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The Department of Defense (DCD) spends over \$2 billion annually for such aircraft depot maintenance as major overhaul and repair or modification of components, engines, and airframes. Findings/Conclusions: The separate aircraft depot maintenance systems of the three military services waste money, personnel, and materials. Proliferating redundant and underused resources has resulted in such maintenance costing more than necessary. Recommendations: The Secretary of Defense should either designate or establish a single manager over aircraft depot maintenance. This single manager should be responsible for managing resources, workloads input by the military services, and maintenance of workloads performed by the depots. The military services should continue to be responsible for determining their depot maintenance needs. There should be such technical interfaces between the services and the single manager as service assignments to the depot maintenance organization. The manager should be required to develop a master plan and program as the basis for future actions toward optimum matching of resources with requirements, peacetime and wartime operations, and efficiently sized military depots; implement uniform cost accounting and management information systems for all aspects of aircraft depot maintenance; and manage aircraft depot maintenance consistent with the master plan. (Author/SC)

6974

BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Aircraft Depot Maintenance: A Single Manager Is Needed To Stop Waste

Concern continues over the cost of support services in the Department of Defense. This report points out that the separate aircraft depot maintenance systems of the three military services waste money, men, and materials.

Proliferating redundant and underused resources has resulted in such maintenance costing more than necessary. This report identifies alternatives for correcting this condition by consolidating the management of aircraft depot maintenance systems which each of the military services operates independently.



LCD-78-406
JULY 12, 1978



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

B-178736


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

This is our report which describes the problems the Department of Defense has had in effectively and economically matching aircraft depot maintenance resources with requirements. It further provides a solution: a single manager.

While reviewing the Army, Navy, and Air Force aircraft depot maintenance systems, we found extensive redundancies and underuse of resources which has resulted in depot maintenance costing more than it should.

We made our review 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, and the Secretary of Defense.


Comptroller General
of the United States

D I G E S T

The military services own about 24,000 aircraft. Regular maintenance is normally available at flight organizations or local repair shops. But, when this maintenance requires more complex facilities, equipment, and skills, it is performed at military depots or contractor plants.

The Department of Defense (DOD) spends over \$2 billion annually for such aircraft depot maintenance as major overhaul and repair or modification of components, engines, and airframes. The Navy has six depots, the Air Force five, and the Army two, with some work being performed at electronics depots.

The current complex of aircraft maintenance depots needs to be more effectively matched with peacetime and mobilization requirements. While Defense is uncertain about the capabilities and capacity required:

- The military services modernize their depots at a rate of about \$65 million annually. (See p. 18.)
- The depots have as much as 130 percent more gross capacity than needed. (See p. 17.)
- Production costs have increased by an estimated \$130 million annually, after allowances for inflation. (See p. 10.)
- The Department spends \$250 million to \$400 million annually for unused capacity in the aircraft industry. (See p. 14.)

A primary reason for this situation is that aircraft depot maintenance is not managed at the DOD level, instead it is managed independently by each of the military services. Based on its desire to be self-sufficient, each has created, with its own assets, an industrial complex capable of performing virtually any kind of depot

maintenance. Furthermore, the Department lacks a master plan for implementing an effective, efficient, and economical Defense-wide aircraft depot posture. Such fragmented and parochial management, by its nature, has bred duplication and concomitant diseconomies and inefficiencies. (See p. 45.)

Twenty years ago, the Congress mandated the Secretary of Defense to take action (including transfer, reassignment, consolidation, or abolition of any function, power, or duty) to provide more effectiveness, efficiency, and economy and eliminate duplications in support activities.

Actions by DOD and the military services, through both depot consolidation studies and programs and interservicing, have not achieved the necessary improvements. Results have been hampered by:

- Service pressures to retain prerogatives over their own workloads and to justify existing depot resources. (See p. 21.)
- Uncertainty regarding the capability and capacity of private industry for meeting peacetime and wartime needs. (See pp. 13 to 19.)
- A lack of consistent and reliable cost and other management information to support management decisions. (See pp. 21 and 41.)
- The prospect of economic and political turbulence. (See p. 23.)

The services have duplicated each other's capabilities; consequently, each generally has the same kinds of equipment, facilities, and skilled personnel. This makes the prospect for depot consolidation and resizing good. If DOD is to effectively match resources with requirements, however, there must be:

- Comprehensive visibility over DOD and commercial resources, costs, and workloads. This will require uniform management information and cost accounting systems.

--A master plan for achieving the most effective, efficient, and economical depot level maintenance complex.

--Comprehensive management over DOD depot resources and the accomplishment of all aircraft depot level maintenance.

The individual services have demonstrated that they are not in a position to effectively use private industry and all Defense aircraft depots to their full capacity. Therefore, DOD needs a single manager over aircraft depot maintenance, either from one of the services or from an independent DOD maintenance agency.

The single manager approach is not new to the Department; it has been implemented with the Defense Logistics Agency, Military Sealift Command, and Military Airlift Command. In late 1977, the Secretary of Defense designated the Army as single manager responsible for procurement, maintenance, renovation, and distribution of conventional ammunition.

RECOMMENDATIONS

The Secretary of Defense should either designate or establish a single manager over aircraft depot maintenance. The single manager should be responsible for managing:

- Resources to include (1) determining Defense depot resource needs in light of peacetime and potential mobilized operations and (2) tailoring the depot complex to efficiently meet those needs which cannot be viably accomplished by private industry.
- Workloads input by the military services to include (1) consolidation to take advantage of similar or common capabilities and (2) distribution to the most economical activity which can effectively perform the work.

--Maintenance of workloads performed by the depots.

The military services should continue to be responsible for determining their depot maintenance needs. The single manager basically would be responsible for effectively, efficiently, and economically accomplishing the service-identified needs. Therefore, there should be such technical interfaces between the services and the single manager as service assignments to the depot maintenance organization.

Further, the Secretary should task the single manager, within specified timeframes, to:

- Develop a master plan and program as the basis for future actions toward (1) optimum matching of resources with requirements considering commercial and military resources, (2) peacetime and wartime operations, and (3) efficiently sized military depots. The plan should identify the depots which will comprise the minimal industrial base needed for requirements, and it should be made available to congressional committees concerned with funding depot operations and construction and modernization projects.
- Implement uniform cost accounting and management information systems for all aspects of aircraft depot maintenance.
- Manage aircraft depot maintenance consistent with the master plan.

AGENCY COMMENTS

While the Department of Defense did not agree with GAO's findings regarding the severity of the efficiency problem, it did agree that a single manager may benefit aircraft depot maintenance. It stated that such an assignment could facilitate further reductions in the unutilized and underutilized capacity identified in 1974

and later, as well as other savings. However, the Department went on to say that additional preliminary work is required to identify and, where possible, quantify anticipated benefits and penalties that might accrue from such an assignment before investing in a detailed study.

GAO believes this report presents ample and persuasive evidence to support the Secretary of Defense's 1975 statement that, today, support of the services has to be viewed in terms of Total Force structure as opposed to separate interests. Therefore, DOD should perform detailed implementing studies for common maintenance of aircraft in support of its own policies. (See pp. 78 to 80.)

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ABBREVIATIONS

DOD	Department of Defense
GAO	General Accounting Office
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense

CHAPTER 1

INTRODUCTION

When equipment needs maintenance which requires more extensive facilities and equipment and higher skilled personnel than are available at lower maintenance levels, it is maintained at depots or contractor plants. The Department of Defense (DOD) spends about \$2.5 billion a year on depot maintenance 1/ to keep its aircraft and aircraft-related items operationally ready. About 70 percent is spent to support military depots, and the remainder is spent for contractors. As of mid-1974, DOD had 15 aircraft depot facilities valued at about \$1.8 billion and maintenance equipment valued at \$950 million. 2/ DOD programmed additional investments to modernize aircraft depot maintenance facilities and equipment at a rate of about \$65 million annually through fiscal year 1979. Further expenditures are planned through 1982.

The basic objectives of aircraft maintenance are

- to keep military aircraft ready to meet contingency and war mission needs,
- to provide an industrial base for rapid expansion to meet prolonged wartime mobilization requirements, and
- to minimize the cost of depot maintenance.

MAINTENANCE ORGANIZATIONS

Each military service has assigned the responsibility for aircraft depot maintenance to one of its commands:

1/ Depot maintenance normally consists of inspection, test, repair, modification, alteration, modernization, conversion, overhaul, reclamation, or rebuilding parts, assemblies, subassemblies, components, equipment and equipment items, and weapon systems. It also includes manufacturing critical nonavailable parts and providing technical assistance to the intermediate maintenance organizations, user organizations, and other activities. It is normally done in fixed shops, shipyards, and other shore-based facilities or by depot field teams.

2/ Does not include aircraft resources at two Army electronics depots.

- Air Force: Air Force Logistics Command.
- Navy: Naval Material Command, which delegated responsibility to the Naval Air Systems Command.
- Army: U.S. Army Materiel Development and Readiness Command.

Each of the three commands operates its own complex of depots. As shown on the map on page 3, the Air Force has five depots referred to as air logistics centers; the Navy has six depots called naval air rework facilities; and the Army has two aircraft and two electronics depots.

The Air Force has organized its depots by technology for components and by type of aircraft for airframes. Under this concept, each depot (1) specializes along technology lines and handles only those components which fit in its assigned technologies and (2) has specific types of aircraft assigned for airframe work (repair, modification, and component removal and replacement). The Navy has organized its depots by type of aircraft, so each depot handles airframes, engines, and many of the components for assigned aircraft. The Army has assigned its aircraft to the Corpus Christi and New Cumberland depots. The Sacramento and Tobyhanna Army depots handle aircraft electronics work, which comprises 10 to 15 percent of their workloads.

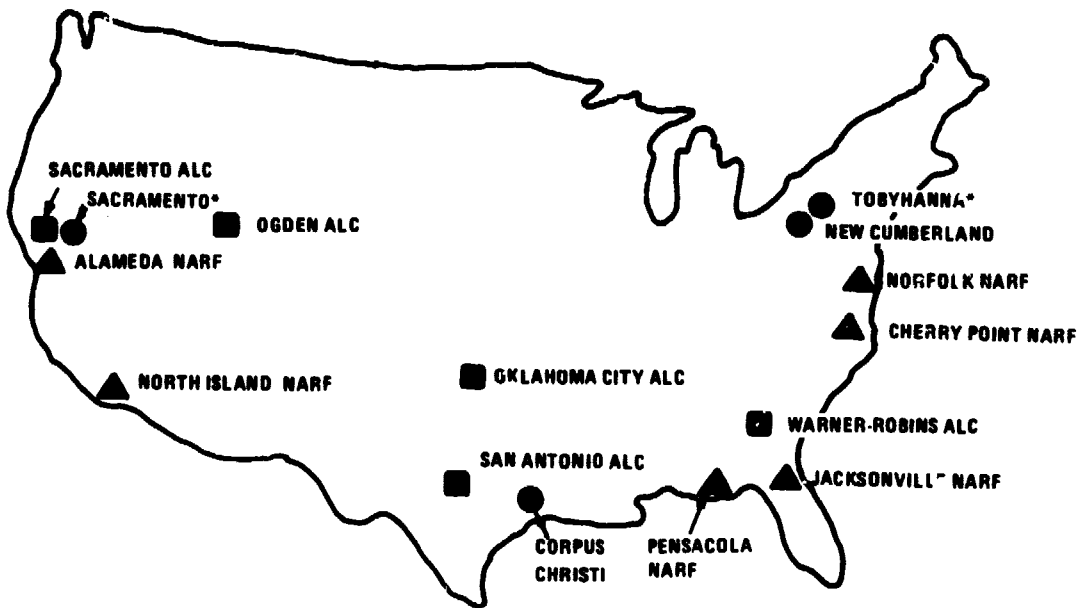
SCOPE OF REVIEW

Although we have issued many reports on various aspects of aircraft depot maintenance, this is the first dealing with the total concept and consolidating previous reports.

Our review was made at the following locations:

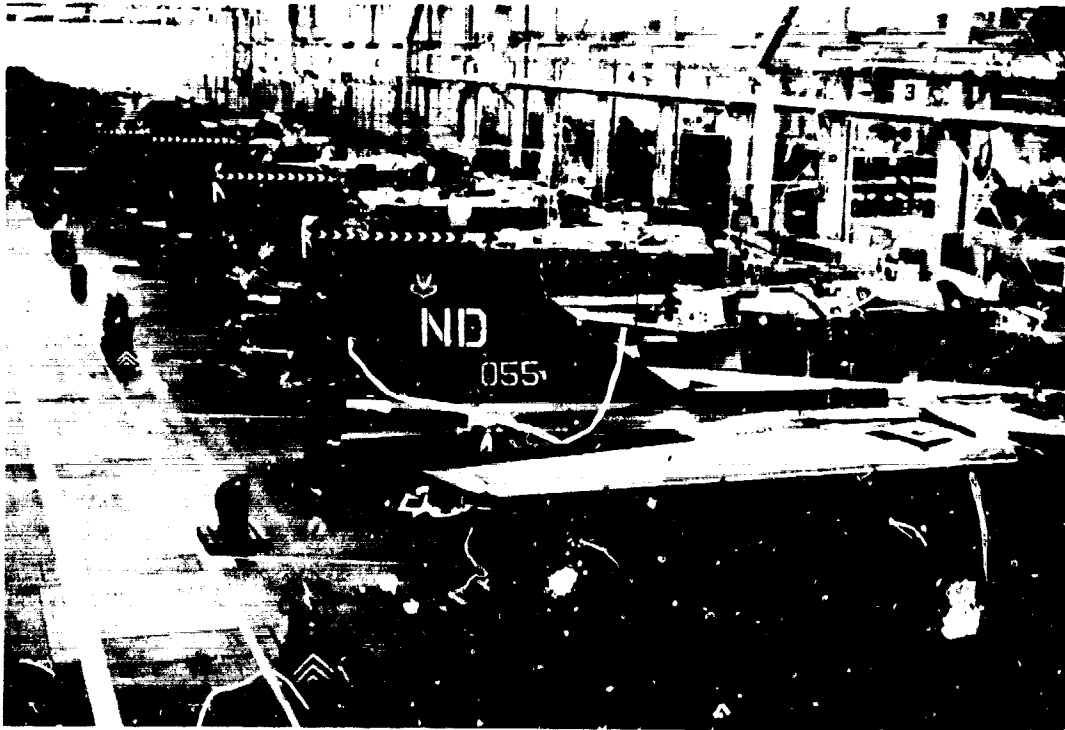
- Headquarters, DOD, The Pentagon.
- Headquarters, U.S. Army, The Pentagon.
- U.S. Army Materiel Development and Readiness Command, Alexandria, Virginia.
- U.S. Army Depot Systems Command, Letterkenny Army Depot, Chambersburg, Pennsylvania.
- Headquarters, U.S. Air Force, The Pentagon.
- Air Force Logistics Command, Wright-Patterson Air Force Base, Dayton, Ohio.

**DEPARTMENT OF DEFENSE
AERONAUTICAL DEPOTS**



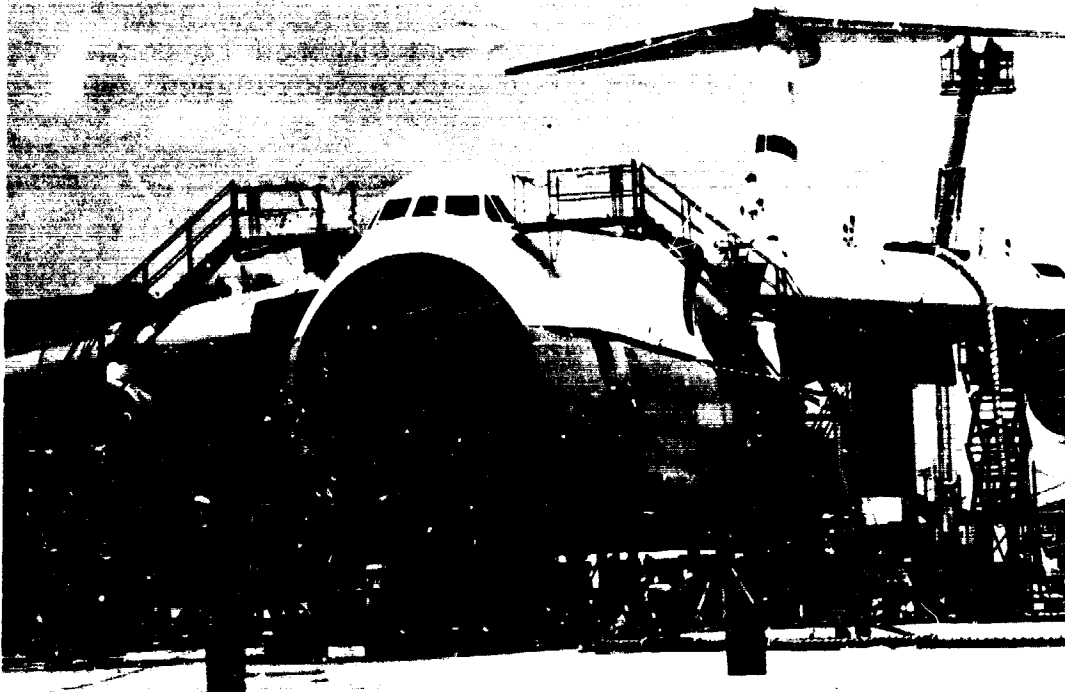
- AIR LOGISTICS CENTER (ALC)
- ▲ NAVAL AIR REWORK FACILITIES (NARF)
- ARMY AERONAUTICAL DEPOTS
- ARMY ELECTRONICS DEPOTS

- Sacramento Air Logistics Center, McClellan Air Force Base, Sacramento, California.
- Headquarters, U.S. Navy, The Pentagon.
- Naval Material Command, Arlington, Virginia.
- Naval Air Systems Command, Arlington, Virginia.
- Naval Sea Systems Command, Arlington, Virginia.
- Alameda Naval Air Rework Facility, Alameda, California.



COURTESY OF THE U.S. AIR FORCE

**F-111 AIRCRAFT MAINTENANCE LINE, SACRAMENTO AIR LOGISTICS CENTER,
MC CLELLAN AIR FORCE BASE, CALIFORNIA**



COURTESY OF THE U.S. AIR FORCE

**C-5 AIRCRAFT MAINTENANCE, SAN ANTONIO AIR LOGISTICS CENTER,
KELLY AIR FORCE BASE, TEXAS**

CHAPTER 2

NEED FOR A SINGLE MAINTENANCE MANAGER

As far back as 1958, the Congress mandated that the Secretary of Defense provide more effectiveness, efficiency, and economy and eliminate duplication in DOD maintenance (10 U.S.C. 125). The Secretary of Defense has attempted to improve depot maintenance by issuing policy statements and leaving it up to the individual services to implement practices which promote DOD-wide effectiveness, efficiency, and economy. However, considering the situation in aircraft depot maintenance, stronger action is needed. Specifically:

- The Office of the Secretary of Defense (OSD) has not adequately assessed commercial capability and capacity. Thus, DOD is uncertain as to what the capability and capacity of service depots should be.
- Unused capacity in the aircraft industry is costing Defense \$250 million to \$400 million annually. Some of this capacity could be used for maintenance.
- Based on recent studies, in gross terms, the existing capacity at DOD depots is as much as 130 percent more than needed. The excess would be greater if some maintenance was shifted to commercial industry to fill some of its existing unused capacity.
- Extensive redundancy and underuse of resources among DOD aircraft depots exists.
- The services invest about \$65 million annually in equipment and facilities without assuring that redundancies are not occurring.
- In 1977, DOD spent about \$130 million (in constant dollars) more than it did in 1971 for the same amount of work. Most of the increased cost can be attributed to overhead.
- DOD lacks consistent and reliable management information to provide the basis for further Defense-wide management actions.

The basic problem inhibiting efficient resource use appears to stem from the fact that although DOD has the authority, it neither performs nor is organized to perform

management functions relative to aircraft depot maintenance. DOD's maintenance activity consists of an office of about six professional staff who develop maintenance policy and review budget requests, making reductions where amounts appear unwarranted.

DOD has delegated maintenance management to the Army, Navy, and Air Force each of whom operates its own aircraft depot maintenance systems. Each service identifies and schedules its workloads and develops and modernizes its resources for accomplishing these workloads without considering the other services' resources and workloads. In part, this is due to none of the services having visibility over programs outside its own and no real incentive for a service to look elsewhere. Thus, no service is in a position to plan for eliminating Defense-wide duplication.

To insure that expenditures are directed effectively, DOD must know its objectives and have a plan for achieving them. In our opinion, a comprehensive DOD master plan would

- identify the best operating posture for all military aircraft depot maintenance and
- establish a program for achieving that posture and adjusting to change as it occurs.

In view of the experience since 1958, it appears that such a master plan could not be developed and carried out under the current triservice operation. Therefore, does DOD need a single manager for maintenance?

BLUE RIBBON DEFENSE PANEL

In 1969, the President and the Secretary of Defense appointed a Blue Ribbon Defense Panel to study DOD's entire organization, structure, and operation. On July 1, 1970, the panel issued its report, which contained the following findings:

- Logistics management resides basically with the services.
- Although the potential for increased efficiency and effectiveness by standardizing and integrating logistics management has long been recognized, progress has been slow.

The panel recommended that the Secretary of Defense create a unified logistics command to supervise support

activities, including maintenance, for all combat forces. Rather than consolidate, however, DOD has preferred such other means as increased emphasis on interservicing for correcting the problem.

RISING COSTS

Although the services maintain different types of aircraft, the maintenance processes, skills, facilities, and equipment are, to a large degree, similar. These redundancies, along with reducing the aircraft inventory and the amount of flying and changes in maintenance practices, have brought about much underuse of depot maintenance resources since the Vietnam conflict. Changes, since 1971, in aircraft activity and depot workloads follow.

DOD Aircraft Inventory, Flying Hours, and Depot Workload Fiscal Years 1971-1977

<u>Year</u>	<u>Aircraft inventory</u>	<u>Percent of 1971</u>	<u>Flying hours</u> (000 omitted)	<u>Percent of 1971</u>	<u>Depot maintenance workload (note a)</u> (000 omitted)	<u>Percent of 1971</u>
1971	31,942	100	14,750	100	89,500	100
1972	29,141	91	12,200	83	89,700	100
1973	27,246	85	10,410	71	84,100	94
1974	25,763	81	8,330	56	78,400	88
1975	24,026	75	7,260	49	77,200	86
1976	23,617	74	6,052	41	71,600	80
<u>b/1977</u>	23,312	73	5,981	41	73,500	82

a/Direct labor hours (DLH).

b/Includes projections.

While aircraft activity has generally decreased, the cost of aircraft depot maintenance has risen. (See p. 9.)

Aircraft Depot Maintenance Costs

Fiscal year	Total cost (note a) of 1977 (000,000 omitted)	Percent of 1977	Cost per aircraft (note a) of 1977	Percent of 1977	Cost per flying hour of 1977	Percent of 1977	Contract cost of 1977	Percent of 1977	DOD depot cost of 1977	Percent of 1977	Cost per direct labor hour (note b) of 1977	Percent of 1977
1971	\$1,029	90	\$57,260	66	\$124	36	\$713	131	\$1,116	75	\$12.47	62
1972	1,839	91	63,110	72	151	44	697	128	1,142	77	12.73	62
1973	1,816	89	66,650	76	174	51	644	119	1,171	79	13.92	69
1974	2,004	99	77,790	89	241	71	731	135	1,272	85	16.22	80
1975	2,006	99	83,490	96	276	81	692	127	1,314	88	17.02	84
1976	1,883	93	79,730	91	311	91	558	103	1,325	89	18.51	91
1977	2,032	100	87,170	100	340	100	543	100	1,489	100	20.26	100

a/Contract plus DOD maintenance.

b/Maintenance at DOD depots only.

c/Based on projections.

Of particular note is the \$7.79 increase (\$20.26 - \$12.47) in the cost per direct labor maintenance hour. We adjusted this cost using the Consumer Price Index to compensate for inflation and found that the cost in constant dollars increased \$1.77 from 1971-77. Applying the \$1.77 to the 1977 workload of 73.5 million hours reveals that the increased cost had reached about \$130 million for 1977. At this growth rate, the increase could reach \$260 million by 1982.

We believe most of the cost increase results from proportionately higher overhead. For example, from 1971-76, the Navy ratio of overhead costs compared to direct costs increased by about \$31 million. Analyzing total Defense depot and overhead costs shows that most of the increase was due to overhead, which follows.

Fiscal year	Total cost	Total costs		Overhead costs		
		Cost expected based on inflation (note a)	Increase or (decrease) in excess of inflation	Total overhead cost	Expected based on inflation (note a)	Increase in excess of inflation
(000 omitted)						
1971	\$1,116,000	\$1,116,000	\$ -	\$364,000	\$364,000	\$ -
1972	1,142,000	1,159,000	(17,000)	418,000	379,000	39,000
1973	1,171,000	1,129,000	42,000	408,000	369,000	39,000
1974	1,272,000	1,148,000	124,000	436,000	375,000	61,000
1975	1,314,000	1,255,000	59,000	456,000	410,000	46,000
1976	1,325,000	1,247,000	78,000	472,000	407,000	65,000
1977	1,489,000	1,359,000	<u>130,000</u>	(b)	(b)	<u>(b)</u>
			<u>\$416,000</u>			<u>\$250,000</u>

a/Using Consumer Price Index with 1971=100.

b/Not available during the review.

Agency comments

Defense officials took strong exception to our estimate of the increased cost of aircraft depot maintenance. They questioned using the Consumer Price Index in our calculation and pointed out that using the Wholesale Price Index or the DOD Composite (overall average of DOD outlays) would not

support the increased costs. They further questioned our rationale that overhead costs should decline proportionately with reductions in direct costs. DOD pointed out that they try to reduce total costs, although a change in the indirect to direct ratio may occur.

In estimating increased costs in gross terms, we believe a general indicator of inflation, such as the Consumer Price Index, is adequate. We did not use the DOD Composite because it is based on an average of DOD outlays and, therefore, could bias the estimate in DOD's favor.

The Wholesale Price Index represents a weighted average movement in price of a sample of products from manufacturing, agriculture, forestry, fishing, mining, gas and electricity, and public utilities. Applying this index to DOD costs does reflect that DOD costs have not increased significantly. We did not use the Wholesale Price Index because we believe it is not representative of a depot maintenance operation. We did note, however, that the index's aircraft industrial component was well below the index itself, and it was closer to the Consumer Price Index. Therefore, the evidence still supports that the cost of aircraft depot maintenance has increased significantly beyond amounts due to inflation.

Regarding the relationship between overhead and direct costs, we do not expect that overhead should decrease proportionately with reduction in direct costs in a constantly sized production base. This is the problem with efficiently sizing the DOD aircraft depot maintenance complex. As workloads have decreased, overhead costs have not fallen accordingly, because some overhead costs do not vary with workload changes.

To the extent that overhead exceeds the ratio to direct costs which would be expected under full production, one may estimate the cost of unused capacity. DOD and the Office of Management and Budget (OMB) used this rationale in their 1976 joint study of the aircraft industry. We believe their rationale is reasonable and that it can be applied to DOD depot operations.

We recognize that the proportions of overhead costs could increase due to efforts to reduce total costs without regard to the ratio of overhead to direct costs. Considering, however, that total costs have increased, we believe that such a reason does not adequately explain the sizable increase in overhead costs incurred.

MATCHING REQUIREMENTS AND RESOURCES

To insure that aircraft are prepared for emergency or war contingencies while minimizing costs, DOD must effectively match requirements and resources. Requirements for both peacetime and wartime must be valid for developing an effective and economical industrial base. And, to meet wartime requirements, the industrial base must be able to increase (surge) its production capacity above the peacetime operating level. Insufficient resources could degrade defense preparedness, while excess resources could waste financial resources. In a budget-constrained operating environment, financial waste could reduce the amount of maintenance that could be done and thus, degrade preparedness.

Determining requirements: the starting point

To effectively match requirements with resources, Defense must know the requirements for both peacetime and contingency operations.

Generally, peacetime requirements are forecast based on prior years' activity and programmed aircraft use. DOD expects that accelerated aircraft use during wartime will increase workloads substantially beyond peacetime requirements. Therefore, by establishing its depot maintenance complex to meet potential wartime needs, DOD can readily accommodate peacetime requirements.

Contingency requirements pose unique problems, however, because of inherent uncertainties in trying to predict the type of conflict and the missions the aircraft will be required to perform. Different contingencies may emphasize using different types of aircraft or may result in substantially different rates at which aircraft are lost. Therefore, for planning purposes, the Department makes certain assumptions on the various types and durations of possible contingencies. These assumptions are provided to the services as the bases for contingency planning. Planning is generally geared to the "worst case" scenario--that which has the strongest impact on aircraft depot maintenance--so that all scenarios can be covered.

Since contingency assumptions provide the basis for determining the size of the industrial base, they must be realistic. Overestimates could cause DOD to unnecessarily spend millions of dollars to purchase, modernize, and maintain facilities and equipment.

The services have found that requirements can be reduced by applying new concepts in aircraft maintenance. These concepts include condition monitoring, or commercial airline practices, where parts are replaced only when sufficient deterioration warrants such action. For example, the Navy, through its Analytical Maintenance Program, reduced P-3 aircraft depot maintenance requirements by 20 percent, or 2,000 direct labor hours per aircraft.

Identifying resources:
What is needed?

Once requirements are determined, the sources of maintenance capacity and the resources needed must be identified. Two basic sources of maintenance capacity are commercial contractors and DOD depots. In distributing requirements between these two sources, Defense considers such factors as reliability, cost, system criticality, the ability to surge to a wartime operating level, and Federal policy.

Federal policy, as described in OMB Circular A-76, is to rely on the private enterprise system to supply goods and services, except when it is not in the national interest. Basically DOD views its organic maintenance i/ as (1) a controlled source of competence, (2) an assurance of an initial surge capability, and (3) a base for expansion. Contractors are to provide a broader maintenance base capable of expanding in wartime.

DOD Directive 4151.1, "Use of Contractor and Government Resources for Maintenance of Material," provides the following criteria for distributing workloads between contractors and DOD depots:

"Generally, organic depot maintenance capacity will be planned to accomplish no more than 70% of the gross mission-essential depot maintenance workload requirements with a facility capacity loading at a maximum rate of 85%, on a 40-hour week, 1-shift basis."

1/Organic depot maintenance is done by a military department using Government-owned or -controlled facilities and military or Federal civilian personnel.

In a 1976 report 1/ to the Congress, we took exception to the DOD workload distribution policy because it did not foster a cost-effective approach. The services tended to adhere to the 70 percent organic figure as the quantity of mission-essential workload that should be retained for military depots. We recommended that the Secretary of Defense develop and apply criteria for

- assessing needs for surge to meet wartime requirements,
- planning the minimum organic and contractor capacity to meet those requirements, and
- relating the status of this capacity to peacetime workloads.

And, our 1977 report 2/ on Air Force depots' responsiveness to peacetime and wartime needs revealed that contractors' ability to provide wartime support had not been adequately assessed.

If DOD is uncertain as to the capability and capacity private industry can and should provide in peacetime and wartime, uncertainty also exists as to the capability and capacity needed at DOD depots. In the face of such uncertainty, and with the desire to keep DOD depots utilized during a period of workload declines, the services' trend has been to reduce the workload distributed to private industry. For example, from 1971 to 1977, the cost of aircraft maintenance at depots increased from \$1,116 million to \$1,489 million, or 33 percent, while maintenance under contract decreased from \$713 million to \$543 million, or 24 percent. (See p. 9.)

Contract support

There is unused capability and capacity available in private industry, thus there may be less needed at DOD depots. Besides unused capacity in the commercial aircraft maintenance industry which may be available due to DOD

1/"Should Aircraft Depot Maintenance Be In-House or Contracted? Controls and Revised Criteria Needed," (FPCD-76-49, Oct. 20, 1976).

2/"Air Force Maintenance Depots--The Need for More Responsiveness To Mobilization As Well As Peacetime Efficiency," (LCD-78-403, Nov. 23, 1977).

cutbacks, the aircraft manufacturing industry also has unused capacity. 1/ A January 1977 joint DOD and OMB study of manufacturers concluded that the cost to DOD of unused commercial production capacity ranges from \$250 million to \$400 million annually. One alternative discussed in the study for making better use of this capacity would be to shift some of the military depot workload to private industry.

While the study pointed out that there are arguments pro and con regarding using the manufacturing industry for maintenance, it also stated that significant savings may be available and, therefore, serious consideration should be given to this alternative in the future. Two factors which indicate that manufacturers may be capable of fulfilling a larger peacetime and wartime maintenance role are that:

- Defense planning generally assumes that the United States will prevail in any likely scenario by means other than outproducing the other side. If aircraft production were to become necessary, it could start to compensate for attrition within 1 or 2 years. Thus, the unused capacity appears to be available for other uses rather than being required as a standby for immediate aircraft production.
- Weapon systems, such as the F-15, F-16, and F-18 aircraft, are depot-maintained by the manufacturer during an initial warranty period; thus, if war erupted during that period, the manufacturer would have a critical maintenance role.

A reason DOD raised for not using manufacturer's capacity for maintenance is that depots, or dedicated commercial maintenance activities, are generally more cost effective. However, in light of the aircraft industry study, we believe more needs to be known about the potential for using the capacity. For example, consideration should be given to possible savings from:

- Phasing down depots.
- Having to pay only the incremental cost over the cost already being incurred for the unused capacity.
- Having not to invest in facilities and equipment by leaving maintenance responsibility with the manufacturer.

1/Joint DOD/OMB Aircraft Industry Capacity Study, January 1977.

Depot support

Because DOD has not adequately assessed the potential for using private industry, it cannot be certain about the organic resources required. Despite this, there is evidence that gross depot capacity is significantly more than needed and that significant amounts of certain types of capacity may not be needed at all for wartime. This situation raises questions regarding the depots' ability to surge to needed operating levels during mobilization. To illustrate, in November 1977, we reported 1/ that the Air Force has yet to define how people, repair parts, and facilities and equipment should be structured to meet mobilization surge requirements. Although progress has been made, the Air Force needs better and more accurate planning before it can determine if it has too much or too little wartime surge capability.

Various studies have shown that Defense depots have substantially more gross direct labor-hour capacity than needed. For example, a 1974 Institute for Defense Analysis study showed that DOD's gross aircraft depot maintenance capacity was over 200 percent of the amount needed for wartime. A later DOD depot maintenance consolidation study reported that, based on a mobilization use of 185 percent of peacetime depot capacity, there was a gross labor-hour excess equivalent to

- four Navy and one Army depot,
- two Air Force depots, or
- one Air Force and three Navy depots.

The services' combined estimate of their organic mobilization workload amounts to about 131.5 million direct labor hours. They expect to meet this requirement by expanding (surging) peacetime operations beyond the one 8-hour, 5-day-a-week (1-8-5) shift. Thus, the peacetime gross facility and equipment capacity needed at DOD depots depends on the extent depots can surge beyond the one-shift operation. DOD has not established criteria for this surge potential; however, based on assumptions used in various studies, gross excess capacity can be estimated as follows:

1/"Air Force Maintenance Depots--The Need For More Responsiveness To Mobilization As Well As Peacetime Efficiency," (LCD-78-403, Nov. 23, 1977).

	<u>Direct labor hours</u>			
	----- (millions) -----			
Surge assumption	(a)	(b)	(c)	(d)
Peacetime capacity available (1-8-5 activity)	89.1	89.1	89.1	89.1
Less peacetime capacity required based on various assumptions	<u>38.7</u>	<u>43.8</u>	<u>57.2</u>	<u>71.1</u>
Excess peacetime capacity	<u>50.4</u>	<u>45.3</u>	<u>31.9</u>	<u>18.0</u>
Percent of required capacity that is excess	130	103	56	25

a/Operating around the clock, 7 days a week, with a 0.6 reduction each day for productivity degradation. This was used by the Institute for Defense Analysis in its September 1974 report, "A Study of Department of Defense Depot Maintenance Requirements, Capabilities, and Capacities," when estimating Army mobilization requirements.

b/Expanding to two 10-hour shifts, 6 days a week. This was used in GAO report, "Navy Aircraft Overhaul Depots Could Be More Productive," (LCD-75-432, Dec. 23, 1975). Navy and Air Force officials have said this rate is reasonable.

c/Naval Air Systems Command factor representing a three-shift, 7-days-a-week operation, with productivity degradation based on a Stanford Research Institute Study of aircraft manufacturing plant operations during World War II. This further assumes a peacetime base operating at 1.5 shifts.

d/Hypothetical use rate for mobilization planning used in the 1974-75 DOD "Depot Maintenance Consolidation Study."

Regardless of which assumption is used, the peacetime industrial base has more gross capacity than needed for mobilization requirements. For instance, the 18 million direct labor hours, the least excess calculated, exceeds the combined peacetime capacity of the 4 smallest of the 13 depots. In 1976, the 4 depots employed about 10,000 people and spent about \$320 million.

If more of the workload were to be contracted, there could be substantially more excess depot capacity. For

example, if contract support were to be used at the 1971 ratio, the excess could be another 10 million direct labor hours.

Another aspect of potentially excess depot capacity is the capacity that is used but not required for wartime operations. Thus, where consistent with national interests, contracting rather than depots could be used. For example, during mobilization, direct work on aircraft is expected to reduce to insignificant levels, while work on components and engines is to balloon. Yet much depot capacity during peacetime is dedicated to direct aircraft work. To illustrate, about one-third of the Air Force workload is on aircraft. Thus, is the capacity that is being retained, the right kind of capacity to support mobilized operations?

A primary reason DOD retains capacity, such as maintaining aircraft, is to assure that a ready source of skills for component work in the event of mobilization is available. Cross-training of personnel will enable them to shift from peacetime aircraft maintenance to a component operation when needed. As we reported 1/ in late 1977, however, in the case of the Air Force, the critical skills needed had yet to be identified. Thus, there remains uncertainty regarding the capacity at DOD depots.

Despite the (1) apparent excess capacity, (2) uncertainty as to DOD depot capability and capacity needed, and (3) lack of a master plan to coordinate total DOD maintenance effort, the services invest at a rate of about \$65 million annually to modernize their facilities and equipment. How can DOD be assured that these expenditures are necessary? To illustrate, replacing an industrial process at a given depot may be very cost effective in light of the depot's operations, but the reverse may be the case if the depot's capacity itself is unnecessary.

The impact of the lack of a master plan can be demonstrated by two projects approved for fiscal years 1973-74 at the Quonset Point Navy depot. Although these projects, estimated to cost \$2.2 million, were later canceled, they were approved shortly before the April 1973 announcement

1/"Air Force Maintenance Depots--The Need For More Responsiveness To Mobilization As Well As Peacetime Efficiency," (LCD-78-403, Nov. 23, 1977).

closing that installation. Further, in 1975, we reported ^{1/} that 23 Navy modernization projects from 1969-74, which cost an estimated \$40 million, were redundant among Navy depots (redundancies with other services were not considered).

Agency comments on
excess depot capacity

Defense officials explained that based on recent Navy and Air Force implementation of DOD planning, programing, and capacity measurement policies and instructions, they have not arrived at the gross excess capacities which the report indicates to exist. They recognize, however, that the Navy continues to show some excess. And, although the Army is not expected to implement the policies and instructions until January 1979, the officials believe it will have no problem because of its discontinuance of maintenance at Sharpe Army depot and its current consideration of another workload consolidation.

They stated that information resulting from the new policies and instructions indicates that Navy and Air Force peacetime facility utilization is between 75 and 80 percent considering a one-shift, 40-hour week. They pointed out, however, that utilization is expected to jump well above 200 percent during mobilization.

As discussed earlier (pp. 13 to 19), until DOD effectively establishes the extent that private industry can and is to be used in peacetime and wartime, there will be uncertainty regarding the extent of excess depot capacity. We did, however, evaluate the utilization figures Defense provided for peacetime and mobilization and found the following.

--Utilization rates were based on a capacity figure which was constrained to allow for time the employees are not on the job due to leave, administrative duties, training, and other reasons. To illustrate, work stations were considered as providing about 1,600 hours annually, the time the worker would be there, rather than the 2,000 hours annually that the station is physically available. Based on unconstrained physical capacity, comparable peacetime, and mobilization, utilization rates would be 64 percent and 160 percent, respectively. During

^{1/}"Navy Aircraft Overhaul Depots Could Be More Productive," (LCD-75-432, Dec. 23, 1975).

our review, top level Air Force officials advised us that the Air Force views its depots as being able to operate at about 300 percent of one-shift capacity during mobilization. (Capacity calculation methods are discussed on pp. 41 and 42.)

- Mobilization utilization rates that the Air Force provided to DOD did not recognize the airframe workload which accounts for about one-third of the peacetime workload, but which is expected to decrease to relatively nothing during mobilization. If airframe changes had been recognized, the utilization rate would be significantly lower.

CONSTRAINTS TO ACHIEVING DOD-WIDE EFFICIENCY

DOD has tried to reduce the excess capacity at aircraft depots by considering alternatives, including closing depots and realining workloads. These actions, however, were generally prompted by tightening budget conditions and top-level action to reduce the cost of support activities.

Defense policy established in 1970 (DOD Directive 4151.1) stipulated that the services were to exchange mission-related workloads, or interservicing, when it would benefit DOD as a whole. In 1973, however, we reported 1/ that little work had been exchanged. Subsequently, DOD initiated an interservicing network and exerted pressure on the services to interservice. Yet today, although each service has an interservicing office, actual interservicing has been minimal.

Some of the constraints which have inhibited the effectiveness of DOD's actions are:

- The services' desire to be self-sufficient in supporting their mission equipment and the exercise of service prerogatives.
- The services' desire to justify existing depot resources.
- The difficulty in comparing and demonstrating benefits from management actions.

1/"Potential For Greater Consolidation of the Maintenance Workload in the Military Services," (B-178736, July 6, 1973).

--The lack of criteria for decisionmaking.

--Political reactions to proposed depot phase-downs or closures.

Self-sufficiency and service prerogatives

Historically, each military service operated under the concept that to insure effective performance of its missions, it had to have complete logistical control over mission equipment. Each service, therefore, developed its own depot maintenance resources without seriously considering the redundancies being created with other services.

Although DOD has directed the services to interservice whenever beneficial, the individual services decide whether or not to interservice specific equipment, a decision which must be unanimous. In deciding, the services tend to hold to remnants of the self-sufficiency concept. For example, a service may decide it prefers to have its own technology so that it can better support its operational units or so that it can be prepared for potential workload increases as the technology expands, as in the case of the Navy's LM2500 gas turbine engine. (See p. 34.)

Or a service may preclude further interservice consideration by classifying an item as mission-critical, a service-created classification. DOD does not recognize this classification as a legitimate reason for retaining workloads, but has not interceded where it has been used.

Justification of existing resources

As a result of the drawdown of forces since Vietnam and the resulting workload reductions, transferring workloads to another service may degrade a service's depot efficiency unless it receives additional work. Interservicing has, therefore, become a matter of give and take, and each service has tried to preserve its equivalent share of the total workload. We believe workloads should be distributed to achieve the most effective and economical use of resources, without regard to service.

Difficulty in quantifying savings

The decision to interservice or consolidate workloads is generally based on an item-by-item study, conducted by the services, which considers potential savings. Reliably determining such savings is a problem because the services

use different maintenance philosophies and management information cost accounting systems. For example, service A may charge a higher rate per direct labor hour worked than service B, but service B may apply its rate based on fewer hours to do the same work. Further, service B may not include the same costs in its rate that service A does.

To standardize certain aspects of depot maintenance among the services, DOD has established a uniform cost accounting system and a standard method for established plant capacity. Even so, when consistency among the services will exist appears uncertain. (See pp. 41 to 43.) And without consistent data, decisions to transfer or consolidate workloads cannot be supported by analyzing day-to-day operating costs. Therefore, in considering inter-servicing, the services have looked primarily at items which require new resource investments, because the investment alternatives can be compared in the common terms of acquisition costs.

Emphasis on new investments receives further support from the Defense and military services position that there is little need to tamper with the existing workload distribution because they already have resources to do the work. Transferring such workloads, they contend, would incur additional costs without producing identifiable savings. On an item-by-item basis, without consistent cost data, their position may be valid; however, we believe DOD-wide workload realignments can isolate and eliminate unneeded capacity and, thereby, achieve substantial savings.

Lack of criteria

To identify excess capacity, one must know how much capacity is needed. Since peacetime one-shift capacity is to be derived from mobilization capacity requirements, one must know the relationship between the two to calculate the needed peacetime capacity. But as pointed out earlier, DOD has not yet identified this relationship. In addition, DOD needs a mechanism for measuring excess capacity.

We believe that depot maintenance capacity should be responsive to needs and that, therefore, there should be criteria and a mechanism to measure and control DOD-wide capacity. Since workloads may have to be transferred between services and depots may be selected for phase-down, the controlling activity would need to be above the individual military service level.

Economic and political turbulence

One of the more effective methods of eliminating excess capacity is to close maintenance depots. DOD had closed several depots in the past and has recently considered additional closure alternatives. Closures have become increasingly more difficult to carry out, however, because of the resulting economic and political turbulence created in local communities. An Air Force study, for instance, estimated that seven community jobs are withdrawn for every defense job eliminated.

A depot closure announcement is likely to bring about prolonged and expensive litigation instigated by the community. An entire State congressional delegation challenged a recent maintenance depot phase-down decision. In another case, a DOD study of a closure concluded that the action would not be cost effective because of the resulting litigation expense.

In view of the turbulence related to depot closure, how can excess capacity be effectively eliminated? Here, a master plan becomes vitally important as the logical basis for decisionmaking and for providing long-range notice of depot closures.

PREVIOUS STUDIES

Over the past 10 years, DOD and the military services have studied and restudied aircraft depot maintenance to try to find ways to stretch the maintenance dollar. Additionally, we have conducted numerous reviews of the area. Although many studies identified redundant depot maintenance capabilities and excess capacities, little has been accomplished DOD-wide in realining organizations or consolidating workloads.

GAO maintenance consolidation study

On July 6, 1973, we issued a report, "Potential for Greater Consolidation of the Maintenance Workloads in the Military Services," (B-178736). The findings included:

- Each military service has overemphasized developing its own maintenance capability rather than trying to use the other services' existing ones.
- Although various DOD instructions have encouraged interservice maintenance, the services have circumvented the policy's intent and, consequently,

have extensively duplicated, and thus underused, maintenance facilities.

- Responsibility for maintenance in DOD was fragmented, but it was feasible to consolidate workloads.
- The Secretary of Defense has not been able to effectively control the services' use of their own maintenance capabilities because they have claimed a need to maintain mission-essential equipment in their own facilities.
- Because duplicated maintenance facilities are costly, interservice use of facilities can save money. Substantial long-range savings and more efficient use of facilities would result by removing direct control of depot maintenance from the individual services.

We recommended that the Secretary of Defense realine management of depot maintenance by either

- establishing an independent agency to assume responsibility for the depot maintenance of all commonly used items or
- assigning a single manager to be responsible for specific classes of items.

The report emphasized that, because the services have resisted using interservice support agreements, DOD should take a strong position in directing the services to work together toward integrated management and should monitor the services' progress to insure that integrated management objectives are achieved.

Subsequent to the report, DOD took a stance in favor of increased emphasis on interservicing rather than establishing a single manager over depot maintenance.

Other GAO studies

We have issued numerous reports highlighting redundancies and underutilization and have encouraged the single manager concept as a solution to such problems. Some reports are summarized below.

- Our June 26, 1975, report, "Use of Numerically Controlled Equipment Can Increase Productivity in Defense Plants," pointed out that some DOD activities had underused such equipment. It recommended that

the Secretary of Defense ensure that these underused resources are considered before procuring additional equipment.

- On August 27, 1975, we issued the report, "Single Manager Needed To Obtain Cost and Fuel Savings in Spectrometric Oil Analysis Program." This report explained that there was little interservicing in this program, even though it was common among the services. The report recommended a single manager over the program for all services, but DOD disagreed and decided instead to develop a new joint agreement among the services.
- On December 23, 1975, our report, "Navy Aircraft Overhaul Depots Could Be More Productive," showed that Navy aircraft depot maintenance capacity far exceeded that required for mobilization. The report recommended reducing Navy depot capacity to the peacetime base required to support mobilization and suggested that, if additional capacity were required for peacetime workloads, the Navy should use interservicing and/or additional shifts. The Navy did not consider multiple shift operations appropriate because certain critical-path and high-cost processes were already working beyond one shift. According to the Navy, additional multishift activity could degrade the ability to surge to mobilization levels.
- Industrial plant equipment was the focus of our October 5, 1976, report, "Management of Department of Defense Industrial Plant Equipment Can Be Improved." The report pointed out that responsibility for managing industrial plant equipment was divided among the services and the Defense Industrial Plant Equipment Center. As a result, DOD appeared to be retaining more equipment than needed for peacetime and mobilization requirements. The report recommended that the Secretary of Defense centralize the management of industrial plant equipment. In response, DOD stated that it would consider centralized management in a study of various alternatives.
- We again reported on the need for a single manager in our May 31, 1977, report, "A Central Manager is Needed To Coordinate the Military Diagnostic and Calibration Program." This report pointed out that the services each maintained independent and duplicative calibration staffs, equipment, and facilities. As of late 1977, DOD was studying the potential for consolidating some of its calibration laboratories.

CONCLUSIONS

The current aircraft depot maintenance system is characterized by rising costs, underuse and duplication of facilities and equipment, and excess capacity. Given these characteristics, DOD will continue to pay ever-increasing costs for unnecessary maintenance resources in a budget-constrained environment. We believe DOD should take decisive action to achieve the economies and efficiencies available.

Most importantly, DOD needs to more effectively match its aircraft depot maintenance resources with its requirements. To do this, DOD must realistically estimate what its requirements are and then develop a maintenance complex which will most effectively and efficiently meet those requirements. Private industry's role in providing aircraft maintenance in both peacetime and wartime should be assessed. Where appropriate, DOD should take advantage of unused Government-supported commercial aircraft production capacity.

For work that should not be contracted, DOD should determine and establish an organic depot structure, sized for efficient operations, which will eliminate unnecessary duplication and underuse of resources. This will require workload and resource realignments across service lines.

But effective workload consolidations go beyond the interservicing program's scope. Interservicing considers individual items, while consideration should be given to resources, processes, and broad categories of workloads. For example, the Air Force has two depots which overhaul gas turbine engines, the Navy has five such depots, and the Army has one. But, how many gas turbine engine depots does DOD need? And, how can we most efficiently distribute the workload among those depots? These questions need to be answered by an independent single manager because they are outside the scope of the individual services, singly or collectively.

We believe a necessary tool for developing the aircraft depot maintenance complex is a master plan which identifies the optimum industrial posture and establishes a program for attaining that posture. We further believe that such a posture can only be developed and carried out by a single manager with visibility and authority over all aircraft depot maintenance.

CHAPTER 3

LITTLE PROGRESS TOWARD EFFECTIVE

USE OF DEPOT MAINTENANCE RESOURCES

In maintaining their equipment, the military services are expected to follow DOD Directive 4151.16, which stresses the need to

- retain only those resources needed to sustain equipment readiness and minimize costs;
- share resources, especially those usable in inter-service support programs; and
- establish management information systems, uniformly applied throughout the services, to monitor maintenance performance.

Progress toward greater sharing of resources and less duplication has been hampered because DOD continues to allow each service to control its own maintenance resources. With management decentralized, the services have individually interpreted DOD guidance and have made decisions on sizing their resources without sufficient regard to the other services' existing resources. Further, the services' maintenance management systems do not yield comparable information for evaluating how well the total resource base is managed.

WORKLOAD REALIGNMENT DECISIONS MADE WITHOUT EVALUATING TOTAL RESOURCE BASE

Each military service has developed a depot maintenance management system to serve its own needs. Decisions to increase or decrease the depot maintenance resource base are made by the individual services without regard for DOD-wide requirements or services. Air Force officials said they do not coordinate closing facilities or realigning workloads with the Army or Navy. In addition, workload realignments have lacked criteria.

Depot closures

In the late 1960s, the Air Force closed three depots at San Bernardino, California; Middletown, Pennsylvania; and Mobile, Alabama. These depots, however, were not closed because of any management criteria for eliminating excess capacity. Rather, the closures stemmed from a 1962 DOD Cost

Reduction Program designed to reduce overall defense costs. One of the objectives was to consolidate logistics activities into fewer, but larger, installations. DOD desired a five-depot Air Force structure and announced that three Air Force depots had to close. The Air Force then determined that the San Bernardino, Middletown, and Mobile depots would close.

Before deciding on these three depots, the Air Force considered several factors. The Oklahoma City, San Antonio, and Sacramento depots had the most vital missions and, along with the Ogden and Warner Robins depots, represented a considerable dollar investment in facilities. Mobile and Middletown, on the other hand, had less attractive facilities and needed to be modernized. The prime missions of each--the F-105 and instrument repair, respectively--could be transferred rather easily. In addition, much of Mobile's item management responsibility already had been given to the Defense Supply Agency. ^{1/} San Bernardino's prime mission--the Titan missiles--was being deactivated.

Similar cases can be found in both the Navy and the Army. In 1974, the Navy closed its Quonset Point, Rhode Island, depot and redistributed its workload to other depots. Navy depots are generally located near Naval air stations, and a support relationship exists between the two activities. The Quonset Point depot was closed because it no longer had a support relationship with an air station.

In the mid-1970s, the Army closed its Sharpe, California, aircraft depot overhaul capability. The depot's workload had consisted primarily of light observation aircraft, the number of which had been severely reduced due to Vietnam attrition, reductions in active inventories, and increased use of contract maintenance. As a result, the Army decided to close the depot.

In both Navy and Army cases, no criteria were used in deciding to close the depots. Rather, circumstances which led to reduced workloads caused each service to recommend the closures.

Technology repair centers

Because of manpower curtailments, the Air Force, in 1972, considered closing one of its five depots but instead

^{1/}In January 1977, the agency's name was changed to the Defense Logistics Agency.

decided to realine its existing workload by technology, thereby creating the technology repair center concept. The Air Force Logistics Command developed the concept to improve the productivity of depot maintenance and to bring it in line with DOD Directive 4151.1, which required that organic maintenance be limited to 70 percent of the mission-essential workload and that depots use at least 85 percent of the available capacity.

The concept involved a shift of workloads among the five depots to consolidate repairing aircraft components requiring similar skills, facilities, and equipment. It, therefore, offered such advantages as eliminating duplication and reducing overhead. The concept applied to components which represented about 32 percent of the command's organic depot workload. The repair and overhaul of aircraft engines had already been consolidated at two depots, Oklahoma City and San Antonio.

The Air Force points out many advantages of the technology repair center concept.

- Fewer repair points. Air Force officials said the number of repair points was reduced from 53 to 23.
- Better distribution of wartime surge responsibilities among depots. Previously, most repair items expected to surge during wartime were the responsibility of two depots.
- Reduced personnel. The Air Force estimated a potential savings of \$18 million due to personnel reductions.
- Reduced facility construction. The Air Force estimated a onetime savings of \$18 million as a result of canceling or reducing construction projects.

In a prior report 1/ on the concept, we were unable to verify the savings claimed by the Air Force, largely due to inadequate maintenance information systems.

A potential drawback of the technology repair center concept is that with such specialization, all weapons systems could be adversely affected by a strike, natural disaster, or sabotage at one depot. The Air Force, however, has contingency plans which provide backup capacity and capability

1/"Assessment of the Air Force's Planning for the Technology Repair Center Concept," (B-172707, July 2, 1976).

from below-depot maintenance activities, similar resources at other Air Force depots, and equipment suppliers.

The technology repair center concept was not implemented by the other services. Army and Navy officials told us the concept was still unproven, and they wanted to wait and see whether the centers could do the job before endorsing it. Even though the other services do not use the concept, they, too, must provide backup capability to assure that maintenance can be provided when the primary resource is incapacitated. The Army uses a primary/secondary depot concept in which a primary depot has the basic maintenance mission assignment for certain equipment, with a secondary depot providing backup capability if needed. The Navy further retains redundant capabilities within its depot system. Thus, considering the similarity of depot maintenance resources among the three aircraft depot systems, the individual backup systems are likely to be fostering multiple redundancies among the services.

If, for instance, the technology repair center concept were to be applied on a Defense-wide basis, a single coordinated backup system could be achieved, thereby reducing the extent of backup redundancies. Applying a master plan to the concept, depot modernization funds could be focused on modernizing the primary capabilities and capacities. Secondary resources may not have to be modernized because infrequent emergency support could be less efficient.

INTERSERVICING MAINTENANCE WORKLOADS

DOD depot maintenance policy emphasizes aggressive use of interservice support whenever increased economy to the Government will result and when such support is consistent with operational requirements. Under the interservicing concept, maintenance resource sharing is accomplished by having each service maintain other services' equipment. This permits more efficient and economical use of existing depot facilities and equipment. Thus, the services avoid duplicating resources.

Although DOD and the services' Joint Logistics Commanders 1/ have stressed interservice support, actual interservicing has been minimal. Despite this, interservicing

1/Commanders, U.S. Army Materiel Development and Readiness Command; Air Force Logistics Command; and Air Force Systems Command; Chief, Naval Material Command; and Deputy Chief of Staff for Installations and Logistics, Marine Corps.

has shown it can save dollars. For example, DOD claims a cost avoidance of about \$15.4 million from interservicing decisions. Since fiscal year 1972, interservicing has ranged from 3.2 to 4.9 percent (averaging 4.3 percent) of the total maintenance workload, as shown below.

Fiscal year	Direct labor hours		Percent
	Total workload (note a)	Total interservicing (note a)	
	(millions)		
1972	144.5	4.6	3.2
1973	130.5	5.9	4.5
1974	123.6	6.0	4.9
1975	117.9	5.0	4.2
1976	101.7	4.9	4.8
1977 (Estimate)	100.3	4.7	4.7

a/Includes an estimate for contract work.

DOD officials stated that only 25 percent of the total service workloads are susceptible to interservicing. The other 75 percent consists of contracting and service-peculiar work. They contended that prior to the Joint Logistics Commanders' interservicing initiative, roughly 30 percent of the susceptible workload was interserviced; today that figure is 49 percent.

We do not agree with DOD's contention for two reasons. First, about 29 percent of the interservicing shown in the preceding schedule represents contract work for which the services have taken interservicing credit. Thus, the actual interservicing that the services performed was significantly less than shown. Second, the reason, "service-peculiar work," is not a valid reason for precluding interservicing. Interservicing should be examined from the standpoint of the resources required and available to perform the maintenance rather than the peculiarity of ownership. While an item may be unique, grouping it with similar types of items may produce benefits such as the Air Force claims with its technology repair center concept. From the resource standpoint, virtually any item can be susceptible to interservicing.

A September 1974 study by the Institute for Defense Analysis stated that interservicing suffers from the "control syndrome." In other words, each service feels more confident about doing its own mission if it has control over the resources needed for current or wartime operations. In citing a lack of information on inter-service support during wartime, the study added:

"We believe that this is further evidence of a failure to analyze the DOD depot maintenance structure as a complete system. It is a structure composed of many individual elements, several of which appear to operate with a high degree of autonomy."

Although DOD's interservicing program was created to increase interservicing, the services have tended not to push for this. There are strong indications that the services view interservicing negatively. For example, the Navy decided it would not interservice its LM2500 gas turbine engines, while Army officials are trying to set aside a decision to interservice altimeters. (See pp. 34 to 40.)

Maintenance interservice support management offices

In July 1974, the Joint Logistics Commanders created a Maintenance Interservice Support Management Office network to expand the use of interservice maintenance. Actually, a network of such offices has existed since 1972, but the 1974 action was designed to strengthen them. The five offices are located at:

- The Air Force Logistics Command.
- The Air Force Systems Command.
- The U.S. Army Materiel Development and Readiness Command.
- Headquarters, Naval Material Command.
- Headquarters, Marine Corps.

Each office is headed by a host command official. These officials are aided by Interservice Liaison Officers representing the other services at each location.

The offices established 11 work groups to study the interservicing potential of commonly used items for commodity groups, such as avionics and engines. Another part of the network, the Maintenance Interservice Support Officers, negotiates and monitors performance under interservicing agreements.

Since 1974, work groups have made over 750 interservicing recommendations affecting over 43,000 stock numbers. While most of the recommendations were in favor of interservicing, the items reviewed were already in the services' inventories. Investments in depot facilities and equipment to support those items had already been made, and no capital investment savings could be achieved by interservicing. Furthermore, the lack of comparable cost data hampered effective evaluation of interservicing alternatives. As a result, ultimate decisions to interservice were minimal. The interservice offices expect that items requiring additional capital investment will be better candidates for interservicing in the future.

Emphasis on new starts

At a July 1975 meeting, the Joint Logistics Commanders determined that the greatest opportunity for avoiding duplication in future depot maintenance capabilities was in the area of "new starts." New starts are (1) new items entering service inventories or (2) existing items which generate requirements for additional facility and equipment investments. Following their July 1975 meeting, the Commanders elevated Maintenance Interservice Support Management Office reviews of new starts to the highest priority level.

The Commanders felt the existing network structure should be altered to handle the transition to identifying and reviewing new starts. As a result, they approved the creation of a Maintenance Interservice Support Group, Central. Located at the Air Force's Oklahoma City ALC, the group will have 18 members representing the Army, Navy, Air Force, Marine Corps, and Coast Guard. These members will be identifying and screening new starts for their interservicing potential. It became operational in July 1977, and if successful, two more groups are planned.

While new starts do offer a great potential for savings through interservicing, we believe DOD's effort to rejuvenate interservicing could fall short of success because

- the lack of central management is likely to continue to permit individual service interests to prevail and
- the lack of comparable data systems will hamper effective decisionmaking.

LM2500 gas turbine engine

The potential for interservicing the Navy's LM2500 gas turbine engines was considered at least twice. A 1972 Navy survey of eight potential repair sites concluded that any of the sites, including the Air Force's San Antonio depot, could accommodate LM2500 depot maintenance. Despite this capability and an estimated savings of \$735,000 in startup costs if the San Antonio site were used, the Navy elected to develop its own repair capability at its North Island depot.

The Navy's study provided the following reasons why the North Island depot was selected over San Antonio.

- North Island's quality control programs would need the least adjustment to reflect the using command's needs.
- Future gas turbine engine use in ships could justify additional overhaul activities.
- Similar, but not interchangeable, parts at the same facility could bring about inadvertent mixing which would lead to engine degradation and possible failure.
- Processing identical parts requiring different tolerances could increase costs and, possibly, degrade engine performance.
- Logistics support teams, on call and under direct Navy control, would be able to operate more effectively in an at-sea environment than Air Force personnel.
- Wharf facilities were available at North Island for engine removal and installation.

It appears that the Navy's reasons illustrate interservicing problems within the present organizational structure. We believe there are obvious weaknesses in the Navy position, which follow.

Regarding quality control programs, the Navy study itself stated that San Antonio had the capability to meet quality requirements. Adjusting the program to meet user needs would appear to be merely a matter of knowing and providing what the user wants.

Establishing capability to support possible future increased requirements for this type of engine presupposes that they will occur. This reason could support any new capability. Further, the study stated that the additional sites surveyed had the capability and could be used as backups to support increased requirements.

Regarding the mixing of similar spare parts and misuse of identical parts, the Navy's argument is counter to DOD's generally accepted policy of repairing similar items in the same shops to lower equipment inventories, reduce facility requirements, and otherwise improve efficiency and economy. Inherent in such a policy is the potential for mixing or misuse of all similar items and, therefore, the Navy's argument could be used to avoid interservicing or centralized repair of all but identical items. The answer is that appropriate quality controls would have to be applied to minimize engine degradation and failure.

The need for a Navy-controlled logistics support team does not dictate that a Navy depot must do the overhauls. Regardless of where overhauls occur, some of the labor force could be Navy-oriented personnel.

Finally, the engine can be removed and installed at sites away from the overhaul activity. This was demonstrated during the warranty period when engines were repaired at General Electric's inland plant at Ontario, California.

Based on its study, the Navy recommended that the engine be maintained commercially at the General Electric plant for a 2-year warranty period. Then, the workload was to be phased into North Island in October 1976. This recommendation was approved by the Assistant Secretary of the Navy (Installations and Logistics) on October 31, 1973. By this time, the cost of special tools and test equipment for North Island was estimated to be \$3.6 million, twice the original estimate. As of August 1975, the Navy had spent over \$5 million to procure special support equipment for the LM2500.

The question of interservicing the LM2500 was again raised in a mid-1975 Air Force Logistics Command letter to the Chief of Naval Material. The letter stated, in part:

"Capability is available at the San Antonio Air Logistics Center to handle the depot repair for the LM2500 engine for the Navy. If timely action is taken, an opportunity may exist to cost avoid special tooling and equipment by Navy dependence on San Antonio ALC * * * I believe, as I am sure you do, that our greatest opportunity to avoid continued criticism is to avoid duplication before the fact. In this connection, I solicit your support in directing a joint evaluation of San Antonio capabilities to satisfy the LM2500 requirements as a potentially preferred DOD tradeoff to further investment at NARF North Island."

In his response, the Chief of Naval Material gave the following reasons for selecting North Island over San Antonio.

- The Navy would have to provide special support equipment to any activity which might be selected.
- The Navy indicated that San Antonio would require a full set of special support equipment and would have to establish a separate repair line, since the LM2500 was not significantly similar to the TF39 engine.
- San Antonio did not have a necessary engine coating capability. The Navy estimated the procurement and installation cost to be \$1 million with a 24-month leadtime.
- Over \$5 million in Navy funds had already been spent to procure special support equipment.
- Some components of the LM2500's electronic control system would need matching by final adjustment on an operating engine. Therefore, collocating the engine and module repair facility was desirable.
- The Navy needed a facility highly responsive to an engine used in a maritime not an aerospace environment.

Of the above reasons, the only one which appears to have substance is that the Navy had already spent \$5 million on special support equipment. The Air Force provided the following rebuttal to the Navy letter.

--Although the LM2500 and TF39 engines are not identical, they are sufficiently similar to share many pieces of special support equipment. In this regard, San Antonio, by maintaining the TF39 engine, was able to provide 300 pieces of excess equipment to the Navy for initial LM2500 support.

--Although San Antonio does not have the coating capability required by the Navy, it has other state-of-the-art coating capabilities. As a result, the Air Force Logistics Command estimated that the capability required by the Navy could be readily added at San Antonio for \$200,000 (not \$1 million) in a 6-month leadtime (not 24 months).

--The General Electric Company advised the command that the electronic control system is envisioned to be repaired onsite, rather than by shipment to an engine overhaul repair depot. Further, General Electric believes that the electronic control system has no special match/mating requirements and is interchangeable with various core engines.

--The Navy's belief that a facility is required which is highly responsive to an engine used in a maritime environment could be construed as suggesting that the Navy should support all equipment used in sea operations. This reason could be given for virtually any new item the Navy did not want to interservice.

The result of this case is that the Navy made a unilateral decision not to interservice when DOD had an interservicing program and held to that decision when the Joint Logistics Commanders had committed themselves to close interservice cooperation.

In evaluating this case, we noted the following salient points:

--Both the Navy and Air Force wanted the LM2500 maintenance assignment and both believed their depot would be the more cost effective.

--A pivotal factor was the cost of a special coating capability needed for the engine. Although this capability was jointly developed by the Air Force and Navy, they could not agree on the cost and feasibility of San Antonio providing the coating.

--The 1972 Navy study cost considerations which supported the decision were limited to estimates of initial startup costs. The 1972 estimate of \$1.8 million to install the capability at a Navy depot was made prior to tooling design and costing and did not consider inflation, configuration changes, and other factors influencing tooling costs. This cost ultimately exceeded \$5 million. Furthermore, the study did not consider overhaul costs because the overhaul procedures were not to be published by the manufacturer until September 1974. The study did examine the cost to overhaul a similar engine, but could not reach a conclusion because of differences in maintenance practices and cost accounting systems among depots. In light of the differences in direct labor pay in 1972--North Island direct labor pay rates exceeded San Antonio's by close to 15 percent--we believe an operating cost analysis would have tended to favor San Antonio.

The decision to overhaul the LM2500 at a Navy depot was an example of the negative approach to interservicing. Our reconstruction of the circumstances suggests the Navy was trying to find reasons why interservicing would not work, rather than trying to show that it would. Regardless of the strengths and weaknesses in the Navy position, the net result of the exchange of views between the two services is the creation of dual maintenance capabilities for a similar item by the Navy and Air Force. There was no authoritative organization to resolve the matter so as to assure that taxpayers were not footing the bill for duplicate capabilities. We believe an independent activity having visibility over the total situation would have been able to assure that such a resolution was objectively reached.

Altimeter repair capability

In the mid-1970s, the Army and Navy began installing AAU-31 and AAU-32 AIMS ¹/ altimeters in helicopters and aircraft. Initially, the Army altimeters were repaired under warranty contract by the manufacturer.

During 1975-76, an interservicing study was made to determine which service would have depot maintenance

¹/AIMS--Air Traffic Control Radar Beacon System (ATCRBS), Identification Friend or Foe (IFF), and Mark XII Identification System Systems.

responsibility for the altimeters. The ability to repair them and excess capacity existed at three non-Army depots. Based on capability, capacity, and investment criteria, the study recommended that the Navy do the Army's workload which was estimated to reach about 56,000 direct labor hours by 1980.

The Army did not accept the recommendation. Instead, it declared the item exempt from interservicing consideration and planned to develop its own repair capability at the Corpus Christi Army depot. The Army gave as its rationale:

- It has been designated by DOD as the executive service for H-1 aircraft and must retain a depot overhaul capability for H-1 aircraft altimeters.
- The altimeter is a critical item and is essential to the aircraft's safety of flight.
- It is the predominant user and has the greatest workload.
- The current Army depot skill for altimeters will ultimately be lost by phasing out existing altimeter workloads.

We believe the Army's reasons for exempting the AIMS altimeter from interservicing are also illustrative of problems in achieving interservicing under the existing structure.

- Being executive service for an aircraft type should not mean the service has to have overhaul capability for every component. If this were the case, the universe of interserviceable items would be very small.
- Deciding what is or is not a critical item is subjective; consequently, a service could declare virtually any item critical, and exempt it from interservicing. In addition, safety-of-flight items, such as engines and other AIMS altimeter models, are being interserviced.
- Possessing a predominant inventory quantity of an item should not dictate the overhaul assignment when capability and expertise exist elsewhere.
- Retaining depot skills by a single depot or service is not necessary when such support is available

at other DOD activities. This is exemplified by the skills consolidation obtained under the Air Force's technology repair center concept.

A May 1977 letter from the Deputy Assistant Secretary of Defence (Supply, Maintenance, and Services) to the Army requested additional information on why the Army would not agree to interservice its altimeter workload. As of April 1978, Army development of its own AIMS altimeter depot capability remained under consideration. This case illustrates the difficulties with reaching an interservicing decision which is unpopular with an individual service. As in the case of the Navy/Air Force LM2500 disagreement, unless some organization within DOD authoritatively resolves the matter, there is strong potential for creating dual maintenance capabilities.

Agency comments

Defense officials stated that the interservicing network's successes are significant and, therefore, they could not agree that interservicing has been ineffective or minimal. They pointed out that screening and consolidating the services' widely varying requirements can often seem complex, but the interservicing organization is structured to accommodate this problem and provides the proper forum for interservice decisions and service manager assignments. They said that occasional deadlocks must be expected, but there is no reason to believe that the Office of the Secretary of Defense cannot act as an arbitrator or final review authority when agreement cannot be reached.

We recognize there have been successes in interservicing; however, the amount of interservicing has decreased since 1974 and in relation to the total workload, there has been little, if any, change since 1973. In view of these factors and considering it has remained at less than 5 percent of the workload, we must conclude that interservicing has been minimal.

We agree that OSD could act as an arbitrator where there is a deadlock, but there is reason to believe it would have difficulty doing so under the current operating structure. For example, DOD would be hampered by inconsistent and unreliable data, as is the interservicing network, and it would need an audit capability to assure that data provided is objective. It would generally need to play a more active role in the interservicing process to assure that decisions are made for DOD's benefit. The AIMS altimeter case illustrates the current situation.

Since first considered for interservicing in 1975, there has been a dispute over which service should get the workload. The Army ultimately decided to develop its own maintenance capability. After we began questioning the Army's decision, OSD contacted the Army regarding its decision justification. Almost a year later, in April 1978, the matter was still under consideration. We believe that an effective arbitrator should be able to timely resolve such conflicts.

LACK OF COMPARABLE DATA SYSTEMS

To standardize information in the services' depot maintenance data bases, DOD has tried to achieve uniform service practices in depot capacity measurement and cost accounting. However, comparable data does not exist among the services. Each service still has its own maintenance management system producing information which may be misleading regarding the extent resources are being used.

Capacity measurement

DOD and the military services need accurate capacity data to measure the depots' ability to support peacetime and mobilization requirements and to properly manage facilities and equipment. To measure a shop's capacity, an industrial engineer views the facility and equipment layout, discusses workflow with shop personnel, and identifies work positions. Each work position can produce 40 direct labor hours a week, or about 2,000 hours a year. A shop's capacity is the total of these direct labor hours.

Like capacity, workload can also be measured and expressed in direct labor hours. Thus, the equation for depot use becomes:

$$\text{Use} = \frac{\text{Workload}}{\text{Capacity}}$$

Determining depot capacity and use seems relatively simple; however, several factors complicate the situation. For example, DOD considers capacity to be the amount of workload, expressed in direct labor hours, that a facility can accommodate while operating 8 hours a day, 5 days a week. Called

1/A work position is the physical area and equipment which would be controlled and operated by one worker. It could be a workbench, one or more pieces of equipment, or whatever the engineer subjectively determines it to be.

physical capacity, it is generally calculated as the number of work positions times the 2,000 hours available per work position each year.

The services prefer to constrain their depot capacities by allowing for time the direct laborers are away from their work positions for leave, training, and administrative time. This constrained capacity, called peacetime capacity, results in higher use rates than physical capacity. Depending on how capacity is calculated, depot use rates can vary greatly.

In fiscal year 1973, for example, the Air Force reported that its depot maintenance capacity had increased about 17 million direct labor hours due to implementing a new DOD capacity measurement formula. As a result, use of Air Force depot maintenance facilities dropped from 99 percent in 1972 to 69 percent in 1973. The Air Force was concerned about reporting such low utilization and further believed DOD's formula was inadequate. Subsequently, the Air Force and DOD agreed to such formula improvements as recognition of bottlenecks and reduced productivity during second and third shifts. During the next three years, reported Air Force depot capacity dropped about 15 million labor hours and, as a result, reported facility use improved to 83 percent in fiscal year 1976. This occurred even though the Air Force work had actually dropped 5 percent, about 2.7 million labor hours, while facility square footage fell only 2 percent.

During this review, Air Force officials were unable to give us their 1977 capacity and workload figures, stating they were incomplete because of ongoing changes to the capacity measurement techniques and workloading levels.

The accurate measurement and reporting of depot maintenance capacity and workload is, therefore, an elusive objective. Because the services have not fulfilled DOD's uniformity and standardization goals, a depot maintenance data base has not been developed.

Cost accounting

Uniform depot maintenance cost accounting systems are necessary for accumulating cost data by individual activity or type of product and for permitting management comparisons to determine where corrective actions are needed. Differences among the services' systems, however, have historically made it virtually impossible to compare the operations of depot facilities doing similar work. Also, Maintenance Interservice Support Management Office officials said that costs to repair a particular item cannot be considered when

making an interservicing decision due to the lack of uniform cost and accounting practices among the services.

DOD has been attempting to achieve a uniform depot maintenance cost accounting system for at least 15 years, without success. For example:

- In August 1963, DOD issued Instruction 7220.14, "Uniform Cost Accounting for DOD," which set forth a uniform cost accounting structure for depot maintenance operations throughout Defense.
- In October 1968, DOD issued Instruction 7220.29 (superseding 7220.14), "Uniform Depot Maintenance Cost Accounting and Production Reporting System," reemphasizing the need for a uniform cost accounting system.

In July 1973, we reported ^{1/} that the services were developing a uniform cost accounting handbook for depot maintenance, at DOD's request. Defense directed the Joint Logistics Commanders to ensure implementation of its provisions by October 1976. The Army and Navy had begun to do so, but an August 1977 DOD audit showed that the Army's system was significantly flawed and that the Navy's required additional work. The need for a mechanized system will keep the Air Force from implementing its system until 1979. While implementation proceeds, several interpretations of items in the handbook had yet to be resolved at June 1977.

Uniform cost accounting data is necessary for effective Defense-wide decisionmaking, and a uniform cost accounting system to provide this data is long overdue. Continuation of the services' existing inconsistent systems can only continue to hamper actions which can improve efficiency and economy.

CONCLUSIONS

While Defense has tried to bring about better use of depot resources, little progress has been made. The services continue to manage their own depot maintenance systems, and DOD's efforts to standardize those systems have been undermined by strong service pressures to remain self-sufficient.

^{1/}"Potential for Greater Consolidation of the Maintenance Workload in the Military Services," (B-178736, July 6, 1973).

To properly size personnel, facility, and equipment resources, the total resource base must be properly evaluated. Currently, this cannot occur because (1) visibility over the total resource base is not possible when each service manages its own resources and (2) data for making decisions about resource levels DOD-wide does not exist or cannot be used due to continued lack of uniformity among maintenance cost accounting and other management information systems.

CHAPTER 4

FACILITY AND EQUIPMENT DUPLICATION

As discussed in chapter 2, the military services' aircraft maintenance depots have excess capacity. A basic characteristic of excess capacity is duplicate and underused facilities and equipment. Duplication is costly to the Government in terms of (1) initial investment, (2) maintenance, and (3) eventual replacement.

In many of our prior reports (some of which are summarized in app. I), we have identified and discussed the problems associated with duplicate and underused facilities and equipment at aircraft depots. The major theme in all these reports has been that the services have developed or purchased more capacity than they need. For example:

- One center could repair many more engines than were needed for either peacetime or mobilization.
- At least two depots had general purpose equipment which exceeded their requirements.
- Some depots had very low use on their numerically controlled equipment, and installations were not exchanging workload to improve equipment use.
- Each military service had developed extensive capabilities in the precision measurement and calibration area. This resulted in facility and equipment duplication and underutilization.

In each instance, the basic problem was that no one was adequately managing production resources nor did anyone have visibility of the total situation. DOD management lacked adequate data regarding service activities, capabilities, and what capacity was needed. As a result, underutilized equipment and facilities were not identified and disposed of.

During this audit, we identified additional examples of duplicate and low-use facilities and equipment:

- The LM2500 gas turbine engine (discussed in ch. 3, pp. 34 to 38).
- The AIMS altimeter.

- Automatic test equipment (ATE).
- Precision measurement equipment labs (PMEL).
- Industrial products operations.

These situations offer consolidation possibilities, which could reduce costs. Further, where such duplicate and underused facilities and equipment exist, new capacity should not be created.

AIMS ALTIMETERS

In 1953, a Presidential committee established a requirement for an air traffic control radar beacon system to minimize air traffic control problems. Therefore, DOD established the AIMS program.

As discussed on pages 38 to 40, the Army is planning to create its own capability and an estimated 56,000 direct labor hour capacity to repair AIMS altimeters. The Navy currently maintains its altimeters at the Pensacola and Alameda depots, and the Air Force maintains its altimeters at the Sacramento depot. These installations have similar capabilities and excess capacity. Consequently, it may be possible to consolidate their activities into fewer facilities with concomitant equipment and floor space reductions.

As follows, the military services have about \$6 million invested in equipment and buildings, and 17,000 square feet dedicated to repairing AIMS altimeters. Further, the Navy plans to purchase AIMS test equipment costing about \$1 million during the next few years for the Pensacola depot. The procurement for 1978 is based upon anticipated savings of 20,000 labor hours per year in reduced test process time.

Installation (note a)	Covered space (square feet)	Costs	
		Construction	Equipment
Sacramento	3,000	\$ 57,000	\$1,184,000
Alameda	4,000	177,000	2,006,000
Pensacola	<u>10,000</u>	<u>1,000,000</u>	<u>1,585,000</u>
Total	<u>17,000</u>	<u>\$ 1,234,000</u>	<u>\$4,775,000</u>

a/The facilities at Alameda and Pensacola are used for some flight instrument work other than AIMS.

In some instances the military services use the same types of AIMS altimeters, as shown below.

Using service	AIMS altimeters					
	<u>AAU-19</u>	<u>AAU-21</u>	<u>AAU-24</u>	<u>AAU-27</u>	<u>AAU-31</u>	<u>AAU-32</u>
Army					X	X
Navy	X	X	X		X	X
Air Force	X	X		X		
<u>Repair location</u>						
Sacramento	X			X		
Alameda	X	X				
Pensacola	X	X	X	X	X	X
Contract					X	X

As shown in the following table, the existing three AIMS altimeter shops have 209,000 direct labor hours of excess capacity.

<u>Depot</u>	<u>Direct labor hours</u>		
	<u>Estimated workload</u>	<u>Capacity</u>	<u>Excess capacity</u>
Pensacola (note a)	101,000	188,000	87,000
Alameda (note a)	57,000	152,000	95,000
Sacramento	<u>60,000</u>	<u>87,000</u>	<u>27,000</u>
Total	<u>218,000</u>	<u>427,000</u>	<u>209,000</u>

a/Pensacola and Alameda include some flight instrument capacity and workload.

Based on the gross excess capacity at existing facilities, the three facilities could be consolidated into two. For example:

Alternative 1: Eliminate Sacramento's capability

	<u>Direct labor hours</u>
Capacity: Pensacola and Alameda	340,000
Less: Navy and Air Force workload	<u>218,000</u>
Excess capacity after consolidation	<u>122,000</u>

Alternative 2: Eliminate Alameda's capability

	<u>Direct labor hours</u>
Capacity: Pensacola and Sacramento	275,000
Less: Navy and Air Force workload	<u>218,000</u>
Excess capacity after consolidation	<u>57,000</u>

Alternative 3: Eliminate Pensacola's capability

	<u>Direct labor hours</u>
Capacity: Alameda and Sacramento	239,000
Less: Navy and Air Force workload	<u>218,000</u>
Excess capacity after consolidation	<u>34,000</u>

Should the workload increase in the future, multishift or contract capability could be used. In this regard, Defense would have to identify mobilization requirements to ensure that sufficient capability was held in reserve.

In light of (1) the 209,000 direct labor hour excess capacity among the Navy and Air Force and (2) the Navy acquisition of AIMS test equipment which will further reduce capacity requirements, the addition of similar Army capability and 56,000 direct labor hour capacity does not appear warranted. Furthermore, a case could be made for eliminating much existing excess and, possibly, assigning the total workload to a single manager.

AUTOMATIC TEST EQUIPMENT

Automatic test equipment is computer-operated equipment used to test and troubleshoot electronic equipment. It provides greater reliability and speed than technicians generally can achieve on mockup benches. Often, the equipment must be used on sophisticated digital circuitry because manual troubleshooting would damage the circuitry. LOD currently has about \$143 million invested in automatic test equipment at 15 sites. 1/

Because automatic test equipment is expensive (an individual system ranges from \$25,000 to \$3 million), users should strive for high equipment use.

1/The aircraft maintenance depots, excluding the New Cumberland Army depot, plus the Air Force Aerospace Guidance and Metrology Center.

We found, however, that some of the equipment is significantly less than fully utilized. For example:

--In the Directorate of Maintenance at Sacramento, 20 stations were used 4 hours or less each day during May 1977, as shown below.

<u>Range of use</u>	<u>Stations</u>	<u>Percent</u>
2 hours or less	11	18
2.1 to 4 hours	9	15
4.1 to 6 hours	10	16
6.1 to 8 hours	10	16
Over 8 hours	<u>21</u>	<u>35</u>
Total	<u>61</u>	<u>100</u>

Depot personnel said this use was representative of fiscal year 1977 use and attributed the limited use to insufficient workload.

--In 1975, the Naval Air Systems Command purchased a special-purpose test station for about \$419,000 to test modules used in the command-activated sonobuoy system. The equipment was installed at Alameda in January 1976 and, as of August 1977, had not been used. The sonobuoy system had yet to generate maintenance requirements for the test station. Although it could be adapted and programed to test other avionics systems and equipment, this had not been done. Alameda officials said any expansion of the equipment's capabilities would duplicate other equipment's already underused capabilities.

--In 1974, Alameda received a Vanzetti Infrared Tester which had been purchased for the closed Quonset Point depot at an estimated cost of \$107,000. It was designed to measure heat generated by electronic circuits, compare the measured temperatures with predetermined standard temperature ranges, and, thereby, identify failed components. Alameda has not used the tester. Engineering personnel said the tester is incapable of such troubleshooting because the temperature ranges in which an electronic component can operate are too extreme to be worthwhile for comparison. They believe the tester would be more useful in a manufacturing or research and development environment.

--The Navy Calibration Laboratory at Alameda obtained an ACS-200 Automatic Calibration Tester in 1972 for \$100,000. This tests and calibrates voltmeters, multimeters, and some oscilloscopes. The tester has not been used since November 1976. Depot personnel said it was faster to repair and calibrate the current reduced workload manually, rather than use the automatic tester. They added, however, that given sufficient workload, the tester could reduce calibration time for some units by one-half. Similar workload is being done at other calibration labs, such as the one at Sacramento. Sacramento has a similar tester costing \$171,000, which is used only 6 hours a day. We believe workload consolidations are possible and would be cost effective.

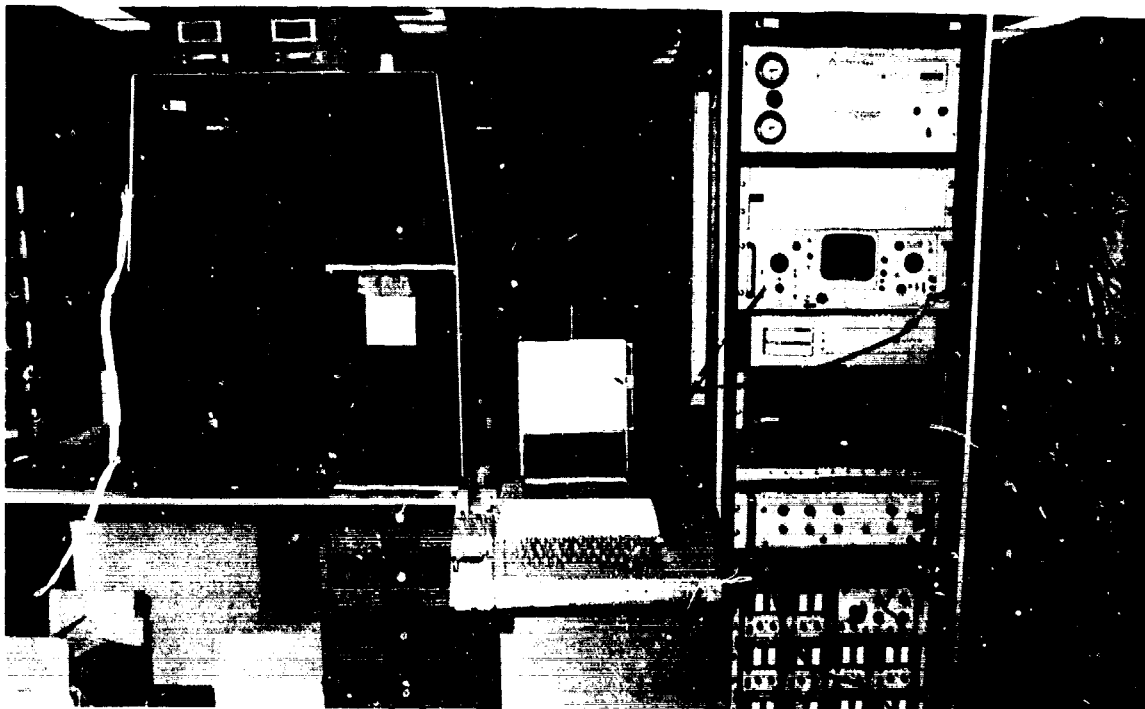
Basic reasons automatic test equipment becomes under-used are

- workload reductions;
- failure of anticipated workloads to materialize;
- equipment need by an individual service or depot, although there is insufficient workload to fully utilize it; and
- equipment obsolescence.

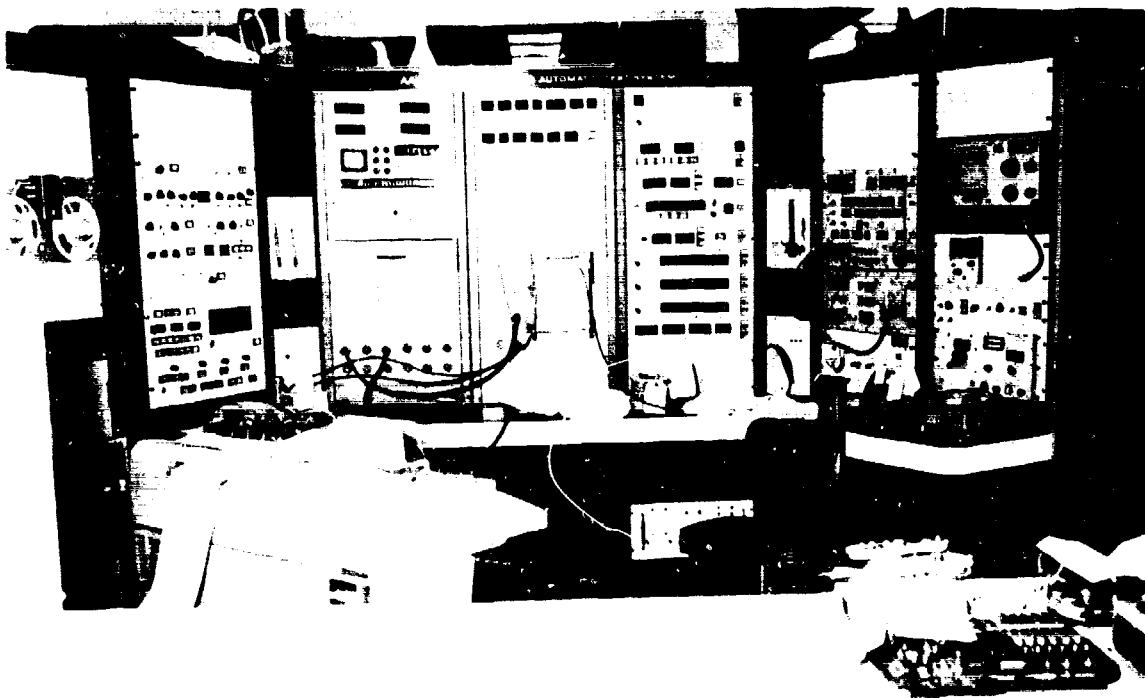
We believe improved automatic test equipment utilization can be achieved by:

- Adapting equipment, as appropriate, to test a wider range of DOD assets.
- Consolidating, among the services, the workloads which require common types of test equipment.
- Managing the equipment on a DOD-wide basis to eliminate, or place in reserve status, equipment no longer required.

Improved utilization can further result in dollar savings from reduced equipment procurements and maintenance or calibration.



VANZETTI INFRARED TEST STATION, NAVAL REWORK FACILITY, ALAMEDA, CALIFORNIA



AA1-5510 AUTOMATIC TEST EQUIPMENT AT A TACTICAL AIR NAVIGATION EQUIPMENT TEST STATION NAVAL AIR REWORK FACILITY, ALAMEDA, CALIFORNIA

PRECISION MEASUREMENT EQUIPMENT LABS

The calibration facilities at Sacramento and Alameda occupy about 50,000 square feet and have about \$5 million equipment investment.

<u>Installation</u>	<u>Building space (square feet)</u>	<u>Building cost</u>	<u>Equipment cost</u>
Alameda	20,233	\$ 301,000	\$3,199,000
Sacramento	<u>30,007</u>	<u>1,035,000</u>	<u>1,763,000</u>
Total	<u>50,240</u>	<u>\$ 1,336,000</u>	<u>\$4,962,000</u>

During our review, these facilities and equipment were not fully used, as shown below.

	<u>Personnel equivalents (note a)</u>		<u>Use (percent)</u>
	<u>Capacity</u>	<u>Workload</u>	
Alameda:			
Standard lab	30	11	39
Calibration lab	140	102	73
Sacramento:			
Precision measurement equipment lab (note b)	<u>112</u>	<u>80</u>	71
Total	<u>282</u>	<u>193</u>	68

a/Personnel equivalent is 2,000 direct labor hours.

b/Sacramento's laboratory is being relocated to a new industrial products building (see p. 54).

It would be possible to consolidate some of these workloads if multiple shifts were used. Using such shifts would depend on how much capacity must be reserved for mobilization contingencies. If these facilities could not be consolidated, their excess capacity would have potential to accommodate work from other facilities, thereby allowing others to consolidate. In this regard, the military services operate over 700 calibration facilities worldwide.

INDUSTRIAL PRODUCTS OPERATIONS

Consistent with each service's interest in being as completely self-sufficient as possible, both Alameda and Sacramento have industrial products organizations, neither of which fully uses its capacity. Because these activities have such similar functions as fabricating and repairing sheet metal, machining metals, electroplating, and manufacturing parts, workload and facility consolidations are possible.

Both Alameda and Sacramento have large underused facilities, as shown below.

<u>Facility</u>	<u>Personnel equivalents</u> <u>Workload</u>	<u>Capacity</u>	<u>Excess</u> <u>capacity</u>	<u>Use</u> <u>(percent)</u>
Sacramento	525	1,031	506	51
Alameda	<u>572</u>	<u>979</u>	<u>407</u>	58
Total	<u>1,097</u>	<u>2,010</u>	<u>913</u>	55

Based on the above raw statistics and disregarding workload mix and concurrent rework, both facilities' workloads could virtually be accomplished by either facility alone. Even if 100 percent consolidation is not feasible, consolidating portions of the operations has strong potential for better capacity use and reduced costs. Facilities thus freed would be available for other uses.



INDUSTRIAL PRODUCTS FACILITY, SACRAMENTO AIR LOGISTICS CENTER,
MCCLELLAN AIR FORCE BASE, CALIFORNIA

Defense officials explained that while current utilization at Sacramento's new facility is about 50 percent, it should exceed 80 percent as forecasted workload transfers occur. They further pointed out that during mobilization Sacramento's utilization rate may reach 274 percent of one shift capacity. The officials went on to state that industrial products shops are fundamental to operating a depot facility, as in any commercial or Government industrial plant, and are necessary to support the aircraft, engine, and component production lines. A consolidation at one location, they said, would severely restrict the operations at the other location and would represent a false economy.

As discussed earlier (pp. 12 to 20), the amount of depot capacity needed is uncertain in light of undefined potential for using private industry. Therefore, the relevancy of utilization rates is currently subject to question. We did examine DOD's rates and found they were based on a manpower constrained capacity and did not recognize the decrease in airframe workload. We estimate the comparable utilization rates for gross physical capacity in peacetime and mobilization to be 64 percent and 146 percent, respectively.

We recognize that consolidating industrial products processes alone may not be practical under some circumstances. However, there is potential for improved utilization of industrial products capacity by:

- Consolidating processes that are infrequently used.
- Shipping items to the other facility for processes when the time to do so does not materially affect the end item's total maintenance time.
- Consolidating workloads completely and phasing down the other depot.

CONCLUSIONS

Our prior reports and the current examples discussed in this chapter demonstrate that what seems to be DOD "management" for interservicing has resulted in inadequate evaluation of available resources, in terms of what DOD actually needs to meet peacetime and wartime conditions. Some problems may stem from each service's interest in providing fully for its own maintenance and support needs. But the problems continuing for such a long time suggests basic weaknesses in the management structure necessary for discovering such problems and in the lines of authority and resource control necessary to resolve them.

Whatever organizational structure is adopted to address these problems, it should include such basic elements as:

- A technical overview of all DOD aircraft depot maintenance resources and workloads.
- Physical or decisionmaking control of DOD's maintenance resources.
- Reliable data on which to base decisions.
- Willingness and authority to make decisions in the interests of efficient and effective maintenance management, even when they may conflict with individual service preferences.

CHAPTER 5

MAINTENANCE MANAGEMENT ALTERNATIVES

None of the problems identified in this report are new, in principle, but because of tightening budgets, the need to solve them has become more pronounced. For instance the Secretary of Defense, in his annual report for fiscal year 1975, stated that:

"The notion that each of the services should be independent of the other 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."

Also, in his fiscal year 1976 report, the Secretary pointed out that applying the principle of mutual support and force interdependence is completely feasible and desirable. Although the Secretary was addressing air defense forces, the principle of interdependence is applicable to a wide range of support requirements and capabilities.

Recent Presidential actions have been oriented toward achieving more efficiency from the Government. In 1976, the President directed that each agency should

"Review current staffing patterns and structures to identify unnecessary position layering and excessive organizational subdivisions. Develop a plan to consolidate subunits with similar and related functions."

More recently, the President established a reorganization project designed to make the Government more responsive, open, accountable, and efficient. With respect to DOD, in late 1977, the President called for the Secretary of Defense to improve DOD's management of its support services which includes maintenance. He pointed out that

--evidence provides that support services, which cost \$36 billion annually, are more expensive and less effective than they might be;

--the services are redundant in providing numerous support functions;

- each service operates a central supply organization with depots which have excess storage capacity often within the same geographical region; and
- the problems in Defense have resisted change for many years.

There is no question as to whether action is needed, the only question is what action will best serve the Government's interest? We believe that the management of DOD's aircraft depot maintenance needs to be restructured and further, that this area is an excellent candidate for reorganization under the President's project.

Four alternative management structures which, to varying degrees, would improve management over aircraft depot maintenance are:

- A single DOD manager.
- A DOD manager of selected responsibilities (i.e., interservicing, workloading, controlling capacity) with the services continuing to operate their own aircraft depot maintenance systems.
- Function managers.
- Geographic managers.

Although our review was limited to aircraft depot maintenance, we believe the following discussions are equally appropriate to depot maintenance of other items, such as electronics and communications equipment and missiles.

SINGLE DOD MANAGER

We believe a single manager, either a new DOD agency or one of the existing military services, could be given the authority and staffing to manage all of DOD's aircraft depot maintenance.

Having a single manager over military logistics or various support activities is not a new concept. In July 1970, the Blue Ribbon Defense Panel's report to the President recommended logistical services be consolidated and assigned to a unified logistics command. Our July 6, 1973, report, "Potential for Greater Consolidation of the

Maintenance Workload in the Military Services," B-173736, recommended that DOD establish an independent agency, similar to the Defense Supply Agency, 1/ to assume responsibility for depot maintenance of all commonly used equipment. Further, on numerous occasions we recommended that various other support functions, such as ammunition, spectrometric oil analysis, industrial plant equipment, and equipment calibration each be consolidated under a single manager.

Strong leadership

Given strong leadership and the necessary authority and personnel, a single manager could implement a master plan for depot sizing and workloading. Such a plan would have to identify:

- Resources needed to accomplish the maintenance requirements set by the military services.
- How much of the work should be done in-house and how much by contractor to insure an adequate surge base for both.
- The in-house capacity needed to accomplish both peacetime and mobilization maintenance requirements.
- The number and location of depots needed to supply such capacity.
- Which depots should be put in a standby condition, eliminated, or reduced in size.

A single manager, with the strong leadership qualities inherent in such a position, could make and implement the difficult decisions which would be needed to structure the depot complex to meet such master plan's goals as:

- Transfer large quantities of work between the services so that remaining facilities would be properly workloaded.
- Restructure or size the depot complex to promote efficiency and economy.

1/On January 1, 1977, the Defense Supply Agency's name was changed to Defense Logistics Agency.

To best use available facilities and equipment, workload would have to be consolidated and parochial attitudes toward asset ownership would have to be overcome. Specialized facilities, such as the Air Force's Technology Repair Centers, might be required.

DOD MANAGER OF SELECTED RESPONSIBILITIES

An alternative short of the single manager is for DOD, or its designated agency, to manage selected parts of aircraft depot maintenance. Such parts include interservicing, workloading, controlling or managing capacity, and others, which if all implemented, would result in the single manager concept. The services would continue to operate the remaining unconsolidated portions of their systems. For instance, DOD could consolidate the workload distribution functions so that all depot workload assignments come from the same source, thereby eliminating the need for interservice coordination. Or, DOD may remove the interservicing program from the services entirely and have it managed by an independent activity with authority to make decisions for DOD's benefit. Advantages of this alternative are that it

- may achieve improved efficiency, as far as it goes, with less disruption of the current operations; and
- can act as a phasein for ultimate implementation of the single manager concept.

This alternative, however, has the following problems and disadvantages:

- Parts of depot operations are interrelated and as such, managing one part requires visibility or control of others. For example, the workload distribution function requires reliable and consistent production information and visibility over depot resources. In another case, controlling capacity requires visibility over plant and equipment assets. Consolidating only parts of the existing operations would necessitate extensive coordination between management levels and, therefore, could result in decreased, rather than improved efficiency.
- Management of any part would still require reliable and consistent accounting and management information which may only become available under a single manager. (See pp. 41 to 43.)

--Improvements achieved from partial consolidations may not be as extensive as those available from a comprehensive single manager.

FUNCTIONAL MANAGERS

This alternative envisions DOD dividing depot maintenance into functional areas, such as engine, electronics (avionics), hydraulics, and landing gears. Depots would be assigned one or more functional areas. Function managers would be responsible for productivity in their assigned areas. They would assure that resources are effectively used and that workloads, input by the services, are effectively accomplished either at DOD depots or contractor plants (wherever they are most beneficial). The military services would continue to determine their own maintenance requirements.

Such a realignment would have similar advantages to the Air Force's Technology Repair Center concept discussed in chapter 4, by (1) leveling the impact of surge between the depots, (2) improving effectiveness and skills, and (3) limiting the number of facilities and equipment requiring replacement or upgrading. These benefits, however, could also be available under a single manager.

Although there are benefits inherent in this alternative, there are also many disadvantages.

- The number of managers would be proliferated by having each functional area separately managed. Even if the functional areas were distributed among the military services, it is unlikely that the size of the management structure would decrease.
- Coordination problems between depots and various headquarters levels would be increased by proliferating management entities.
- Such an organizational change would not address problems in the airframes and industrial products areas. Each of these areas would require management. In addition, each depot would probably require some capability in each of these areas; consequently, they could not be designated functions and assigned a manager.

- This alternative does not permit the overall management to decide which depot resources were needed and which could be put in a standby condition or eliminated.
- Management would still be fragmented, thus, problems associated with designing and implementing uniform management systems would still exist.
- Additional shipments of assets would arise which would increase time and cost.
- Mobilization surge interface with commercial organizations, which may not be as specialized, would be more complicated.

The major drawback to this alternative is that most problems identified with the existing system would not be solved. In fact, some problems could be aggravated if management entities proliferated beyond the three which now exist.

GEOGRAPHIC MANAGERS

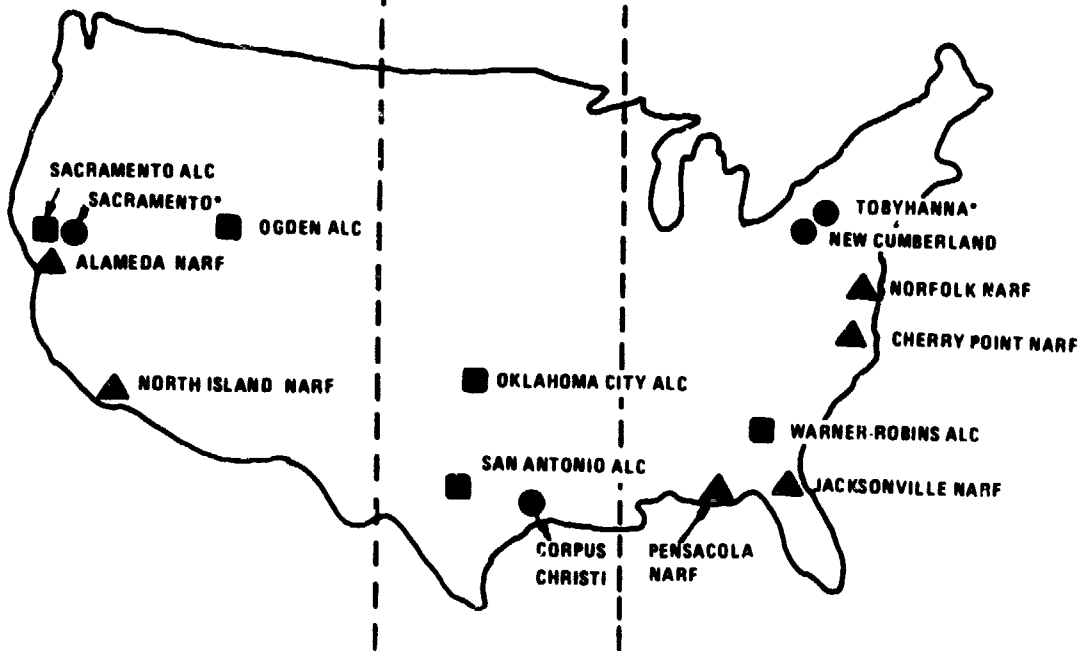
Under this alternative, DOD would regionalize depot maintenance, with each region having a separate manager. The managers would be responsible for managing resources and accomplishing workloads input by the services for their assigned regions. The regions could be assigned to the services for management or be handled by a single service or an independent DOD agency. One natural division is shown on the following map.

Within each region, depots could specialize in functional areas similar to the previously discussed alternative. Such a configuration could have the following benefits:

- Intraregional facility and equipment duplication could be reduced.
- Dispersion of overhaul capability among geographic areas would provide flexible backup capability in case of war, natural disaster, or labor strike.

Recently, the military services have been evaluating the potential for geographic consolidations of equipment calibration and they have identified savings. For example, studies of two California areas identified that consolidation could save over \$5 million in 5 years.

DEPARTMENT OF DEFENSE
AERONAUTICAL DEPOTS
HYPOTHETICAL REGIONS



- AIR LOGISTICS CENTER (ALC)
- ▲ NAVAL AIR REWORK FACILITIES (NARF)
- ARMY AERONAUTICAL DEPOTS
- ARMY ELECTRONICS DEPOTS

There are, however, several reasons why creating geographic managers is not the best alternative for aircraft depot maintenance.

- Interregional facility and equipment duplication would still exist.
- Management entities could proliferate because each region would be separately managed. Even if there were only three regions, the current configuration where the three services manage overhaul activities would not improve.
- The higher level management needed to provide overall visibility and direction would still be missing.
- It is likely that regions would have the same kinds of interaction problems that the military services now have, as with interservicing.

As with the functional manager alternative, the drawbacks to this alternative appear to outweigh the benefits and too many problems associated with the current management structure remain unsolved. Thus, only the single manager alternative appears viable.

CONCLUSIONS

There are numerous management structure alternatives available which can improve the efficiency of various aspects of aeronautical depot maintenance. We believe, however, that the single manager is the most viable alternative for solving the efficiency problems of DOD aircraft depot maintenance. It can result in effective matching of workload requirements with resources; reliable and consistent management information Defense-wide; and a master plan for the most effective, efficient, and economical future depot complex. Other alternatives fall short in achieving all of these objectives.

CHAPTER 6

BENEFITS FROM AN AIRCRAFT

DEPOT MAINTENANCE SINGLE MANAGER

Specific cost savings from implementing the single manager concept for Defense aircraft depot maintenance are exceedingly difficult to measure because

- various alternatives for single manager application exist;
- a single manager would have various options for improving aircraft depot maintenance;
- management information and cost accounting system inconsistencies among the services preclude effective comparisons of alternatives; and
- military strategies (e.g., requirements for a minimum number of depots) may preclude certain savings options.

Even so, many tangible and intangible benefits can be accrued to DOD from implementing the concept. To illustrate, assuming a single manager would be responsible for depot maintenance requirements (as determined by the services), the following improvements in effectiveness, efficiency, and economy could be expected.

IMPROVED EFFECTIVENESS

Characteristics of the single manager concept which are likely to improve aircraft depot maintenance effectiveness are:

- Increased flexibility from having all depot resources available for needs resulting from any potential contingency. The actual nature, duration, and weapon system requirements of future contingencies are uncertain. As contingencies unfold, the single manager could direct the total resource base toward meeting Defense-wide priorities. Currently, depots are oriented toward fulfilling their own service priorities.
- Uniform implementation of Defense policies and directives. Under the current system, DOD establishes policies and directs the services to implement them

uniformly. Uniform implementation by the services, however, is exceedingly difficult in some cases because of the inconsistencies which evolved among service depot maintenance systems. For example, DOD has been trying to implement a uniform depot maintenance cost accounting system among the services for well over a decade and such implementation is still a possibility. A single manager having control over all resources, practices, and policies would be able to eliminate the inconsistencies and, thereby, achieve responsive and effective implementation of policy decisions.

--Reliable, consistent, and useable management information. Currently, the services operate management information systems which are inconsistent among each other and, therefore, data taken in total has marginal utility. For example, inconsistent cost data has hampered workload interservicing decisions. Another illustration concerns DOD Depot Maintenance Management Summaries which are published annually from data the services provide. For 1976, the summary showed the Navy spent \$191.6 million for general and administrative expenses, which was about 23 percent of its total cost. In contrast, the Air Force summary showed it spent \$16.9 million or 1 percent of its total cost. Obviously, there are differences in how the Navy and Air Force classify general and administrative expense. Without adequate management information, the Office of the Secretary of Defense is in a weak position for making management decisions regarding the total depot maintenance resource base. Important decisions would include such matters as: how many depots are needed, what should their capacity be, how should workloads be distributed, and where should modernization and other resource funds be spent? To make such decisions, OSD must have useable cost, resource, and workload data. A single manager could establish a comprehensive and consistent management information system and, therefore, provide the basis for more effective top-level management.

--More versatility with personnel skills resources. A single manager could bring about more uniformity in technical manuals, terminology, and procedures which would expand workforce understanding and capabilities regarding types of assets all services use. For example, a jet engine mechanic could become qualified to maintain jet engines used by all three

services. Such versatility could provide for auxiliary capability within the depot maintenance system. Further, expanded individual capabilities could foster increased job satisfaction and professionalism within the workforce.

--Improved control over manpower and skills resources. A single manager would be able to manage the total skills resource base in light of total requirements. For example, critical, short-supply skills would be available to the total system to be used as overall requirements and priorities dictate. Although the single manager would still be constrained by Federal regulations, labor unions, and political factors regarding transferring personnel, the opportunity to draw on short-supply skills throughout DOD as temporary emergency conditions require would exist. Further, the manager would be in a position to relate and assign workloads to where the needed skills are and, in the long run, develop workforce skill mixes where needed.

--More effective planning. With visibility and control over workloads and resources, a single manager could plan for achieving an appropriate and cost-effective balance between the two. Currently, depot maintenance planning is delegated to the services which plan for meeting their own requirements. This procedure's shortcoming is that individual services lack the visibility and control necessary to decide whether existing resources and proposed capital expenditures are necessary in light of total Defense resource requirements.

IMPROVED EFFICIENCY

A single manager could establish a comprehensive system of production standards (materials, labor, and overhead) which would permit efficiency evaluations and result in corrective actions, where appropriate. Such evaluations would also be helpful for planning the extent to which specific depots are to be used. An additional benefit from standards would be the ability to make efficiency comparisons among depots, thus fostering competition which, in itself, could lead to improved efficiency.

IMPROVED ECONOMY

There are many ways a single manager who has full visibility over resources and requirements could economize

through various management actions taken on a case-by-case basis. The following systemwide economies, however, would be expected.

- There would be more effective use of aircraft depot modernization dollars because modernization would be based on the total system's needs, rather than individual depots'. A single manager's plan would identify where modernization should occur to be consistent with future requirements. Dollars would be less likely to be spent at depots that have marginal future utility or for new similar facilities proximate to each other. For example, a single manager could have developed more economical alternatives than constructing similar industrial facilities within 15 miles of one another, as occurred in 1976 between the Sacramento Army depot and Sacramento Air Logistics Center. 1/
- DOD could expect economies to result from the visibility provided by an effectively implemented depot maintenance uniform cost accounting system. Reliable and consistent data from such a system would provide the bases for effective management action.
- DOD could expect economies from reducing fixed overhead costs. Single manager implementation would enable consolidating the Army, Navy, and Air Force headquarters functions that manage the aircraft depot maintenance systems. Savings could be expected from reducing administrative positions and restructuring the supervisory framework. Further funds could be saved by making better use of individual depots, so as to obtain more production in relation to the overhead dollars spent.
- The interservicing network would no longer be required. In the 30 months ending April 1977, the services' interservicing network spent \$6.8 million for salaries and temporary duty. The network's basic function was to promote sharing workloads and resources where DOD would benefit overall. Although there has been some change in the network's structure, it is

1/"Observations for Improving Depot-Level Maintenance Construction In the Department of Defense," (LCD-76-432, June 7, 1976).

continuing to operate, deciding which depot and service should accommodate items which require new capital expenditures. In addition to the cost of the interservicing network, the individual services expend considerable effort to justify workloads being assigned to their depots. Under a single manager, the total interservicing effort would be unnecessary. With his/her visibility, the manager would be able to select the most appropriate DOD depot for all workloads, without extensive analysis and negotiation among the services.

- There would be improved visibility and control over capital equipment, thus enabling elimination of unnecessary redundancies. Savings could be particularly significant regarding automatic test equipment and numerically controlled machinery. A single manager would be able to consolidate workloads and shops to best use this expensive equipment and reduce future acquisitions and maintenance costs. For example, a single manager could have taken advantage of available Air Force resources for overhauling the Navy LM2500 gas turbine engine, rather than establish additional capability as the Navy did at North Island.
- Provisions for backup capacity and capability could be consolidated, thus eliminating the need for each service to provide for its own auxiliary support. The services currently have contingency plans for obtaining needed depot maintenance support should depot production be impaired by strike, natural disaster, or other factor. Resources considered include below depot activities, other depots within the same service, and commercial contractors. Little consideration is given to other services' depots. In light of the similarities of primary maintenance capabilities among the services, backup systems would also be redundant. Thus, for example, between the Air Force and Navy, there are likely to be as many as four capabilities of the same type. A single manager would be able to develop a single backup system to serve all depots, thus minimizing redundancies.
- Consolidating commercial contracting for aircraft depot maintenance could reduce costs by (1) reducing the total number of contracting actions, (2) obtaining lower prices from increased quantities, and (3) eliminating competition among the services for support

from the same contractor. A single manager could be the focal point for contracting, thereby achieving such cost benefits. Currently, each service arranges for its own commercial contracts except where an interservice contracting arrangement exists.

--Consolidating similar workloads could lead to greater specialization by individual depots with resultant savings likely to accrue from economies of scale. Economies could result from such factors as improvements in work flow, quantity discounts in acquiring materials, improved equipment use, and lower proportional overhead costs. For example, when the Air Force consolidated workloads by technology in 1973, it claimed that (1) depot maintenance management would be streamlined, (2) facility utilization would be increased; and (3) about 1,153 overhead spaces would be eliminated. ^{1/} A single manager would be able to foster such economies Defense-wide, rather than just for individual services.

--Better utilization of some existing resources could release others for other uses. Inherent with holding resources is the opportunity cost of not using resources for other purposes. Realignments of workloads by a single manager could release resources for other uses, thus precluding the cost of acquiring additional equipment or facilities.

--A single aircraft depot maintenance system having uniform procedures, terminology, and technical manuals would facilitate consolidating training functions, thus achieving additional economies of scale.

^{1/}See our report entitled, "Assessment of the Air Force's Planning for the Technology Repair Center Concept," (LCD-76-429, July 2, 1976).

CHAPTER 7
DOD USE OF THE
SINGLE MANAGER CONCEPT

DOD has a history of applying the single manager concept on a selective basis, to solve efficiency problems and eliminate duplication of effort. Three of the broader areas operating under this mode involve transportation, supply, and conventional ammunition.

TRANSPORTATION

Prior to 1942, the military services and other Federal departments managed their own transportation requirements and assets. In 1942, the Government saw the need to reduce duplication and make better use of technologically improved transportation resources and unsuccessfully tried to centralize traffic management under the Treasury Department.

After World War II, general opinion within the Government was that for the military, land transportation should be the responsibility of the Army; sea, the Navy; and air, the Air Force. The National Security Act of 1947, as amended, charged DOD to eliminate the duplication of transportation among DOD agencies. Subsequently, Defense moved toward the single manager concept, which culminated with DOD designating, in 1956, the Navy to be a single manager for ocean transportation and the Air Force to handle airlift service. Then, in 1965, DOD designated the Army to be the single manager for land transportation and common-user terminals. Basic objectives of these assignments were to

- eliminate duplication and overlapping of effort between and among DOD elements,
- improve the effectiveness and economy of these operations throughout DOD, and
- ensure that the approved emergency and wartime requirements of DOD are met.

The multiservice approach to transportation was examined by the Blue Ribbon Defense Panel and, in 1970, it recommended that transportation be further consolidated under a unified logistics command. Today, however, the three managers operate basically as originally established.

SUPPLY

During World War II, a need surfaced for coordinated procurement of supplies by the armed services so they would not compete among themselves. After the war, Defense, in an effort to promote greater efficiency and economy in the supply mission, established centralized purchasing of medical supplies and petroleum products for the services.

In the mid-1950s, DOD added food and clothing to the included commodities and assigned the commodities to individual services which were to be single managers. As a single manager, a service had responsibility for determining, procuring, funding, cataloging, and standardizing needs; controlling inventory; and maintaining and disposing of surplus. By 1961, the single managers were able to reduce the inventories of the involved commodities by 30 percent, or about \$800 million.

On October 1, 1961, DOD established the Defense Supply Agency to oversee and control the single managers' activities. The agency's initial responsibility was to direct and coordinate the single managers' activities. Since then, this responsibility has been expanded to include troubleshooting military logistical support problems. On January 1, 1977, the Defense Supply Agency's name was changed to the Defense Logistics Agency.

CONVENTIONAL AMMUNITION

In December 1973, we issued a report to the Congress on DOD's management of conventional ammunition. This report discussed the fragmentation of conventional ammunition management and what effects it had. For example, we found that:

- Each service determined its own ammunition requirements. The services could readily identify excess inventory stocks within their own services; however, they could not always identify the other services' available assets, unless the owning service had reported them as excess. Thus, sometimes one service requested and received funds for ammunition items, while another had sufficient stocks to satisfy part or all of these needs.
- The services, in some cases, relied on the same commercial contractor for ammunition components. The contractors did not always have unlimited capacity to satisfy the service demands. Because of service

rivalries, it was not assured that the more critical requirements within DOD were being met.

--Production and storage facilities were under the Army's or Navy's control. This dual capability did not provide the overall perspective needed to maximize using the plants. Instead, it fostered interservice competition for workload and modernization funds.

Our report concluded that the individual services' management of ammunition was neither efficient nor economical. Therefore, we recommended that the Secretary of Defense establish a central control for ammunition, either by creating a new ammunition organization or assigning control to one of the services.

The Secretary of Defense recognized the need for more effective ammunition management; however, the Secretary maintained that centralizing into a new organization or into one of the services should be done as a last resort. DOD wanted to address the problems through a concept which had been under study since March 1971. It consisted of a coordinating group and working committees with representatives from the services operating under the Joint Logistics Commanders. These activities were to be responsible for addressing daily management problems and developing necessary procedures and systems which would provide such information as item production costs, inventory requirements data, and facilities capabilities and capacities for the Defense ammunition production base.

Although the concept was not a full commitment toward single management, its implementation did provide centralized visibility, an important aspect of the single manager concept. Because of this visibility, the services have been able to save about \$1 billion in ammunition resources since 1974, as opportunities for cost avoidances and deferrals have been more readily apparent. This Joint Logistics Commanders approach, however, had a serious shortcoming. The ammunition coordinating group could only act as an advisor and its recommendations could be overruled by any of the military services. As a result, it had limited effectiveness when involved in actions beneficial to DOD, but unpopular with one or more of the services.

Therefore, on November 26, 1975, the Secretary of Defense designated the Army as the single manager of conventional ammunition for DOD, beginning October 1, 1977. As a single manager, the Army is responsible for procurement, production, maintenance, renovation, and storage to

- eliminate unwarranted overlap and duplication and
- achieve the highest possible degree of efficiency and effectiveness in DOD operations required to provide top quality conventional ammunition to U.S. Forces during peacetime, surge, and mobilization.

CONCLUSIONS

The single manager concept has proven feasible in DOD. As it exists today, it will provide

- transportation for soldiers and their equipment to combat zones;
- food, clothing, medical supplies, and fuel to support the combat forces while there; and
- ammunition for them to fight with.

Basically the single manager provides the support combat forces need to fight. There is a service/customer relationship. We believe this same relationship can be developed with aircraft depot maintenance.

CHAPTER 8

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The current complex of aircraft maintenance depots needs to be more effectively matched with peacetime and mobilization requirements. While the Office of the Secretary of Defense is uncertain about the capabilities and capacities required, the services are continuing to invest in facilities and equipment to modernize the depot complex, which already provides substantially more gross capacity than needed.

In the meantime, production costs of Defense depots have well exceeded inflation, while depot resources are redundant and underused. And, the military spends hundreds of millions of dollars annually to retain unused capacity in the aircraft industry.

A primary reason for the current situation is that the services, independently of one another, developed their aircraft depot maintenance systems under the concept that to be mission effective, a service had to provide its own complete logistical support. As a result, each has created an industrial complex capable of maintaining virtually any kind of depot. Such fragmented and parochial management, by its very nature, breeds duplication and wastes money.

LOD's and the military services' actions to correct this situation through (1) depot consolidation studies and programs and (2) interservicing have not created the necessary improvements. Efforts have been hampered by:

- The lack of Defense-wide visibility and control over costs, workloads, and resources.
- Uncertainty, regarding the extent private industry can and should be used.
- Potential economic and political turbulence created by considered alternatives.
- The inability or reluctance of the services to make decisions unpopular with the services but beneficial to Defense.

Can the Government afford the duplication and under-utilization which the multiple management system has fostered? We believe the entire industrial complex must be restructured and managed to maximize efficiency, economy, and effectiveness, consistent with maintaining at least the minimum mobilization base. In this regard, both organic and contractor capabilities must be considered. It is not enough to manage only part of the total resource package.

For effective action, a uniform management information system is needed. Such a system should provide management with data on: (1) the maintenance resources it has available (organic and contract), (2) what resources it needs to meet requirements (both during peacetime and mobilization), and (3) which resources should be put in a standby condition or eliminated. This type of data would enable management to formulate a master plan for sizing and workloading the depot complex to make it more efficient, effective, and economical. To implement such a master plan and manage the resulting complex, a management system exhibiting strength and unity of purpose is needed. We believe only a single manager for aircraft depot maintenance can provide such management. If any entity is to effectively minimize costs, there should be a uniform cost accounting system for all depots so that evaluations can be based on reliable and consistent data.

Further, plant modernization should be directed toward facilities where a definite need has been established. This means that the minimum required industrial base needs to be identified DOD-wide and, then, modernization funds need to be directed to those depots which are included in that base. The current approach, which allows each service to upgrade their facilities with little or no regard for what the other services have, does not make the best use of available resources. A single manager would be in a position to selectively upgrade facilities, making better progress toward modernizing the depots. A smaller, modern complex would better serve DOD's needs than the expensive and duplicative complex which now exists.

RECOMMENDATIONS

The Secretary of Defense should either designate or establish a single manager over aircraft depot maintenance. The single manager should be responsible for managing:

- Resources, to include (1) determining Defense depot resource needs in light of peacetime and potential mobilized operations, and (2) tailoring the depot complex to efficiently meet those needs which cannot be viably accomplished by private industry.
- Workloads input by the military services to include (1) consolidation to take advantage of similar or common capabilities, and (2) distribution to the most economical activity which can effectively perform the work.
- Maintenance of workloads performed by DOD depots.

The military services should continue to be responsible for determining their depot maintenance needs. The single manager basically would be responsible for effectively, efficiently, and economically accomplishing the service-identified needs. Therefore, there should be technical interfaces between the services and the single manager, such as, by service assignments to the depot maintenance organization.

Further, the Secretary should task the single manager, within specified timeframes, to:

- Develop a master plan and program as the basis for future actions toward optimum matching of resources with requirements considering commercial and military resources, peacetime and wartime operations, and efficiently sized military depots. The plan should identify the depots which are to comprise the minimal industrial base needed for requirements, and it should be made available to congressional committees concerned with funding depot operations and construction and modernization projects.
- Implement uniform cost accounting and management information systems for all aspects of depot maintenance.
- Manage aircraft depot maintenance consistent with the master plan.

AGENCY COMMENTS

DOD did not agree with the findings regarding the severity of the efficiency problems in aircraft depot maintenance. It did agree, however, that there is some capacity excess to current and projected requirements; however, the Department stated that eliminating excess takes time. It pointed out that while a single manager of depot maintenance operations might be better able to document excess capacity, it is incorrect to assume that pressures against facility reductions would be less under a single manager.

The Department also stated that the services have overcome their previously strong reluctances to rely on interservice support. In the future, it expects to recognize major savings from interservicing new systems or items.

Regarding the need for a master plan, the Department stated that each service is required to implement a depot maintenance programming system covering the current fiscal year and 5 subsequent years. This system, it explained, will enable DOD to assess mobilization capacity, capability, and utilization at each depot starting with the period covering fiscal years 1980-84. The Department believes this system will satisfy the need for a master plan.

Finally, while the Department did not agree with the rationale behind our recommendations, it recognized that there may be benefits to be had from a single manager assignment for accomplishing aircraft depot maintenance. It stated that such an assignment could facilitate further reductions in unutilized or underutilized capacity identified in 1974 and in the future, as well as other savings. The Department went on to say, however, that additional preliminary work is required to identify and, where possible, quantify both the anticipated benefits and penalties that might accrue from such an assignment before investing in a detailed study.

We do not agree with the Department's exceptions to our analysis of the aircraft depot maintenance efficiency problems. These exceptions are discussed in related sections of the report.

Regarding a single manager's ability to eliminate excess capacity, we recognize that similar pressures may continue to slow efforts. To effectively eliminate excess, however, it needs to be identified and there should be a plan of action. This plan should result in actions to

isolate excess--through consolidating workloads to fully utilize resources to be retained--and then to eliminate it. The identification, plan, and actions should be without regard to service boundaries to assure that the most efficient DOD depot maintenance complex will result. We believe the current multimangement structure does not provide the comprehensive visibility and perspective needed for this assurance.

With respect to interservicing, we recognize that the services' commitment to interservicing has potential for substantial savings to DOD. We do not believe, however, that the interservicing program is the answer to assuring depot maintenance efficiency throughout DOD. The program is basically limited to assigning new systems or items entering the DOD inventory to a service for depot maintenance responsibility. We believe there is a strong need for comprehensive management of existing workloads and resources to bring the ongoing depot structure to a more efficient operating posture and to assure timely adjustments as changes in needs occur.

Concerning the master plan, in our opinion, DOD's review of products from a depot maintenance programing system which is to be implemented by each of the services will not, in itself, satisfy the need for a master plan. DOD's review or assessment of the results of individual service planning, programing, and managing efforts is essentially management from the bottom up, which has some problems. Unless there is top down planning, for instance, there is no assurance that the service plans, in total, will lead to optimum DOD operating posture. Further, unless Defense establishes an acceptable operating framework for the combined services, it will have insufficient bases for effectively assessing the results of service operations. We believe a DOD master plan can fulfill these needs, as well as provide the basis for actions to change today's aircraft depot maintenance complex into a significantly more efficient one tomorrow.

We do not agree with DOD that there is further need for detailed study of the potential for common aircraft depot maintenance support. As noted on page 57, the Secretary of Defense, in his fiscal year 1975 annual report, stated the principle that, today, support of the services has to be viewed in terms of total force structure, as opposed to separate interests. We believe our report presents ample evidence that the Secretary's principle is correct. We believe it to be somewhat paradoxical that DOD

believes an additional detailed study is needed to support the principle already enunciated by the Secretary before action can be taken. We feel a persuasive case supporting improved common support of aircraft exists. It is now up to DOD to implement studies in support of its own policies.

PREVIOUS GAO REPORTS
ON AERONAUTICAL DEPOT MAINTENANCE
FACILITIES AND EQUIPMENT DUPLICATIONS

Management of Department of Defense
Industrial Plant Equipment
Can be Improved (LCD-76-407, Oct. 5, 1976)

The Air Force does not compute industrial plant equipment mobilization needs based on full production; consequently, it has equipment exceeding that needed to meet mobilization requirements.

Oklahoma City Air Logistics Center has the capacity to overhaul the equivalent of 2,500 engines a year on one shift and 4,250 on two shifts. The 1977-79 peacetime and mobilization overhaul requirements, as estimated by Oklahoma City in May 1975, were:

<u>Fiscal year</u>	<u>Peacetime engine overhauls</u>	<u>Mobilization engine overhauls</u>
1977	2,116	2,530
1978	2,105	2,128
1979	2,211	2,077

Oklahoma City's projected annual peacetime and mobilization requirements for engine overhauls can be met on a one-shift basis. In addition, according to Center officials, it is likely that overhaul requirements will decline in the future.

Industrial Management Review
of the Army Aeronautical Depot
Maintenance Center,
Corpus Christi, Texas
(B-159896, Dec. 17, 1973)

Production equipment used in repairing and overhauling helicopters, engines, and components was valued at about \$20.4 million. About \$16 million of this pertained to 366 pieces of general-purpose equipment. Our studies of general-purpose equipment showed an overall 34-percent usage rate. Because many of the depot's machines were identical

or could do comparable work, the amount of unused machine capacity suggested that excess machines were onhand.

We made two studies on machine usage. Both studies showed that machines were idle about 66 percent of the time. For the remaining time, the machines were (1) working, (2) being set up to do work, (3) being maintained, or (4) running but not working. The machines were working about 17 percent of the time.

The studies indicated that it may be possible to reduce the machine inventory, especially when duplicate machines are involved. For example, the depot had \$1.5 million invested in 58 grinding machines. Assisted by the shop foreman, we identified groups of grinding machines capable of doing the same work. The observed average use rate on these grinders was about 42 percent. Similar conditions existed for milling machines and engine lathes.

An Industrial Management Review
of the Maintenance Directorate
San Antonio Air Materiel Area
San Antonio, Texas (B-159896, Apr. 11, 1974)

At the San Antonio Air Materiel Area (now Air Logistic Center) depot, general purpose production equipment--grinders, lathes, and mills, each costing \$1,000 or more--totaled \$18 million. From a random sample of general purpose machines in four machine shops, we made four equipment use studies. The studies, which were made during the day shift, showed that these machines were in use only about 18 percent of the time. According to depot personnel, setup times are about equal to in-use time, giving an estimated overall average use rate of 36 percent. Further, we observed that 34 percent of machines included in our studies were never used.

During this review, depot management had requested the procurement of general purpose production equipment costing about \$4.1 million for fiscal years 1971-73. Most of this equipment had been approved for procurement, and equipment valued at about \$1 million had been received. In requesting these procurements, depot management had relied on estimated use which was overstated.

Use of Numerically
Controlled Equipment (note a)
Can Increase Productivity
in Defense Plants
(LCD-75-415, June 26, 1975)

A 1967 DOD directive stated that each DOD component should request support from another component when the capabilities are available and when such support is to DOD's overall advantage. However, little numerical control work has been exchanged, either within a service or between services. By exchanging work among activities, the Government could reduce its investment in additional machines and present machines could be used more productively.

Many machines at Government activities were used for only part of one shift. Instead of relying on these activities with unused capacity to make parts, nearby activities were planning to order similar numerical control machines. The following table shows the types of equipment which some DOD activities planned to buy.

<u>Type of machine</u>	<u>Number</u>	<u>Cost</u>
		(000 omitted)
Lathe	42	\$ 5,861
Machining center	39	8,536
Mill	24	2,344
Drill	13	885
Punch	2	705
Grinder	4	522
Borer	2	350
Other	<u>3</u>	<u>314</u>
Total	<u>130</u>	<u>\$19,517</u>

Many different types of machines can produce identical work. For instance, machining centers can do most work that drills do, and drills can do the drilling work done by machining centers. Therefore, capacity may be duplicated even where machines are different. The report cited examples of duplicate and similar machines at four operating activities. One of the examples follows.

a/In a broad sense, a numerically controlled system is machinery-controlled automatically, by coded instructions. The system has two basic elements: (1) the machine which does the work, and (2) an electronic control unit which directs the machine's motions.

<u>Punch presses</u>	<u>Cost</u>	<u>Approximate percent use on two shifts</u>
Sacramento ALC:		
Weideman punch 72" x 36"	\$ 117,959	4
52" punch press	143,000	(a)
Alameda NARF:		
Strippit punch, 10-gauge	63,000	11
Mare Island Naval Shipyard:		
Weideman punch, 14-gauge	54,236	(b)
Weideman punch, 11-gauge	72,122	7

a/Planned machine.

b/Not installed during period.

A Central Manager is Needed
To Coordinate the Military
Diagnostic and Calibration Program
(LCD-77-427, May 31, 1977)

The military services operate more than 700 calibration facilities worldwide and employ about 9,000 civilian and military technicians. Each military service has established its own system and facilities to satisfy common calibration needs. DOD has recognized that many facilities are housed together or in close proximity to each other and has had some success in reducing existing duplication. However, the services continue to maintain independent, substantial, and duplicative calibration staff, equipment, and facilities. Aside from the effort of the Joint Technical Coordinating Group for Metrology and Calibration's subgroup on consolidations, no serious attempts by the services to maximize calibration cross-servicing were found. As a result, DOD continued to underutilize its resources and incurs unnecessary costs for transportation, equipment, staff, and facilities.

At Alameda Naval Air Station, a field calibration activity is located at the same location as the Naval Air Rework Facility calibration laboratory. An evaluation showed that the field activity workload could be assumed by the NARF laboratory without additional cost. Through consolidation, surplus equipment valued at \$92,115 could be released, personnel costs could be reduced by about \$25,000, and space having an estimated replacement cost of \$26,000 could be vacated.

In August 1977, National Bureau of Standards officials said that they had agreed to become the Government contact point for calibration and metrology. Further, they stated that a Federal Precision Measurement Coordinating Committee would be formed. Because of these actions, the prospects for improved management over calibration and metrology look good.



MANPOWER,
RESERVE AFFAIRS
AND LOGISTICS

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

21 APR 1978

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

Dear Mr. Shafer:

This is in reply to your letter to the Secretary of Defense regarding your report dated December 22, 1977 on "DoD Aeronautical Depot Maintenance: A Single Manager Is Needed," OSD Case #4794, GAO Code 947293.

GAO reports that in constant FY 1977 dollars, the DoD spent about \$134 million more in FY 1977 than in FY 1971 for a like amount of work. Further, GAO projects these excess expenditures could reach \$246 million annually by 1982. Believing most of these added costs are due to higher overhead costs, GAO attributes the increased overhead costs in turn to excess depot maintenance capacity and capability. Finally GAO credits the excess capacity primarily to ineffective management within DoD wherein decision making is decentralized to the military departments which by tradition are reluctant to effect workload consolidations on an interservice basis. GAO further indicates that DoD does not have a "master plan" for management of aeronautical depot maintenance and is lacking management visibility DoD-wide because of incompatible information systems. GAO recommends establishing a strong single manager to provide centralized control as the appropriate solution to the identified problems.

We take strong exception to the basic finding as to excess expenditures by the DoD. The GAO estimate of \$134 million unnecessary cost was derived by inflating FY 1971 costs using the Consumer Price Index (CPI). We believe it is more appropriate in the case of depot maintenance to apply either the Wholesale Industrial Price Index (WPI) or the DoD Composite (overall average of DoD outlays) to adjust FY 1971 costs to FY 1977 conditions. Use of either of these indices would not support the GAO excess expenditure estimate of \$134 million.

Even if the GAO calculation were correct we question the GAO rationale which implies that overhead costs should decline in direct proportion to direct costs over an extended period. In the FY 1971 to FY 1977 time frame DoD has initiated a number of initiatives such as increased use of numerically controlled machine tools and automatic test equipment which result in decreased direct costs but frequently cause an increase

in indirect expenses for programming, calibration and in some cases maintenance. Through such initiatives we seek to reduce total costs even though a change in indirect to direct cost ratios may result. Other factors also impact on the ratio and should be considered before drawing broad conclusions. Direct costs tend to increase due to the rapid expansion of workloads requiring higher labor skills such as electronics. Substantial increases in energy costs have added to overhead costs. Though the net effects of these factors are not known we believe that they should not be ignored.

We agree that there is some aeronautical depot maintenance capacity excess to current and projected requirements. Some portion of this excess results from reduced operating programs. Some portion results from good management in that management initiatives have been taken to reduce capacity requirements while continuing to meet mission requirements. Examples would include adoption of the Technology Repair Center (TRC) concept by Air Force, progressive implementation of Reliability Center Maintenance (RCM) in all services, and continued emphasis on interservice support.

Regardless of whether the excess capacity is the result of reduced operating programs or management actions, elimination of the excess takes time. We interpret the GAO report as claiming a deficiency in DoD management because excess capacity has not been promptly closed out. We would point out in this regard that efforts have been underway to eliminate capacity identified as excess by DoD in 1974 and 1975. Navy closed out its engine overhaul activity at the Naval Air Rework Facility at Pensacola, Florida. Army terminated aeronautical depot maintenance at Sharpe Army Depot in Lathrop, California. In early 1976 Army announced a study of the potential for consolidating aeronautical workloads between Corpus Christi Army Depot and New Cumberland Army Depot, but the results of this study are not yet available. While a single manager of depot maintenance operations might be able to better document excess capacity, it is not correct to assume that pressures against facility reductions would be less under a single manager.

The strong reluctance to rely on interservice support attributed to the services by GAO may well have been a dominating influence in the past. In the five most recent years, however, the services have evidenced an increasing willingness to use interservice support where it is cost effective. The major one-time study by the Joint Logistics Commanders (JLC) of items currently in the inventory is essentially complete. It will result in an increase in interservice support despite an overall trend of reductions in workloads. (In this regard, we disagree with the GAO approach of measuring interservice support as a percent of total workload rather than in relation to workloads susceptible to interservicing.) Most importantly, the JLC effort recognized that the major interservicing savings will result from examining new systems or items coming into the DoD inventory for potential support by a single service. We fully support the JLC in establishment of the joint group to conduct the necessary reviews of these new systems.

We do not have a document titled "Master Plan." However, the services are each required to have a depot maintenance programming system which covers the current fiscal year and five out years. This system provides a detailed workload breakout for each depot activity by production shop category for each of the six years permitting an assessment of facility utilization. This same system also permits the assessment of mobilization capacity, capability and utilization at each of the facilities. Based on our review of service implementation we expect that we will be able to examine service aeronautical depot maintenance programs for FY 1980-1984 as part of the Program and Budget review cycle. We believe this satisfies the intent of a master plan as suggested.

We note that in making its recommendation GAO has not described the responsibilities it visualizes for the proposed single manager. In this regard we feel strongly that technical responsibilities must remain with the respective military services for their weapon systems and major equipments. Similarly each service must prepare and be responsible for its requirements. We view the potential role of a single manager to be limited to management and control of the production aspects of depot maintenance.

While we do not agree with much of the GAO rationale in support of its recommendation we believe that there may be benefits to be had from a single manager assignment for accomplishing aeronautical depot maintenance. Such an assignment could facilitate further reductions in unutilized or underutilized capacity identified in 1974 and in the future, as well as effect other savings. However, additional preliminary work is required to identify and, where possible, quantify both the anticipated benefits and penalties that might accrue from such an assignment before making the investment in a detailed study. If the advantages are sufficient we will consider the possible single manager assignment for inclusion in our study program and assign the necessary resources. It would be helpful if GAO could provide more detailed information on potential benefits and penalties. We will initiate a preliminary survey later this year to determine if a full scale study is warranted.

We have provided more detailed comments in the attachment in support of our above views and on selected report items to assist you in preparing your final report.

We appreciate your continued interest and assistance in improving the DoD management of depot level maintenance.

Sincerely,



ROBERT B. PIRIE, JR.
Principal Deputy Assistant Secretary
of Defense (MRA&L)

Attachment a/s

DOD DETAILED COMMENTS
GAO DRAFT REPORT DATED 22 DECEMBER 1977
"DOD AERONAUTICAL DEPOT MAINTENANCE:
A SINGLE MANAGER NEEDED"

Each of our detailed comments below are identified usually with a single report page/paragraph number. Several GAO statements with which we take exception however are repeated throughout the text. We have not attempted to comment on the repeated statements intending that a single comment apply to repetitive statements

Page 4, First Paragraph: Sacramento Army Depot (SAAD) and Tobyhanna Army Depot (TOAD) are not considered aircraft maintenance depots. SAAD and TOAD are totally electronic depot maintenance oriented. Approximately 10-15% of the SAAD and TOAD electronic workload is associated with aircraft systems. The Army has assigned its aeronautical depot maintenance workload to Corpus Christi Army Depot (CCAD) and New Cumberland Army Depot (NCAD). The Army is currently re-examining the need for two aviation maintenance facilities based on projected future aviation depot maintenance requirements. [See GAO note 1, p. 95.]

Page 5: [See GAO notes 1 and 5, p. 95.]

Page 6, Second Paragraph, Last Two Sentences: During the last half of CY 77 both the Navy and Air Force implemented the depot maintenance planning, program and capacity measurement systems called for in DoDI 4151.15 ("Depot Maintenance Programming Policies," November 22, 1976) and DoD 4151.15H ("Depot Maintenance Production Shop Capacity Measurement Handbook," July 28, 1976). The information from the system indicates that both the Navy and Air Force have a peacetime facility utilization of between 75-80% considering one shift, forty hour week. However, both the Navy and Air Force facility utilization during mobilization is well above 200%. DoD has the mobilization facility utilization guidelines under review, however, we do not believe there is any gross excess facility problem for mobilization in either service. The Army is expected to have both the DoDI 4151.15 and the DoD 4151.15H systems implemented by January 1979. [See GAO note 1, p. 95, and p. 19 for GAO comments.]

Page 10, First Paragraph: The statement that there is no mechanism at the DoD level for managing from a DoD-wide perspective is not entirely correct. We do review military construction proposals that relate to depot facilities and we have visibility of the individual services' schedules, resources and workloads. In addition, the JLC reviews new start workload plans and dispositions and reports to us on request. Also under the JLC, we have an active group that provides for the interchange of technical information and interservice coordination on the capabilities and capacities of industrial equipments, processes, techniques and methods used in the depot maintenance and overhaul of aeronautical systems and equipments. This group, the JTCG on Aeronautical Depot Maintenance Industrial Technology (ADMIT), was chartered during December 1973. [See GAO note 1, p. 95, and GAO discussion on pp. 6 to 7.]

Page 17, First Major Paragraph: This paragraph indicates DoD is paying substantial dollars annually for lay-away commercial aircraft production capacity and that at least some of this capacity could be used for peacetime depot maintenance. The peacetime aircraft depot maintenance workload, work force and facilities (whether they be organic or contract) are inexorably tied to mobilization requirements. Shifting depot maintenance workload during mobilization from a contractor facility and work force to an organic source or other contract source could be inviting trouble. As indicated by the widening gap between peacetime workloads and wartime requirements the services will have to rely on the commercial sector to perform part of the maintenance workload during mobilization. Additionally, with the short fused "come as you are" scenarios which our planners are tasked to work with, it is apparent that the peacetime repair sources must also be the wartime sources. If as the report implies, the lay-away aircraft production capacity is not crucial to immediate mobilization requirements, but only to a long term conflict, than it would appear questionable whether such a capacity should be in the lay-away category.

Experience with commercial activities indicates that the prime aircraft manufacturers (within whose organizations most of the excess commercial capacity resides) are not cost competitive with smaller, dedicated, commercial maintenance activities nor with the organic depots. As a result, it is unlikely that the commercial excess capacity of concern would be offset to any extent by increased contracting out of depot maintenance work. [See GAO note 1, p. 95, and GAO discussion on pp. 13 to 20.]

Page 18, Second Paragraph: The three studies referenced in this part of the report (IDA, DoD and GAO) all identified the need for a standard methodology for measuring depot maintenance capacity. DoD 4151.15H ("Depot Measurement Handbook," July 28, 1976) was published to provide the standard methodology. There is every indication that handbook is an effective document. The Navy and Air Force have implemented the handbook methodology and have not come up with the gross excess capacities which the report indicates to exist. The Navy does continue to show some excess. The Army has not yet fully implemented the handbook, however, with closure of the Sharpe Army Depot and the present study of further consolidation of workloads between Corpus Christi and New Cumberland, we do not expect a problem in the Army. [See GAO note 1, p. 95, and GAO discussion on pp. 19 to 20.]

Page 21: The conclusion reached is not appropriate considering our comments to pages 10, 17 and 18 and our covering letter. [See GAO note 1, p. 95, and GAO discussions referenced for comments cited.]

Page 25, Last Paragraph and Page 26: We do have compatible management information systems either existing or nearing completion; consistency of information is not "years in the future" as stated by GAO. A depot maintenance cost system in accordance with DoD 7720.29H ("DoD Depot Maintenance and Maintenance Support Accounting and Production Reporting Handbook," October 21, 1975) exists in each service and is being improved to provide better compatible cost information. The depot maintenance planning, programming and capacity measurement systems

implemented by DoDI 4151.15, ("Depot Maintenance Programming Policies," November 22, 1976) and DoD 4151.15II ("Depot Maintenance Production Shop Capacity Measurement Handbook," July 28, 1976) are operational in the Navy and Air Force and are providing compatible management information. The Army is expected to have both systems implemented before the end of the year. [See GAO note 1, p. 95, and GAO discussions on pp. 21 and 41.]

Page 29, Middle Paragraph: The GAO states that little has been done (over the past 10 years) in realigning organizations or consolidating workloads. In 1967 there were four Army depots with aircraft maintenance facilities -- Atlanta, Sharpe, Corpus Christi and New Cumberland. Atlanta was closed in 1971 and the Sharpe aircraft maintenance facility was closed in 1976. Today there are just two and the Army is studying further realignment. Also the Air Force Technology Repair Center (TRC) concept realignment was accomplished during this time frame. Army also closed out maintenance activities at two non-aeronautical depots: Pueblo Army Depot and Lexington-Blue Grass Army Depot. [See GAO note 1, p. 95, and GAO discussion on p. 23.]

Page 32 and Page 47, First Paragraph: The report suggests that since interservice activities cover only 4.9% of the total annual aeronautical depot workload for 1976, and averaged 4.6 percent from 1972 to 1977, many interservicing opportunities are being overlooked. We do not concur in the GAO approach for measurement of workload interserviced as a percentage of total workload. We previously expressed our views during April 1973 and March 1976 on the impracticality of this approach in commenting on the GAO report entitled "Potential for Greater Consolidation of the Maintenance Workload in the Military Services." As we discussed, the interserviced work should be related to only that part of the total workload having potential for interservicing; i.e., exclude contracted work and service peculiar work for unique service systems (e.g., F-14, B-52 ships, etc.) and components. If, however, GAO continues to believe their approach is valid, the basis for their computations should be explicitly explained in the report and interservicing goals should be estimated for comparison with their computations of work interserviced.

Workload susceptible to interservicing constitutes only 25 percent of the total DoD program. The other 75 percent is made up of contract and service peculiar work. Prior to the JLC interservicing initiative, roughly 30 percent of the susceptible workload was covered by interservicing. Today that figure is 49 percent.

[See GAO note 1, p. 95, and GAO discussion on p. 31.]

Page 47, Second Paragraph: The statements concerning interservicing savings and expenditures are inaccurate or incomplete. Interservicing actions in process during the survey have now culminated in an additional \$8.6 million dollars (or a total of \$15.4 million) of cost avoidance, with the prospect of significant annual savings from 26 additional new starts now under evaluation as well as from items already interserviced. The projected FY 1978 costs of the interservicing organization directly related to the new start cost savings are \$1.1 million.

[See GAO note 1, p. 95, and GAO discussion on p. 30.]

Page 49, Second Paragraph: We cannot agree that interservicing has been ineffective or minimal. The successes of the relatively new MISMO and MISGC organizations are significant. The screening and consolidating of the widely varying requirements of the Services can often seem complex, but the MISMO/MISGC is structured to accommodate this problem and provides the proper forum for interservice decisions and single service manager assignments. We must expect occasional deadlocks to occur, but there is no reason to believe that OSD cannot act as an arbitrator or final review authority when agreements cannot be reached. [See GAO note 1, p. 95, and GAO comments on p. 40.]

Page 49, Second Paragraph:

[See GAO notes 1 and 4, p. 95.]

Page 52, Last Paragraph and Page 53: The statements imply that the Navy bypassed the Joint Logistics Commanders' process, ignored "potential" DoD cost savings, and created duplicative/underutilized depot capability within the DoD in order that the Navy might "keep control" over LM2500 depot maintenance. This is not true. GAO contends that the Navy report states all facilities surveyed had the capability to overhaul the LM2500 and selection of Kelly AFB would have saved the Navy \$735,000. "Basic capability" was intended to mean that each facility had a building and had successfully overhauled jet engines in the past. However, each facility required expenditure of funds to acquire LM2500 capability. The Navy estimates showed that Kelly would cost the Navy \$735,000 less than North Island excluding \$1 million required to provide Kelly with a CODEP coating facility. North Island already possessed the CODEP capability. The cost trade-off was therefore considered equal. Navy advises that the Air Force estimate of \$200,000 to add the CODEP

capability was too low. See comments to page 57 of the draft report. [See GAO note 1, p. 95, and GAO discussion on pp. 34 to 38.]

Page 55, Last Paragraph: It is true that the original estimates for special support equipment (SSE) proved too low. This was not altogether unexpected. The estimates were made prior to tooling design and costing and had not considered inflation, configuration changes, and other factors influencing tooling costs. GE estimates for SSE over this same period also inflated more than 100%. Therefore, costs would have risen on the same scale had Kelly been selected. It is also true, as subsequently determined by the Air Force, that the cost increase would have been further compounded by the necessity to establish a separate line for the LM2500 at Kelly AFB.

[See GAO note 1, p. 95, and GAO discussion on pp. 34 to 38.]

Page 57, Third Indented Paragraph: The GAO inference that the Air Force loaned the Navy tools to "start" its LM2500 depot capability is misleading. These tools were excess to the Air Force's requirements and through their transfer the Navy was able to reduce its SSE procurements without duplication. Additionally, once these tools were made available, the Navy invested \$3.7 million in facility modifications to install this tooling which could not be recovered had the decision been made to place the LM2500 at Kelly AFB.

[See GAO note 1, p. 95, and GAO discussion on pp. 34 to 38.]

Page 57, Fourth Indented Paragraph: The GAO statement is misleading. The coating capability in question is known as CODEP, a Navy/Air Force developed hot-section treatment for GE engines intended to replace an earlier proprietary coating. It is now used on all GE produced engines, including the LM2500. The coating is extremely difficult to apply to used parts. Therefore, although many facilities have attempted to develop CODEP capability (including Air Force facilities), all have failed except North Island and the commercial vendor Walbar. The \$1M estimate for Kelly was based on the actual cost of having established the North Island facility.

[See GAO note 1, p. 95, and GAO discussion on pp. 34 to 38.]

Page 58, First Paragraph: The GAO report is misleading. The LM2500 depot selection decision was made prior to the establishment of the current MISMC organization.

[See GAO note 1, p. 95, and GAO discussion on pp. 34 to 38.]

Page 62, Last Paragraph: There is a definite need to know both peacetime capacity and physical capacity. The connotation in the report is that the only reason to use peacetime capacity figures is to mislead. This is inaccurate. It appears the principal basis for the GAO statement is the undocumented assumption that "service self-interest" governs facility utilization, interservicing decisions and other related matters. The Joint Logistic Commanders do work closely together with the common goal of good maintenance management in the best interests of the government.

[See GAO note 1, p. 95, and GAO discussion on p. 41.]

Page 63, Last Paragraph: As was pointed out during the investigation by the GAO team at HQ AFLC as late as September 1977, a major revision to the DoD plant capacity measurement and utilization requirements had recently been published, and the AFLC had not yet completed the new computations. These data were subsequently developed and presented to

OASD(MRA&L) in November 1977. The data was, therefore, available at the time of the final outbreak on 11 January 1978 and would have been presented upon request. Overall peacetime utilization is low at 78 percent of peacetime capacity, but of more importance the wartime facility utilization is computed at 287 percent. [See GAO note 1, p. 95, and GAO comments on pp. 19 and 4.]
Page 58, Third Paragraph:

[See GAO notes 1 and 5, p. 95.]

Page 69, Bottom Chart:

[See GAO notes 1 and 5, p. 95.]

Page 70, Last Paragraph:

[See GAO notes 1 and 3, p. 95.]

Page 72, Second and Third Paragraphs: GAO alleges that Automated Test Equipment (ATE) capacity is underutilized, and the apparent underutilization does not reflect consideration for total process cost. Maximizing the utilization of ATE capacity can defeat the primary purpose for automation -- more effective personnel utilization. To justify ATE, Air Force gave up substantial numbers of personnel to effect net savings. It would make little sense now to have the remaining workers or work queue on the equipment driving up costs. [See GAO notes 1 and 2, p. 95.]

Page 73, Last Paragraph: Since the procurement of the special purpose equipment designed to test the modules in the airborne portion of the command activated sonobuoy system, the operational utilization of sonobuoys and associated airborne equipment has not yet increased to a level where failures requiring depot level maintenance have occurred in the airborne system.

[See GAO note 1, p. 95, and GAO discussion on p. 50.]

Page 74, First Paragraph: Concur that NARF Alameda has not utilized the Vanzetti Infrared Tester. The Vanzetti Tester, originally procured for Quonset Point, and subsequently transferred to Alameda, has become obsolete due to rapid advancements in electronic integrated circuitry. Another Navy activity is presently investigating its potential use in a research and development environment. [See GAO note 1, p. 95.]

Page 74, Second Paragraph: Concur. The ACS-200 was designed for production type calibration. Due to a change in the maintenance philosophy in 1976, the calibration of equipment supported by the ACS-200 is being performed by AIMDs. NARF Alameda is now only required to perform calibration incidental to depot level repairs of equipment supported by the ACS-200. Means of employing the ACS-200 elsewhere, including AIMDs, in a more efficient and effective manner are under investigation. [See GAO note 1, p. 95.]

Page 74, Last Paragraph:

[See GAO notes 1 and 4, p. 95.]

Page 76, Bottom Chart: The capacity of the Sacramento ALC PMEL facility is 124 PEs (Personnel Equivalents) instead of 134 PEs and utilization is 89 percent instead of 60 percent. Finally, despite advice to the GAO staff that functions were being relocated from the old to the new Industrial Products Facility, the draft report indicates a utilization of 36 percent. Currently utilization in the new facility is 50 percent and should exceed 80 percent as forecasted workload transfers take place. It must be clearly understood that, even after correcting the above errors, peacetime utilization is not the only criterion for sizing new facilities. Sacramento must also face a 274 percent wartime utilization rate.

[See GAO note 1, p. 95, and GAO discussion on pp. 52 to 54.]

Page 77, First Paragraph: In consideration of possible cost savings in relation to consolidation, the DoD Joint Technical Coordinating Group for metrology and calibration (JTCC-METCAL) chartered the Consolidation of Calibration Services (COCS) Subgroup to study consolidation of Calibration/Metrology facilities in the San Francisco/Sacramento area. The study findings are to be published in the near future. Any action in the above area will be based on the JTCC-METCAL Group's finding.

[See GAO note 1, p. 95.]

Page 77, Last Paragraph: These shops are fundamental to the operation of the depot facility, as in any commercial or government industrial plant, and are necessary to support the aircraft, engine and component production lines. A consolidation at one location would severely restrict the operations at the other location and would represent a false economy. [See GAO note 1, p. 95, and GAO discussion on p. 54.]

- GAO notes:
1. Page references in this letter may not correspond to pages in this final report.
 2. DOD comment was unresponsive.
 3. Deleted comment pertains to an update which was incorporated into the final report.
 4. Deleted comments pertain to matters which were presented in the draft report but are not included in this final report.
 5. Deleted comments pertain to adjustments which were incorporated into the final report.

PRINCIPAL OFFICIALS
RESPONSIBLE FOR ADMINISTERING
ACTIVITIES DISCUSSED IN THIS REPORT

	<u>Tenure of office</u>	
	<u>From</u>	<u>To</u>
<u>DEPARTMENT OF DEFENSE</u>		
SECRETARY OF DEFENSE:		
Dr. Harold Brown	Jan. 1977	Present
Donald H. Rumsfeld	Nov. 1975	Jan. 1977
James R. Schlesinger	July 1973	Nov. 1975
William P. Clements, Jr. (acting)	Apr. 1973	July 1973
Elliott L. Richardson	Jan. 1973	Apr. 1973
Melvin R. Laird	Jan. 1969	Jan. 1973
DEPUTY SECRETARY OF DEFENSE:		
Charles W. Duncan, Jr.	Jan. 1977	Present
William P. Clements, Jr.	Feb. 1973	Jan. 1977
Kenneth Russett	Feb. 1972	Jan. 1973
Vacant	Jan. 1972	Feb. 1972
David Packard	Jan. 1969	Dec. 1971
ASSISTANT SECRETARY OF DEFENSE (MANPOWER, RESERVE AFFAIRS, AND LOGISTICS):		
Dr. John F. White	May 1977	Present
Carl W. Clewlow (acting)	Apr. 1977	May 1977
ASSISTANT SECRETARY OF DEFENSE (INSTALLATIONS AND LOGISTICS) (note a):		
Dale R. Babione (acting)	Jan. 1977	Apr. 1977
Frank A. Shrontz	Feb. 1976	Jan. 1977
John J. Bennett (acting)	Apr. 1975	Feb. 1976
Arthur I. Mendolia	Apr. 1973	Mar. 1975
Hugh McCullough (acting)	Jan. 1973	Apr. 1973
Barry Shillito	Feb. 1969	Jan. 1973

a/The offices of Assistant Secretary of Defense for Installations and Logistics and Assistant Secretary of Defense for Manpower and Reserve Affairs were merged in May 1977.

	<u>Tenure of office</u>	
	<u>From</u>	<u>To</u>
SECRETARY OF THE ARMY:		
Clifford Alexander	Feb. 1977	Present
Martin R. Hoffman	Aug. 1975	Jan. 1977
Howard H. Callaway	July 1973	July 1975
Robert F. Froehke	Jan. 1971	Apr. 1973
SECRETARY OF THE NAVY:		
W. Graham Claytor, Jr.	Feb. 1977	Present
J. William Middendorf	June 1974	Jan. 1977
J. William Middendorf (acting)	Apr. 1974	June 1974
John W. Warner (acting)	May 1972	Apr. 1974
SECRETARY OF THE AIR FORCE:		
John C. Stetson	Apr. 1977	Present
John C. Stetson (acting)	Jan. 1977	Apr. 1977
Thomas C. Reed	Jan. 1976	Jan. 1977
James W. Plummer (acting)	Nov. 1975	Jan. 1976
Dr. John L. McLucas	July 1973	Nov. 1975
Dr. John L. McLucas	June 1973	July 1973
Dr. Robert C. Seamans, Jr.	Jan. 1969	May 1973