An Industrial Management Review Of The Maintenance Directorate San Antonio Air Materiel Area San Antonio, Texas B-159896

Department of the Air Force

UNITED STATES
GENERAL ACCOUNTING OFFICE

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

LOGISTICS AND COMMUNICATIONS
DIVISION

B-159896

The Honorable
The Secretary of Defense

Dear Mr. Secretary:

We have reviewed industrial operations of the Maintenance Directorate, San Antonio Air Materiel Area, Kelly Air Force Base, Texas. Our report identifies opportunities for improving both the management of maintenance operations and the productivity of the work force.

The Air Force has taken or plans to take actions in line with our recommendations.

We are sending copies of this report to the Director, Office of Management and Budget; the Chairmen, Senate and House Committees on Appropriations, Government Operations, and Armed Services; the Chairman, Subcommittee on Priorities and Economy in Government, Joint Economic Committee; and the Secretary of the Air Force.

Sincerely yours,

F. J. Shafer

Fred J. Shafer
Director

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ABBREVIATIONS

DOD Department of Defense

GAO General Accounting Office

GENERAL ACCOUNTING OFFICE
REPORT TO THE
SECRETARY OF DEFENSE

AN INDUSTRIAL MANAGEMENT REVIEW OF THE MAINTENANCE DIRECTORATE SAN ANTONIO AIR MATERIEL AREA, TEXAS Department of the Air Force B-159896

D I G E S T

WHY THE REVIEW WAS MADE

In February 1971 GAO reported to the Congress that industrial management reviews could identify ways to reduce Government contractor costs and that it was feasible for GAO to make such reviews.

GAO made an industrial management review of the Maintenance Directorate (the depot), San Antonio Air Materiel Area, Kelly Air Force Base, Texas, because of the similarities between its operations and those of industrial maintenance contractors.

FINDINGS AND CONCLUSIONS

The depot could improve its use of direct resources for repairing, overhauling, and modifying end-items. Although the potential savings from strengthening management controls were not fully measured, they could amount to several million dollars.

The depot's work measurement system, which was intended to improve labor productivity and provide decision-making data, fell short of its objectives because of inflated or inappropriate labor standards and incomplete productivity analyses.

Inflated labor standards increase maintenance costs because they allow more labor hours than necessary for repair work.

The work measurement system does not compare actual performance with planned (standard) performance by product. Consequently, depot officials cannot identify which specific products are being repaired efficiently. (See ch. 2.)

Depot officials observed that about 700 employees--about 7 percent--were on sick leave each workday at a cost of about $29,700 a day. The depot needs a more effective program to reduce the loss of labor resources from sick leave. (See ch. 2.)

There are opportunities for reducing accumulations of unneeded parts in maintenance shops by improving direct material standards and control over parts removed from components undergoing repair. (See ch. 3.)

The depot's 36-percent general-purpose machine-use rate indicated unneeded machines were on hand. Removing these machines would increase the use of the remaining machines, reduce the depot's investment in machines, make excess machines available to other Department of Defense (DOD) installations, and increase

floor space in the shops.

In deciding whether to replace or retain machines, the depot used estimated data which overstated machine use. Although machine use is not the only criterion for determining machine needs, overstating current use can result in unrealistic forecasts of future needs. (See ch. 4.)

Procedures for reviewing repair-or-purchase decisions can be improved. Although the depot was required to compare the expected repair costs with the catalog prices before deciding whether to repair items, GAO found the costs of repairing some items had exceeded the catalog prices. (See ch. 5.)

RECOMMENDATIONS

In summary, GAO recommends that the Secretary of Defense have the depot commander:

--Develop valid engineered standards for those jobs having high-volume workloads.

--Establish a realistic sick leave goal and identify and correct the causes of excessive sick leave.

--Make a complete physical inventory of parts in the shops and establish reliable inventory records of parts in process.

--Develop a program for accumulating actual equipment use data.

--Establish procedures for prompt and reliable reviews of decisions to repair or replace parts.

AGENCY ACTIONS AND UNRESOLVED ISSUES

GAO discussed its findings with depot and Air Force Logistics Command officials. They have taken or plan to take actions on most of the problems GAO found. The Air Force commented on this report to GAO, and GAO considered those comments in preparing this report.

CHAPTER 1

INTRODUCTION

Industrial management reviews are useful in determining the efficiency of an organization's performance and its relationship to product costs. Such reviews evaluate system operations and procedures for achieving efficiency and economy.

In February 1971 GAO reported to the Congress that these reviews could identify ways to reduce Government contractor costs. Because of the similarities between the operations of Government contractors and Department of Defense (DOD) depot maintenance facilities, we applied industrial management review techniques in studying the Maintenance Directorate, San Antonio Air Materiel Area, Kelly Air Force Base, Texas.

San Antonio Air Materiel Area is one of five air materiel areas under the direction of the Air Force Logistics Command. Its Maintenance Directorate (the depot), maintains, repairs, and overhauls Air Force weapon systems and their component parts.

The depot, one of the Air Force's largest maintenance directorates, occupies 79 shop and administrative buildings which cost about $31.9 million to acquire. Shop production equipment on hand at June 30, 1972, was valued at about $75.5 million.

The depot's primary operating costs are for its 10,000 employees and for materials; the operating costs do not include the costs of buildings and equipment. Operating costs during fiscal year 1972 were:

Personnel:		
Direct labor	$86,940,000	
Operating overhead	21,816,000	
Administrative overhead	10,782,000	$119,538,000
Materials		62,632,000
Contractual services		1,190,000
Other		8,110,000
Total		$191,470,000

The depot has maintenance responsibility for B-52 bombers and C-5 transport aircraft; T-56, J-79, and TF-39 aircraft engines; several types of gas turbines; and a wide range of aircraft accessories and components. The direct labor work force puts each of these end-items through a similar maintenance process.

The following table shows the major work completed at the depot in the past 3 fiscal years and the average number of direct labor man-hours used.

	Programs completed					
	1972		1971		1970	
Program	Number	Average man-hours	Number	Average man-hours	Number	Average man-hours
B-52:						
Maintenance	79	25,329	80	29,071	54	39,239
Modification	53	4,617	24	13,895	59	5,733
C-5:						
Modification	22	9,309	3	9,727	-	-
Aircraft engines	1,488	1,161	1,379	1,027	1,647	1,133
Gas turbines	1,943	228	2,141	223	2,272	219
Components	254,197	12.2	228,712	15.9	(a)	(a)

[a]Not available.

RESOURCE MANAGEMENT

The depot manages direct resources--men, materials, and machines--by production planning. Its direct labor planning is based on labor standards.

A labor standard identifies the expected hours an experienced operator needs to do a task under average conditions. To measure direct labor performance efficiency--one of the major uses of standards--the depot needs to know the actual time it took to do the task and the number of times the task was done.

Task standard X count = standard hours completed (earned hours)

Earned hours ÷ actual hours = performance (effectiveness rate)

The depot can then analyze variances between actual and standard performance and identify factors impeding performance.

A comparison of the actual direct labor hours expended with the standard hours follows.

Fiscal year	Actual hours	Standard hours	Effectiveness rate
1970	12,463,197	11,545,639	92.6
1971	11,880,235	10,487,028	88.3
1972	12,079,338	9,791,803	81.1
1973	-	-	[a]85.6

[a]Provided by the Air Force in its comments on this report.

CHAPTER 2

DIRECT LABOR

The objectives of DOD's work measurement system were (1) to improve labor productivity and (2) to provide a common base of work measurement and productivity data for decisionmaking. The depot's work measurement system fell short of these objectives because:

--Appropriate standards had not been developed for many high-volume repair jobs and some standards were inflated.

--Variances between actual and planned performance were not evaluated for individual jobs.

Standards affect scheduling, shop performance evaluations, and standard cost determinations because, if more time than necessary is provided, usually not enough work will be scheduled to keep the work force busy, nonproductive time or inefficient performance will not be noticed, and costs will be increased.

The depot determined labor performance levels by shop rather than by individual jobs. Since each shop usually has several jobs, high or low performance levels and major changes in performance levels on individual jobs need to be highlighted for management attention.

In addition, sick leave appeared to be excessive. Decreasing unscheduled absences would increase labor hours available for productive work.

DIRECT LABOR STANDARDS

About 7,000 of the depot's 10,000 employees are in the direct labor force, and their work is scheduled and controlled by labor standards. The depot has four types of direct labor standards--types A, B, 2, and 3. Types A and B are reportedly statistically accurate engineered standards; type A is more accurate. Types 2 and 3 are estimated standards; type 2 is more accurate.

Although the engineered standards are more accurate, they are more expensive to develop. Therefore, under Command criteria, the engineered standards apply only to jobs with high-volume workloads, those expected to use more than 2,000 man-hours or to produce more than 25 units annually. Estimated standards apply to low-volume jobs. The Command expects the type 3 standard to be used very seldom--primarily when it is not economical or feasible to develop engineered standards.

As of July 1972 the depot had about 65,000 labor standards. The fiscal year 1972 workload was estimated to require about 10,680,000 standard hours. The percentage of workload controlled, by type of standard, as of December 1971 was as follows:

	Percent of workload controlled			
	Engineered standard		Estimated standard	
Division	A	B	2	3
Aircraft	9	12	27	52
Accessories	62	1	22	15
Engines	12	7	34	47
Electronics	51	6	11	32
Laboratories	25	4	9	62
Manufacturing and repair	21	13	29	37

The workload controlled by standards A and B averaged 37 percent (type A, 30 percent; type B, 7 percent) and by standards 2 and 3 averaged 63 percent (type 2, 22 percent; type 3, 41 percent).

The majority of the depot's workload is controlled by estimated standards. We did not review estimated standards because their documentation was not sufficient to permit us to assess their validity.

Engineered standards for high-volume workloads

For the fiscal year 1972 workload, depot personnel identified 479 high-volume jobs for which type A standards were desirable. These were estimated to require 4.1 million

man-hours, or about 39 percent of the total projected workload. Type A standards had been developed for 172 jobs, leaving 307 jobs which needed type A standards. By the end of the fiscal year, 282 type A standards had been developed, covering about 54 percent of the high-volume workload.

The 110 new type A standards reduced the standard man-hour requirements from 936,000 to 802,000 man-hours, or 14 percent. If the remaining 197 standards were similarly overstated, the depot could have more effectively used about 272,000 standard man-hours, valued at about $2 million.

Valid standards should be developed for all repetitive work so that management can better plan, schedule, and control this high-volume workload.

The Air Force stated it was developing an improved concept with greater emphasis on developing thoroughly engineered standards for high-volume workloads. This concept, it said, would minimize engineering and planning efforts for low- and intermediate-volume workloads so that available resources could be concentrated in the high-volume areas. This program, known as the Depot Maintenance Programing, Budgeting and Costing System, is scheduled for implementation during fiscal year 1975.

Accuracy of engineered standards

A work-step occurrence rate shows how often a step should be done and is used to determine the standard time to be allowed.

To evaluate the accuracy of type A standards, we compared the occurrence rates for selected work steps in 43 type A standards with the actual occurrences (estimated by shop personnel) on the production line. We found that the occurrence rates were overstated, which caused the standard time allowances to be overstated by an average of 42 percent.

For example, overhauling wing-flap drivescrews was a high-volume workload. A work step to reload ball nuts was required in 18 standards. The standard time for this work step for a B-52 was 28.5 minutes and for a C-141 was 2.1 hours. The ball nut might be loaded with standard-sized or

oversized ball bearings. Each standard contained a work step to load the ball nut with standard-sized ball bearings and a second step to reload it with oversized ball bearings. The standard occurrence rate was 100 percent for each step; that is, the two steps were to be done each time a drive-screw was overhauled.

Production line foremen said the actual work method, however, was to first load the ball nut with standard-size bearings and then reload it with oversized bearings only if needed for proper fit. The foreman for the B-52 line estimated a 35-percent occurrence rate for reloading, and the foreman for the C-141 line estimated a 15-percent occurrence rate for reloading. On the basis of these estimates, the reloading-step time allowance was overstated by about 300 standard hours during a 3-month production period.

In another example, the standard occurrence rates for all work steps in overhauling a winch were doubled because, according to the technician who prepared this standard, the winch was heavy and required two men to lift it. He acknowledged, however, that two men did not work together on all the steps. Another reason for doubling the occurrence rates, he said, was that certain shop conditions impeded work efficiency:

--A proper test stand was not available.

--Some needed tools and fixtures were not available.

--The replacement parts were not always available.

--The workmen were not experienced in repairing the winch.

Although two workmen may be needed to lift, carry, and position a heavy winch on the workbench, one would be able to do the other work steps. Because the standard called for two workmen on each step, it allowed about 82 more standard hours than necessary during a 3-month production period.

The standard cited in this example was not consistent with Air Force policy which stated that standards should not be established for nonstandard conditions such as material shortages and untrained personnel. Establishing standards to cover inefficiency, we believe, buries the inefficiency in the standard which is intended to represent acceptable

performance. This practice could perpetuate inefficiencies rather than highlight them for management's attention.

Change in work content and labor standards

Before labor standards were upgraded in fiscal year 1972, the depot repaired wing flaps for the B-52s to original factory configuration and condition. This repair work was done under type 3 estimated standards which allowed 599 standard hours to overhaul a wing flap. All repairs made, according to depot officials, were required by the work specifications to produce a like-new flap.

A May 1971 Air Force study compared wing flaps repaired by the depot with those repaired by contractors and found no significant differences in serviceability. However, although contractors replaced only those parts which had to be replaced, the depot replaced many more parts to produce a like-new product.

The work content and standards were reviewed in January 1972 and were later revised to reduce the work content. At the same time the labor standard was upgraded from an estimated to an engineered standard. The new standard allowed 279 standard hours, a 53-percent reduction, for overhauling a wing flap. This change reduced the standard cost by about $390,000 for fiscal year 1973.

STANDARD AND ACTUAL PERFORMANCE

Labor performance efficiency can be determined by comparing standard hours with actual hours. According to a DOD instruction, a performance-efficiency rate should be determined for all jobs, functions, and activities which are done under engineered standards. A low efficiency rate or a change in the rate should alert management to areas requiring attention. Analysis of the underlying causes should identify more efficient ways of doing this work.

The depot compares standard and actual hours by shop rather than by job, although it has a standard for each job. Although the present system allows management to evaluate overall shop performance, it does not provide management with an opportunity to evaluate specific jobs which are exceeding the standard or to take the necessary action to revise the standard and/or plan the work more efficiently.

Air Force Audit Agency findings

The Air Force Audit Agency's report, dated June 19, 1972, contained similar findings on labor standards.

> "a. The existing labor accounting system did not provide for a comparison of actual with standard labor hours for either an operation or a specific product. We believe this weakness restricted management's visibility as to the propriety of both established labor standards and product costs based upon these standards.
>
> "b. Production count reporting was not always processed in a timely and accurate manner. Untimely processing resulted in data being reported in the wrong accounting period and, accordingly, distorted operating results. Inaccurate production count * * * also impacted on future planning actions such as scheduling workload and computation of sales rates."

The audit report recommended revising the labor accounting system to permit a more meaningful comparison of actual with standard labor hours and strengthening production count controls to improve the accuracy and timeliness of reported data. The report stated that depot management had agreed with the findings and had initiated action on all recommendations.

In commenting on the report, the Air Force stated that comparing actual labor hours with standard time, by job, was not possible under its current procedures. It recognized, however, the need for such a reporting system as an aid in analyzing the adequacy of labor standards and said the Depot Maintenance Programing, Budgeting, and Costing System (see p. 8) was expected to satisfy this requirement.

ABSENTEEISM--SICK LEAVE

Sick leave at the depot has been steadily increasing during the last 7 years and is above the national average.[1]

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[1]Office of Management and Budget Report A-93, "Man-years and Personnel Costs, Executive Branch, U.S. Government."

	Average per employee per year			
	Percent of total hours lost		Average days lost	
	Depot	National	Depot	National
1966	3.5	-	8.9	-
1967	3.7	-	9.4	-
1968	4.3	-	10.9	-
1969	4.2	-	10.6	-
1970	4.4	3.4	11.1	8.7
1971	4.6	3.8	11.6	9.6
1972	5.9	3.9	15.0	9.8

The fact that at the depot's level of employment--over 10,000 employees--a 1-percent change represents a difference in annual payroll costs of about $1 million dollars demonstrates the significance of these sick leave averages. Depot officials observed, at 1 point during calendar year 1972, that about 700 employees were on sick leave each workday at a cost of about $29,700 a day.

Air Force officials contend that sick leave abuse is difficult to control because regulations place primary responsibility for proper sick leave use with the employee.

The Air Force had no established sick leave goal. The depot did not identify or counsel sick leave abusers, and no disciplinary action had been taken as far as we could find. The depot administered the program rather loosely. Actions taken included writing occasional letters to supervisors and employees stressing the importance of proper sick leave use, carefully reviewing requests for advanced sick leave, and attempting to identify any unusual employee health problems that contributed to sick leave use.

Although this approach might be appropriate in an organization where the sick leave rate had been low and had remained relatively constant, the increasing use of sick leave at the depot indicated that much more aggressive management action was needed.

High sick leave use can be symptomatic of internal organizational problems causing worker dissatisfaction. Analysis of sick leave use, we believe, should assist management in spotting the chronic absentee, identifying both

the immediate and underlying organization-related causes, and forming a better basis for alleviating these causes.

We noted, for example, that an Army maintenance depot, in the same geographic area and operating under the same basic regulations, achieved sick leave rates of 3.2 and 3.7 percent for 1971 and 1972, respectively. The Army has established a goal of 3.1 percent, or 7.8 days for each employee each year. The Army depot tried to achieve this goal through such positive actions as giving recognition to those individuals and groups with good sick leave records and identifying those who abused sick leave, counseling them, and then taking disciplinary action when warranted.

Current regulations and the depot-union agreement provide the basis for taking disciplinary action in cases of sick leave abuse, although they do not describe specific actions. However, Civil Service regulations prescribe such actions as charging these absences to annual leave, leave without pay, or absence without leave. Such actions should be taken when it is clear that absences are not properly chargeable to sick leave.

Sick leave is a privilege extended to Federal employees, and its proper use should not be deterred. Conversely, abuse of the privilege should not be tolerated.

We believe the 3.9-percent national average is a reasonable goal for the depot and can be achieved. Achieving this goal would increase direct labor hours available by about 429,800 hours valued at over $1.9 million.

According to the Air Force, a study is being made of sick leave administration to provide firm guidance for identifying sick leave abusers and controlling sick leave abuse.

RECOMMENDATIONS

We recommend that the Secretary of Defense have the depot commander:

--Develop valid standards for those jobs having high-volume workloads.

--Analyze earned and actual hours, by jobs, and report deviations to management.

--Establish a realistic sick leave goal and identify and correct the causes of excessive sick leave.

CHAPTER 3

MATERIAL MANAGEMENT

In its fiscal year 1972 repair program, the depot used direct materials costing about $62.6 million. Economical material management depends largely on (1) reliable predictions of the number of parts which must be replaced and (2) effective control over components being repaired. The depot can improve its operations in both these areas.

DIRECT MATERIAL STANDARDS

Direct material standards are lists of the parts and materials to be stocked and used for repairing end-items. Each part is assigned a standard rate at which it will need to be replaced as items are used during repair. Inflated standards can result in the accumulation of excess material in the shops, but understated standards can result in insufficient material to complete scheduled repairs. Constant review and adjustment of material standards, therefore, are essential to an efficient and effective repair operation.

Depot production-planning personnel are responsible for developing and continually reviewing and refining material standards.

We reviewed standards in 3 of the depot's 5 production divisions by selecting 71 items of material with high-dollar variances between standard and actual use, which under Air Force criteria should receive priority attention by the planners. Most of the standard replacement rates were greater than the actual-issue rates.

Type of condition	Number of variances	Approximate dollar variance
Standard rates exceeded actual rates	59	$16,181,000
Actual rates exceeded standard rates	12	1,566,000
Total	71	$17,747,000

About 3 months after the 71 variances had been reported, we interviewed personnel to determine whether adjustments had been made. Only 20 standards had been adjusted.

Of the 51 unadjusted standards, 8 did not need adjustments because of such conditions as discontinued workloads. Thirty standards were not adjusted because the actual issue rates, according to planners and shop personnel, did not accurately show the amount of materials used in prior periods and, consequently, were not valid bases for determining expected use.

Causes of unreliable issue data included incorrectly recording material used in the shops and not recording the use of material obtained from other components awaiting repair.

Before November 1971, variances between standard and actual replacement rates were reported to the planners and they could then adjust the standards. Now the material standards maintenance system automatically adjusts the standards to agree with reported use, unless the planners block the adjustments within 18 days. Automatic adjustments, although they may help the planners, do not provide for accurate material standards if unreliable data is used. To improve the reliability of use data, controls over material issues need to be strengthened to insure that all parts used are properly recorded and that parts not used are returned to supply.

About a year after the automatic adjustments began, the depot started to pay more attention to the need for more accurate material standards. Systems management personnel briefed planners, as well as shop personnel who ordered and used materials, on the importance of accurate standards and recommended corrective actions. The recommendations emphasized the need for refining standards and for more effective monitoring by management to insure that planners review the standards and that shop personnel properly record material use.

The Air Force agreed that the automatic system of updating material standards was subject to error, but it believed the system was the most reliable method of updating the standards because actual history normally provided the

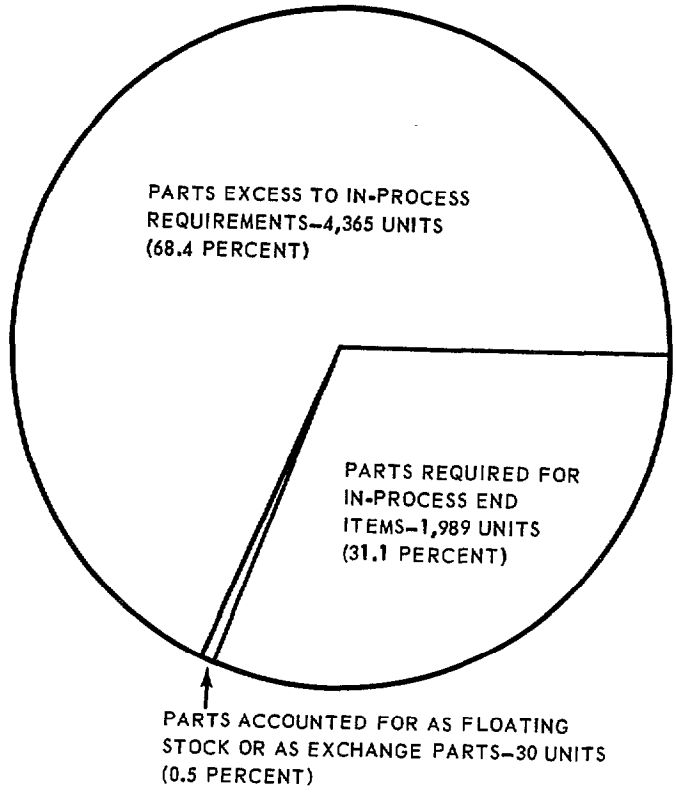
best prognosis of material requirements. Recognizing the system's shortcoming, the Air Force is establishing a standard material control organization, effective April 1, 1974, which will be responsible for preparing, purifying, and inputting exception data to update material standards at its depot maintenance activities.

ROUTED-ITEM CONTROL

The depot's repair shops had an oversupply of parts because routed-order files were not accurately maintained. Routed orders authorize repairs and control the movement of material, components, and raw stock through the shops. Properly maintained routed-order files serve as a perpetual inventory of routed items and enable the timely scheduling, repair, and return of the items to the end-item reassembly shops. However, when routed items are not repaired in time to meet end-item production schedules, shops are authorized to obtain serviceable replacements from the supply system. Since the files were not accurately or properly maintained, routed items which were not repaired in time to meet end-item production schedules were being replaced with stocks from the supply system but were not being returned to the supply system after repair.

We inventoried 42 Federal-stock-numbered parts which had a total catalog value of about $1,950,000 and which had repair routes involving 22 of the depot's 88 shops. Parts with a catalog value of about $970,000 were excess to end-item in-process requirements. The ratio of parts in the shops to end-items in process averaged 3 to 1 and ranged from 1 to 1 to 15 to 1.

Most of the excess parts were not recorded on depot inventory records as available assets. Depot officials suggested that some of these parts may have been authorized floating stock or may have been recorded in accountable records as exchange parts to be returned to the supply system, but less than 1 percent of the excess parts were recorded on these records. The results of our inventory of the 42 parts (6,384 units) are summarized in the following chart.



The following examples of excess parts illustrate the need for improved routed-order management.

--We found 11 units of a $1,286 part with a planned repair time of 9 days in 2 support shops. In one shop eight units had been "on route" over 60 days. In the other shop one unit had been on route for over 1 year.

--We found 29 units of a $345 part in the shops although only 9 units were needed to repair the 9 actuators in process.

--We found 35 units of a $1,042 part in 1 shop. Routed-order files supported only 30 units, 15 of which had been on route over 90 days even though the planned repair time was 12 days.

CONCLUSIONS

The depot could improve material standards through more effective reviews of the variances between standard and

actual use rates and through better control over material issues. Improved standards would provide for more accurate projections of material needs and would result in more effective and economical parts support.

The depot also could improve controls over routed items in the shops. We believe accurate records of items being repaired are necessary to prevent an oversupply.

RECOMMENDATIONS

We recommend that the Secretary of Defense have the depot commander:

--Make a complete physical inventory of parts in the maintenance shops. Excess parts could be either returned to the supply system or used to offset short-range replacement-part requirements.

--Reestablish routed-order files on the basis of physical counts and accurately maintain the files so that all available assets can be considered before additional parts are requisitioned.

DEPOT ACTIONS AND OUR EVALUATION

After our review, the maintenance director ordered each division to inspect the shops, turn in all excess parts and material, and prevent future buildups of excesses. According to personnel in two divisions, the inspections helped to reduce the quantities of excess parts.

Although the inspections reduced excesses, we believe they were not fully effective. Personnel in two production divisions told us that the inspections had not resulted in complete inventories because they had not considered the quantities of parts on route to other shops for repair. For example, in April 1973 one production division reported it had complied with the directive on excess material control. Later that month, excess quantities for eight parts valued at over $1 million were returned for disposition. We believe the total quantities of parts on hand must be known to determine the excess quantities.

The Air Force, in commenting on this report, stated that it would take a one-time, complete physical inventory of all shops involved in routed-order processing.

The Air Force was aware of and agreed that excess material caused by routing reparable components and ordering serviceable replacements had been a continuing problem at its depots. In fiscal year 1973 the Command implemented a component exchange and repair program at its depots for aircraft and engine workloads. This program was intended to minimize the number of components routinely routed into the shops directly from aircraft and engine repair lines. Instead, these components are to be returned to item managers who make repair decisions based on total depot and field requirements.

The Air Force said that a phase of the Advanced Logistics System, scheduled for implementation in November 1974, contains total visibility to resolve excess material problems.

CHAPTER 4

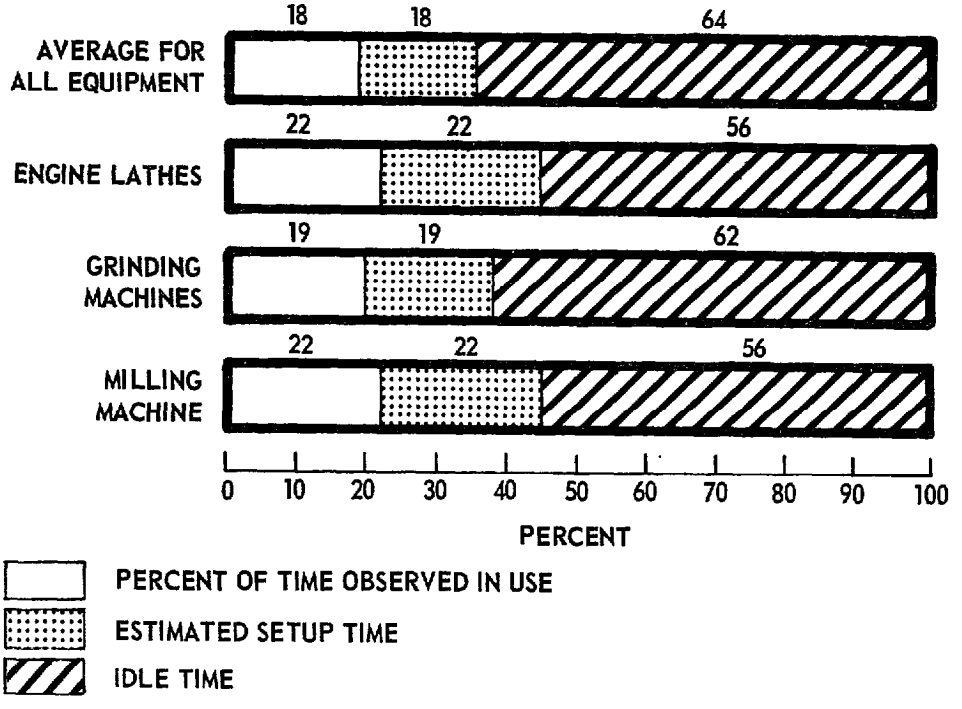
GENERAL-PURPOSE PRODUCTION EQUIPMENT

At the depot general-purpose production equipment--grinders, lathes, and mills, each costing $1,000 or more--totaled $18 million.

The depot used overstated estimated use rather than actual use as the basis for buying new replacement equipment. This equipment had, at most, a 36-percent use rate, suggesting that (1) unused machine capacity was excessive, (2) unneeded machines were on hand, and (3) machine replacements were based on erroneous information.

EQUIPMENT USE

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 time is about equal to in-use time. We doubled the in-use time to provide for setup time and arrived at an overall average use rate of 36 percent. During these studies, we observed that 34 percent of the machines were never in use. The following chart shows the results of our studies.



One shop had 82 lathes valued at $964,000. At random intervals during 2 of our studies, we made 200 observations of 19 randomly selected lathes. The lathes were in use about 21 percent of the time; doubling this rate to account for setup time produced a 42-percent use rate. Data available to depot management showed the use rate was 6.4 hours a day, or 80 percent of prime shift time. After our review, management turned in 17 lathes because of their low use.

We found similar results on the grinders, mills, and other general-purpose machines in this and three other shops. In our opinion, management needs to know the actual use before deciding whether to retain equipment.

After our followup review in March 1973, the depot began a program for identifying unused machines. It found that 65 machines, valued at about $985,000, were not needed. These machines were made available for redistribution as follows:

Status--June 1973	Number of machines	Cost of machines
Claimed by a DOD activity	18	$257,000
Action pending--reported to other DOD activities for screening	7	145,000
Action pending--reported to General Services Administration for screening	15	159,000
In process of being reported	25	424,000
Total	65	$985,000

EQUIPMENT ACQUISITIONS

At the time of our 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 relied on estimated use which, as shown previously, was overstated. Although machine use is not the only criterion for

determining machine needs, overstating current use can result in unrealistic forecasts of machine needs.

For example, in justifying the acquisition of a numerically controlled drilling machine, the depot estimated the elements in its economic evaluation. It assumed that the conventional equipment items to be replaced were being operated 2,016 hours a year. This was 8 hours each workday, less holidays. Because a numerically controlled machine was assumed to be three times more productive, it could replace three conventional machines and save $24,659 a year with a net investment of $102,128. If the 36-percent use rate we found were substituted for the estimated conventional and numerically controlled equipment-use rates, the annual savings would be reduced to $9,407 a year; the payoff period would change from 4.14 years to 10.86 years; and the investment ratio (i.e., present value of benefits divided by investment) would drop from 1.58 to 0.594. To create a return on investment similar to that in the justification, the numerically controlled machine would have to replace six conventional machines rather than the three shown in the justification.

In its comments the Air Force said that, through November 1973, this machine realized an actual use rate of 89 percent, on a one-shift basis. We did not verify this rate.

CONCLUSIONS

The depot has more machines than it needs for its current workload. Collecting actual equipment-use data could identify equipment which is not being used and could help management in making procurement decisions. By removing unneeded machines, the depot could:

--Increase the use of the remaining machines.

--Reduce its investment in equipment.

--Make excess equipment available to meet the needs of other DOD installations.

--Increase floor space in the shops.

RECOMMENDATIONS

We recommend that the Secretary of Defense have the depot Commander:

--Develop a program for accumulating actual equipment-use data.

--Examine existing and proposed investments in general-purpose equipment to insure that the equipment is needed.

DEPOT ACTIONS

By March 1973, the time of our followup review, the depot had begun installing time meters on some equipment items. We were told that these meters, which were part of a manual system being tested, would provide actual-use data needed to make equipment replacement decisions.

AIR FORCE COMMENTS AND OUR EVALUATION

In commenting on this report, the Air Force said that, although it recognized the need for management data on equipment use, it had found that historical use was not a major indicator of future equipment requirements. Due to rapid changes in both variety and quantity of workloads, equipment justifications must be based on projected workloads on an individual-machine basis.

We recognize that usage is not the only criterion for determining machine needs. However, we objected to the equipment justifications because the Air Force justified new equipment principally on the basis of historical use which was estimated by shop personnel who were not aware of the projected workload. Therefore, as long as justifications are based on historical use, it should be reliable.

The Air Force also felt that application of random sampling to across-the-board conclusions on state-of-the-art equipment was erroneous, particularly as it related to replacement of machines.

We agree with the Air Force. However, we used our random sample to determine the overall level of machine

usage and to draw some inference of the total machine population. We did not intend the inference to apply to any specific piece of equipment.

The Air Force said it recognized that low use of general-purpose equipment had been a problem within AFLC. It also said a program was underway to install elapsed-time meters on all major equipment, to accumulate actual-use data which would be used to identify excess equipment and provide better control over depot equipment.

CHAPTER 5

DECISIONS TO REPAIR OR REPLACE NONCRITICAL PARTS

Decisions to repair or replace noncritical parts should be based on economic considerations. Management must (1) have a clearly stated economic repair criterion--generally the maximum acceptable ratio of the cost to repair a part to the cost to buy a replacement part, (2) compare the repair cost with the replacement price, and (3) compare the ratio developed from the cost comparisons with the economic repair criterion.

The depot's procedures for reviewing repair-or-purchase decisions can be improved. During the first 3 months of fiscal year 1972, the depot spent $2.3 million, based on standard costs, to repair parts that exceeded the economic repair criterion.

UNECONOMICAL REPAIR OF PARTS

Air Force regulations contain policy and criteria for making repair decisions. The criteria provide that unserviceable parts not be repaired when the repair costs (parts and labor) exceed established percentages of the replacement costs. These percentages, ranging from 45 to 75 percent of the replacement cost, are to be applied depending on the dollar value and quantity of parts needing repair.

The depot is first required to compare the expected repair cost with the replacement price. The depot should not exceed the economic repair criterion unless it receives written authority from the item manager to do so.

In a test of 82 parts produced during September 1971, we identified 26 which appeared to violate the economic repair criterion. Although the items may initially have been economically reparable, later changes in prices and repair costs should have prompted another review and decision. For example, when the B-52 wing-flap drivescrew is overhauled, parts are removed and repaired. In 1966 one of the parts could be purchased new for about $133. By 1971 the purchase price had dropped to $22 and the cost to overhaul the drivescrew was about $45. This change made overhauls no longer economical.

We discussed the 26 parts with a depot official who directed further research on each part. As a result, the depot discontinued repair of 17 parts. Repair cost reductions and catalog price changes placed three items within economic repair limits. Two items were no longer being repaired. Authorizations were obtained to continue repair on the remaining four items.

To assess the magnitude of this problem, we compared the repair costs and catalog prices of 3,759 parts repaired during July through September 1971 by using a special computer program. About 6 percent (210) of these parts violated the economic repair criterion, but the depot spent $2.3 million to repair various quantities of the parts. The repair costs of 53 of the 210 parts exceeded catalog prices as follows:

Repair costs	$938,865
Catalog prices	700,080
Difference	$238,785

The depot should continually review economic repair decisions to preclude uneconomical repairs being made. Resources applied to these repairs should be redirected to valid workload requirements.

RECOMMENDATIONS

We recommend that the Secretary of Defense have the depot commander:

--Show prices on repair cost reports to permit comparisons of prices and repair costs.

--Establish procedures for prompt and reliable reviews of decisions to repair or replace parts.

AIR FORCE COMMENTS

The Air Force agreed with our recommendations and said it was implementing them at all depots.

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

28 JAN 1974

Dear Mr. Grosshans:

The Secretary of Defense has asked me to reply to your report of November 29, 1973, "An Industrial Management Review of the Maintenance Directorate, San Antonio Air Materiel Area, San Antonio, Texas (Code 65601)" (OSD Case 3745).

The Air Force appreciates the recommendations made by GAO regarding the Industrial Management Review at San Antonio Air Materiel Area. We are pleased to note that current programs are in existence to resolve the problems cited. Specific comments are attached addressing GAO comments and recommendations.

I appreciate the opportunity to comment on the draft report.

Sincerely,

PHILIP A. TILSON, Col, USAF
Assistant for Maintenance and
Engineering
Deputy for Supply and Maintenance

1 Attachment
AF Comments

Mr. Werner Grosshans
Director, Logistics and Communications Division
US General Accounting Office
441 G. Street, N. W.
Washington, D. C. 20548

GAO note: The attachment has been omitted but the comments have been considered in appropriate sections of this final report.

APPENDIX II

PRINCIPAL OFFICIALS OF THE DEPARTMENTS OF DEFENSE AND THE AIR FORCE RESPONSIBLE FOR ADMINISTRATION OF ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF DEFENSE		
SECRETARY OF DEFENSE:		
James R. Schlesinger	Apr. 1973	Present
Elliot L. Richardson	Jan. 1973	Apr. 1973
Melvin R. Laird	Jan. 1969	Jan. 1973
Clark M. Clifford	Mar. 1968	Jan. 1969
Robert S. McNamara	Jan. 1961	Feb. 1968
DEPUTY SECRETARY OF DEFENSE:		
William P. Clements, Jr.	Jan. 1973	Present
Kenneth Rush	Feb. 1972	Jan. 1973
David Packard	Jan. 1969	Dec. 1971
Paul H. Nitze	July 1967	Jan. 1969
Cyrus R. Vance	Jan. 1964	June 1967
ASSISTANT SECRETARY OF DEFENSE (INSTALLATIONS AND LOGISTICS):		
Arthur I. Mendolia	Apr. 1973	Present
Hugh McCullough (acting)	Jan. 1973	Apr. 1973
Barry J. Shillito	Feb. 1969	Jan. 1973
Thomas D. Morris	Sept. 1967	Feb. 1969
Paul R. Ignatius	Dec. 1964	Sept. 1967
DEPARTMENT OF THE AIR FORCE		
SECRETARY OF THE AIR FORCE:		
John L. Lucas	July 1973	Present
Dr. Robert C. Seamans, Jr.	Jan. 1969	July 1973
Dr. Harold Brown	Oct. 1965	Jan. 1969

	Tenure of office	
	From	To
DEPARTMENT OF THE AIR FORCE (continued)		
ASSISTANT SECRETARY OF THE AIR FORCE (INSTALLATIONS AND LOGISTICS):		
Richard J. Keegan (acting)	Aug. 1973	Present
Lewis E. Turner (acting)	Jan. 1973	Aug. 1973
Philip N. Whittaker	May 1969	Jan. 1973
Robert H. Charles	Nov. 1963	May 1969

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