to California from Mississippi and Florida, even though the Tactical Air Command and Navy maintenance sites in Arkansas and Florida were much closer.

- Three separate sites (two Navy and one Air Force) in northern California within about 125 miles of each other were not consolidated.

- The Navy Reserve shipped engines about 800 miles from Wisconsin to Virginia, even though the Air Force Reserve capability in Michigan was less than half that distance.

The map overlays show the maintenance redundancies not only within a T-56 series but also between the series. Together the three series clearly show both the need and the opportunity for regionally consolidating the T-56's maintenance, since the existing maintenance sites are concentrated primarily in four areas of the country. Although different types of equipment may be needed to maintain different series, the skills used are essentially the same for all three series. By pooling the maintenance equipment at centrally located sites, little if any new equipment would be needed and the present equipment and skills could be used more productively. Such a consolidation is discussed further on page 41.

The T-56 is not the only engine common to the services or separate commands of the same service. The J-57 engine, for instance, is used by the Navy on A-3 and F-8 aircraft and by the Air Force, including the Reserve, on B-52, C-135, F-100, F-101, and F-102 aircraft. As with the T-56, manufacturer representatives said models in the J-57 series had maintenance compatibility. Also the J-85 engine is common to the Air Force, on its F-5 and T-38, and to the Navy, on its T-2. Some helicopter engines, such as the T-58 used by the Navy and the Air Force, are also common to the services.

CONCLUSIONS

By emphasizing the need for unit self-sufficiency, DOD has forgone the many benefits from consolidating maintenance. Both within and between the military services, below-depot maintenance has been characterized by underuse and redundancy. Overhead functions, personnel skills, and equipment have been duplicated among often-nearby activities, and many of these resources have been underused. If the services put more effort into eliminating maintenance redundancies, resources could be more effectively used and large dollar savings could be obtained. Maintenance consolidation would also bring the services' total peacetime maintenance capabilities more in line with total peacetime requirements without compromising defense preparedness. As discussed in the next chapter, this is only one of several methods for improving below-depot maintenance operations.

RECOMMENDATION

We recommend that the Secretary of Defense encourage the military services to consolidate their maintenance programs, in order to maximize the use of their limited resources and to simultaneously achieve desired readiness for national emergencies.

AGENCY COMMENTS

In commenting on our report (see app. I), DOD said its policy on consolidation, set forth in DOD Directive 4151.16, was to consolidate maintenance activities and operations into the minimum number of facilities at each installation while insuring that readiness levels were maintained and operational commitments could be satisfied. The directive also requires interservice maintenance support where economic benefits will result and where operational capabilities will not be degraded. DOD has said that, because it does not control the threats that may arise, military forces must retain sufficient flexibility and must be manned and equipped accordingly.

In DOD's opinion, consolidating facilities, workloads, or maintenance organizations must be approached with great caution and a distinction must be drawn between units that will deploy and those not likely to deploy. DOD said, however, that it would continue to encourage consolidated

maintenance where it would not adversely affect readiness and that the military services, on a case-by-case basis, were looking into potential consolidations of deployable units. The cases of redundant capability which we presented in this chapter would be a good starting point for the military services' consideration. And through further study and better coordination, the services would likely find other instances in which consolidation could eliminate existing redundancies in equipment, skills, and overhead personnel but maintain readiness.

CHAPTER 4

POTENTIAL FOR REDUCING MAINTENANCE COSTS

WITHOUT COMPROMISING READINESS AND MOBILITY

The increasing pressure to reduce defense spending and the adoption of the All-Volunteer Army concept, with its attendant rise in military personnel costs, have created unusual demands on the military services to reduce costs without sacrificing defense preparedness. Recognizing these demands, the Secretary of Defense, in his "Annual Defense Department Report for FY 1975," stated:

"In this time of high personnel costs it is more imperative than ever that we utilize our people in the most effective manner possible."

* * * * *

"The notion that each of the services should be independent of the others so that it doesn't have to rely, as it were, on external sources of support is outdated. We can no longer afford it. We have to now think in terms of Total Force structure as opposed to separate interests."

He also said the services must make a concerted effort to share logistical functions, such as aircraft and vehicle maintenance, to get the best use from bases and facilities.

We agree with the Secretary's observations and believe several actions could optimize, and thus reduce the cost of, below-depot maintenance. DOD and the services could, for example:

- Validate maintenance requirements to arrive at realistic estimates of the manpower and equipment required to meet anticipated military emergencies.
- Consolidate, eliminate, or place in reserve those capabilities which, on the basis of validated requirements, exceed peacetime and immediate-response requirements.

- Rely on peacetime maintenance capabilities to support, through expanded work hours and minimum supplemental staffing, those units or parts of units which will mobilize first.
- Rely on Reserve personnel to quickly replace mobilized personnel. This would allow peacetime staffing to be reduced and to be more productively used.
- Reallocate maintenance workloads during peacetime, to insure the productive use of resources which exceed peacetime requirements but which are necessary for emergency mobilizations.

We believe each of these actions, as discussed in more detail below, can greatly reduce maintenance costs without degrading military preparedness.

VALIDATE MAINTENANCE REQUIREMENTS

The basic assumptions about force deployment in military emergencies directly affect the amount and type of maintenance capability required, both in peace and in war. For example, if it were assumed that every combat and combat-support unit would immediately deploy in all emergencies, the units would have to be staffed and equipped during peacetime with full capability to satisfy their emergency maintenance needs. Such an assumption would have a decidedly unfavorable impact on peacetime military budget demands. On the other hand, although costs could be greatly reduced, it would be unrealistic to assume that all maintenance needs could be satisfied by activating Reserve manpower and equipment after a defense emergency developed.

Obviously, somewhere between the above extremes lie more reasonable assumptions about force deployment under varying defense threats. On the basis of these assumptions, and with accurate data on maintenance manpower and equipment required to support weapons at varying levels of use, a realistic estimate of the specific maintenance resources needed for all anticipated contingencies should be possible. It should also be possible, using the required military response times, to determine the most economical mix of

Active and Reserve maintenance resources needed by each combat unit.

Because of past emphasis on unit self-sufficiency and on the basis of the low productivity, low equipment use, lack of definitive maintenance data, and redundant capabilities we observed, existing below-depot capabilities appear to have been developed without adequate regard for the probable deployment of forces. Navy organizational aircraft maintenance, for example, is structured so that each aircraft squadron can satisfy its own organizational maintenance requirements. This structure appears to be based on the assumption that every squadron will have to independently deploy all of its aircraft at the same time, which would require enough deployment sites to provide a separate base of operations for each squadron. We believe a validation of emergency requirements would reveal that it is more realistic to assume that like squadrons would be deployed at least in pairs, rather than individually. The number of maintenance organizations could then be cut in half merely by consolidating the separate capabilities of paired units. Such consolidation, in turn, would result in lower maintenance costs because of reduced overhead personnel and maintenance support equipment requirements.

We believe a general validation of maintenance requirements, based on reasonable mobilization assumptions and improved requirements data, will show many potential opportunities for reducing maintenance costs by restructuring capabilities so as to be consistent with requirements.

ELIMINATE REDUNDANT CAPABILITIES

Military officials generally stated that the maintenance redundancies we observed (see ch. 3) were necessary to preserve unit integrity and to insure defense readiness. Although these are important considerations, we believe consolidating maintenance would result in both cost savings and improved defense preparedness, particularly if maintenance capabilities were revalidated on the basis of reasonable emergency requirements.

The following advantages might be expected if, for example, the Navy consolidated its organizational aircraft maintenance on the assumption that squadrons would be deployed and could be supported in pairs rather than individually. (These advantages also would be expected under other assumptions, such as two maintenance squadrons supporting four or five aircraft squadrons.)

- Maintenance personnel costs would decrease because the overall number of mechanics needed to support the peacetime workload would be reduced and because a separate maintenance overhead structure for each flight squadron would be unnecessary.
- Maintenance equipment costs would decrease because not all the duplicate, seldom-used test equipment would have to be available for daily use. For example, if each squadron previously needed an electronic test set to support its aircraft but used the set only 10 percent of the time, the consolidated maintenance group supporting two or more squadrons would need only one active test set to support the combined number of aircraft. The extra test sets could be taken out of daily service, packaged, and stored for immediate deployment if actually needed. Thus the cost of keeping them maintained, calibrated, and otherwise operational would be reduced.
- Unit readiness should not suffer because the consolidated maintenance group could concentrate on sustaining the readiness of those aircraft designated for immediate deployment.
- Personnel readiness would improve because the maintenance mechanics would have more opportunity to learn and practice their skills on a meaningful workload, that is, the peacetime workload would more nearly match the work force available and would give each mechanic more opportunity to do productive work.
- The consolidated workload would not be as subject to the extreme peaks and valleys which can occur

when one aircraft squadron is in a high flying cycle while another squadron is not.

--Readiness would be maintained because the equipment, personnel, and aircraft selected for particular deployments could be drawn from consolidated resources, thus better insuring that the deployed force consisted of the best skill mix and most appropriate resources available.

--Unit morale and integrity should not suffer because mechanics would have more productive work to do and because all personnel would know they were supporting a viable program aimed at providing a ready squadron of well-maintained aircraft.

Of course, Navy organizational aircraft maintenance is not the only opportunity for effective consolidation. Some of the other opportunities, although they appear to offer the same cost and readiness advantages, may take on completely different forms. For example, consolidating redundant Army, Army Reserve, and Army National Guard maintenance capabilities, as discussed on page 28, might best be accomplished on a regional basis.

Other redundancies, such as those concerning Air Force, Navy, Air Force Reserve, and Air National Guard maintenance of T-56 aircraft engines (see p. 31), might best be eliminated by consolidating on a regional and interservice basis. If some regional consolidation of jet engine intermediate maintenance is beneficial from a cost and readiness standpoint, as the Navy and Air Force have separately concluded for the T-56 engine, would it not also be beneficial for the Air Force Reserve and the Air National Guard? Furthermore, how reasonable is it to ship engines to single-service or command consolidation points 2,000 miles away, crossing each other en route, when they could be shipped to fewer sites maintained on an interservice basis? We believe the military services have not properly considered these alternatives because of the emphasis each gives to its own needs, rather than to total force needs based on validated military maintenance requirements. Why else would the Air Force Reserve unit at McClellan Air Force Base continue to maintain a complete jet engine

intermediate maintenance capability for its small annual requirements, while the active Air Force unit at McClellan serves as a consolidated maintenance point for the same type of engines shipped across the country? Such redundancy is not necessary or valid.

Maintenance consolidation for selected engines could take several forms. Maintenance for the T-56, for example, might best be consolidated by establishing four regional sites in the United States to serve the combined needs of all T-56 users. Responsibility for operating each site could be shared on an interservice basis, or the four prime using organizations could each operate one site for the benefit of all. This form of consolidation would offer many of the advantages mentioned earlier for Navy aircraft maintenance, plus others. For example:

- The unneeded equipment could be stored for immediate deployment to new consolidated maintenance sites which might be needed in a defense emergency.

- During an emergency deployment, the pooled manpower and equipment could support the particular requirements of the deployment. If the Air Force Reserve and National Guard T-56 users were not directly involved in the deployment, for example, their maintenance personnel and equipment could still be active at the consolidation sites supporting the T-56 users involved in the deployment.

Consolidated maintenance has already been tested and proved practical and economical by the Navy. The Navy established 10 public works centers which provide consolidated maintenance, including vehicle maintenance and other support activities. Savings of over \$21 million annually have been reported for the 10 centers, as follows:

Personnel	\$20,059,000
Transportation equipment	974,000
Shop equipment	151,000
Shop space	<u>288,000</u>
Total	<u>\$21,472,000</u>

RELY ON RAPID EXPANSION OF PEACETIME CAPABILITIES

On the basis of the low productivity observed, we believe the services have not adequately recognized that peacetime staffing levels can rapidly expand maintenance capabilities. The maintenance activities visited, with few exceptions, worked 8 hours a day, 5 days a week. Although this arrangement is acceptable during peacetime, more work hours can be expected of each employee during emergencies. Therefore, in converting validated emergency maintenance personnel requirements to peacetime personnel requirements, appropriate reductions in staffing requirements should be made. For example, if a particular deployment is determined to require 1,200 maintenance staff-hours a day, peacetime staffing might be set at 100 mechanics, assuming each could work 12 hours a day on a short-term emergency basis. This and other built-in capabilities for immediate expansion¹ should help bring peacetime staffing levels more in line with the naturally reduced peacetime workloads.

Maintenance personnel cannot be expected to work extended hours indefinitely during an emergency. However, it is reasonable to expect that such an extra effort could be sustained until supplemental personnel became available from other sources, such as the Reserves.

MAXIMIZE USE OF RESERVE PERSONNEL

The use of Reserve personnel could represent an effective bridge between required emergency staffing levels and lower, more cost-effective peacetime levels. This is especially true in the continental United States, where most installations have permanent civilian personnel as well as assigned military units. When peace seems stable, the military units are normally inactivated to better match the peacetime workload with the peacetime work force. If Reserve mechanics were available for activation within a reasonable time, the installations' wartime capabilities

¹Work hours available can also be expanded by short-term assignments of indirect personnel to help with direct maintenance work.

could quickly expand. Thus required peacetime staffing could be kept to a minimum and therefore could be more productive.

If an aircraft wing's peacetime maintenance staffing requirements were 70 percent of its full mobilization requirements but if only half of the wing's aircraft would be used in immediate response to an emergency, reliance on Reserve personnel could produce a plan as follows:

1. Peacetime staffing levels would be set at 70 percent of the full mobilization requirement.
2. Emergency deployment of half of the wing's aircraft would be supported by deploying 50 to 70 percent of assigned mechanics, depending on the expected expansion in normal work hours. (See p. 43.)
3. Reserve mechanics would be activated to replace deployed mechanics and, if needed, to bring total staffing up to 100 percent of the mobilization level. Activated mechanics would begin immediate on-the-job refresher training with regular mechanics left to support the undeployed aircraft.
4. The regular and activated Reserve mechanics would be used to supplement the mobilized mechanics and, if conditions warranted, to support mobilization of the remaining aircraft.

Reserve mechanics could be activated from Reserve units assigned aircraft similar to those being deployed or from a pool of Reserve mechanics not associated with units. We believe readiness and mobility would best be served if the Reserve mechanics, during peacetime, were assigned to and trained with the active aircraft wing which they would be called on to support. By training in this manner--similar to that under the Air Force's Reserve Associate Program--the mechanics would become more familiar not only with the aircraft maintenance support equipment and unit operating procedures but also with the active-duty mechanics. Thus Reserve mechanics could more rapidly be assimilated with the wing mechanics to become an effective, homogeneous unit.

REALLOCATE WORKLOAD TO INSURE
REASONABLE PEACETIME PRODUCTIVITY

Validation of maintenance requirements, elimination of unnecessary redundancies, and greater reliance on longer working hours and Reserve personnel during emergencies should all help to better align peacetime staffing levels with normal peacetime workloads. When it is determined, however, that staffing levels must exceed peacetime maintenance requirements to insure readiness and mobility, additional productive work should be made available from other sources.

Some of the units reviewed had backlogged work that should have been done. In addition, the Army recently reported that direct- and general-support activities had a backlog of modification work orders exceeding 5 million staff-hours. Besides these backlogs, workloads exist which are within the capabilities of below-depot personnel but which are not assigned to them.

As discussed in our October 1, 1974, report to the Congress on "Management of Aircraft Modification Programs in the Army, Navy, and Air Force" (B-157373), the services have a large volume of approved aircraft modification work which is planned to be done at the depot level. We concluded that much of this work could and should be done at below-depot activities, particularly when these activities have underused personnel.

Other sources of work for underused below-depot mechanics include:

- Work originally designated for below-depot activities which is currently done at the depot level. Much of the intermediate maintenance of McClellan Air Force Base, for instance, is done by civilian mechanics at Air Force depots, despite such capability at the intermediate level.
- Work currently assigned to depots which is similar or identical to work done at below-depot activities. Civilian mechanics at the Navy depots in Norfolk and Alameda, for example, do intermediate maintenance

on depot-assigned ground support equipment; military-staffed intermediate shops at these locations do the same work on similar or identical equipment assigned to them.

--Work which is designated for the depot level but which, with a minimum investment in tools, could be transferred to below-depot activities. The Navy testified in the fiscal year 1974 budget hearings, for example, that there was always a backlog of this kind of work which could not be completed at depots because of funding constraints. The Navy stated that other work which would have been scheduled for depots in 1974 had been rescheduled, with a small investment in tools, for below-depot activities with a forecast net savings of \$5.6 million. Many similar opportunities for transferring depot-level work to below-depot activities are also cited in another report to the Congress, "Improving Productivity Through Better Management of Maintenance Operations in Europe" (LCD-75-401, Mar. 7, 1975).

--Work currently being done by full-time Reserve technicians and depot employees which is within the skill levels of below-depot military mechanics and which could be done by them at the Reserve and depot facilities.

In our opinion, existing maintenance workloads, such as those cited above, can be reallocated to military below-depot personnel in peacetime, if required to insure their productive use. Such reallocation, if properly administered and controlled, can be done without degrading military preparedness. Readiness could actually improve because military mechanics would be given more opportunity to practice and expand their maintenance skills on a meaningful workload.

CONCLUSIONS

The actions discussed in this chapter are by no means the only methods of improving below-depot maintenance. But each of them offers great potential for reducing maintenance costs and improving productivity without compromising

military readiness. Realization of this potential, however, depends to a great extent on whether DOD can overcome the factors which have led the services to independently develop their own maintenance capabilities without considering the needs and resources of the total force. Better coordination of the services' maintenance programs and full consideration of the total force are needed.

AGENCY COMMENTS

DOD's overall view of our report was that many of the suggestions, such as regional consolidations, greater use of Reserve Forces, and reallocation of work from depots to below-depot maintenance activities, were being carried out by one or more of the services on a limited basis. (See app. I.) DOD felt that more aggressive and widespread application of these suggestions would be appropriate. DOD said, however, that any savings or increased productivity must be achieved carefully and methodically, primarily by the military services but with a strong DOD interest, to insure that military capabilities are not compromised.

Concerning the need to validate maintenance requirements, DOD said its employment plans for the Armed Forces, including manpower and equipment requirements, were under continual review and were updated regularly to insure that force structure was optimally aligned to meet the perceived threat. As we pointed out on page 39, the low productivity and redundant capabilities we observed lead us to believe that capabilities had been developed without adequate regard for the probable deployment of forces. We believe that, if total force needs and capabilities were more visible, the need for reevaluating requirements would come into focus. Such a reevaluation, as well as full consideration of the other suggestions in this chapter, would likely reveal that present maintenance capabilities are excess to both peacetime and wartime needs.

In the version of this report which we sent to DOD for its comments, we suggested that below-depot maintenance be centralized and coordinated. DOD did not agree with that recommendation because, in DOD's opinion, it is critical that the military forces be organized, equipped, and

managed in peacetime in a way as close as possible to that which will be experienced in wartime. DOD said that, with the expected reduced leadtimes to respond in modern warfare, changing quickly from centralized to decentralized management would introduce additional and perhaps unnecessary complications into an already extremely complex undertaking. DOD also said that all other alternatives for reducing costs should be explored before considering centralized below-depot maintenance.

We now agree that other alternatives should be explored first. However, we continue to believe that many opportunities exist for reducing maintenance redundancies without reducing responsiveness. Full realization of these opportunities can best be achieved through better visibility of total force requirements and capabilities. Therefore the concept of centralized below-depot maintenance management remains appealing to us, and we offer it as another alternative for improving productivity in the future.

CHAPTER 5

SCOPE OF REVIEW

We reviewed DOD, Army, Navy, and Air Force regulations, procedures, and documents relating to the services' below-depot maintenance programs. We also examined maintenance records and reports and verified, on a test basis, the accuracy of various records.

The principal installations visited were:

Alameda Naval Air Station, California

California Army National Guard, Sacramento,
California

Davis-Monthan Air Force Base, Arizona

Fort Bragg, North Carolina

Fort Hood, Texas

Fort Ord, California

Hamilton Air Force Base, California

Langley Air Force Base, Virginia

Lemoore Naval Air Station, California

Mather Air Force Base, California

McClellan Air Force Base, California

Moffett Field Naval Air Station, California

Norfolk Naval Air Station, Virginia

Oceana Naval Air Station, Virginia

Presidio of San Francisco, California



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ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

INSTALLATIONS AND LOGISTICS

14 MAY 1975

Mr. Fred J. Shafer, Director
Logistics and Communications Division
United States General Accounting Office
Washington, D. C. 20548

Dear Mr. Shafer:

The Secretary of Defense has asked me to respond to your letter of March 10, 1975 and the General Accounting Office draft report on the "Need to Improve Productivity of Below-Depot Maintenance Activities" (OSD Case #4039).

We generally concur with the conclusion that there is a requirement to improve the productivity of below-depot maintenance activities whenever possible, as long as the readiness of units to perform assigned missions in contingencies is not degraded. The requirement for increased productivity below-depot level has become increasingly important in recent years, as the cost of both military and civilian labor has escalated. We are pleased, therefore, that the Draft Report recognizes the many initiatives by the Military Departments toward this goal.

The DoD plans for employment of the armed forces are under continual review and are updated regularly to assure that the force structure is optimally aligned to meet the perceived threat. During these reviews, manpower and equipment requirements are updated to support the planned wartime employment of the force. Overall, the active forces are structured to provide forces for minor mobilization contingencies, for early deployment in major war before the Reserves can be mobilized, for strong deterrence, and for peacetime deployments. The forces not included in the above four categories are in the reserve, unless evaluation demonstrates that reserves cannot perform such a mission. The report very properly points out the increased reliance on reserve forces in the programs of the individual services, such as the Associate Reserve Program in the Air Force, and the Civilian Technician Programs in the Army and Air Force.

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It is the position of the DoD that readiness of the active military units, and the reserve forces to accomplish their assigned missions is of primary importance. Beyond that, DoD policy as contained in DoD Directive 4151.16, "DoD Equipment Maintenance Program," dated August 30, 1972 is that "Where economies can be expected, maintenance activities and operations will be consolidated into the minimum number of facilities at each installation consistent with assuring that weapon and equipment end-item system readiness levels can be maintained and that operational commitments, including contingency deployment, can be satisfied." This directive also requires interservice maintenance support to be utilized wherever economic benefits will accrue without resulting in significant degradation in operational capabilities. Since we do not control the actual threat that may arise, it is imperative that our military forces retain sufficient flexibility to respond to situations varying to some degree from the planning scenario. They must be manned and equipped accordingly.

We agree that existing cost documentation for below-depot level maintenance is insufficient for management of that function. Since visibility is a first step toward solution of the problem, DoD has endorsed the Air Force development and test of a Base-Level Cost Accounting System for equipment maintenance. This cost system will identify both direct and indirect staff hours and will further identify costs to weapon system and sub-systems by mission/design/series. This system is scheduled for implementation by Air Force for aircraft systems starting July 1, 1975. Implementation of this system is, in our opinion, essential to improved utilization of resources for equipment maintenance. We expect that successful implementation by Air Force will be followed by introduction of similar systems into the other Services.

The use of engineered and other standards, as called for by existing DoD policy, will be facilitated and become more meaningful as accurate and reliable information on actual performance becomes available. The combination of reliable costs and valid standards are the basic requirements for increased productivity on a broad scale.

The consolidation of facilities, workloads, or maintenance organizations suggested in the report must be approached with great caution. A distinction must be carefully drawn between military units with a contingency assignment and those that will very likely not deploy. The very successful consolidation of work by Navy into Public Work Centers, cited in the report, is a case where deployment is not a major factor.

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Nevertheless, the individual services are examining potential consolidations of even deployable units or organizations where the risk of degrading mission capability is minimal. The best example is the current Air Force effort of consolidating all aircraft maintenance activities under a single Chief of Maintenance for an installation or region. Field tests of this concept are in progress.

Our overall view of the report is that many of the recommendations, such as regional consolidations, greater use of reserve forces, reallocation of work from depot to intermediate maintenance organizations are being done by one or more of the services but on a limited basis. It would appear that your recommendation for more aggressive and widespread application of these alternatives is appropriate.

We have considerable concern with the recommendation that below-depot maintenance be centralized under the OASD(I&L) or under single managers either on a commodity, regional or other basis. It is critical in our opinion that the military forces be organized, equipped, and managed in peacetime in a manner as close as possible to that which will be experienced under military contingencies. With the reduced lead times expected in modern warfare to mount a military response, the requirement to quickly change from a centralized to decentralized mode of management would introduce additional and perhaps unnecessary complications into an already extremely complex undertaking. We believe that all other alternatives should be first explored for reducing costs before considering centralizing the below-depot maintenance which is in most instances closely aligned to operations. With regard to the specific recommendations contained in the report, we are pleased to comment as follows.

We concur in the requirement to insure the availability of accurate data for measurement of productivity at below-depot maintenance activities. Implementation of a new cost accounting system in Air Force as a pilot program is the first step toward achieving this goal. As a companion step, we will continue to emphasize the requirement to utilize engineered or other standards.

We will continue to encourage the military services to consolidate maintenance programs below-depot level where economies can be achieved without adverse impact on military readiness. We are not convinced, however, that such consolidation must necessarily be on an installation or regional basis to be effective, but such consolidations will be considered on a case-by-case basis by the military services.

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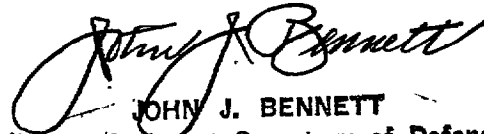
We do not concur that management of below-depot maintenance should be consolidated either at the national level under the OASD(I&L) or under single managers whether by commodity, geography or other category.

This report has encompassed a very broad area which is critical to the military capability of the Department of Defense to respond to military contingencies. We believe that substantial opportunities exist to increase productivity of below-depot maintenance. We firmly believe, however, that any savings must be achieved by a careful and methodical approach, primarily by the military services but with a strong DoD interest, to assure that our military capabilities are not compromised.

The questionable management practices that are highlighted in the report have been brought to the attention of the services through distribution of the draft report.

We appreciate your interest in reducing the cost of maintenance support and look forward to your continued assistance.

Sincerely,


JOHN J. BENNETT
Acting Assistant Secretary of Defense
(Installations and Logistics)

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DEPARTMENTS OF THE ARMY, NAVY, AND AIR FORCE
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APPENDIX II

APPENDIX II

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