REPORT TO THE
COMMITTEE ON APPROPRIATIONS
HOUSE OF REPRESENTATIVES

An Analysis Of Air Force Rates Of Aircraft Not Operationally Ready Due To Supply B-179264

Department of the Air Force

BY THE COMPTROLLER GENERAL
OF THE UNITED STATES

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WASHINGTON, D.C. 20548

B-179264

The Honorable George H. Mahon
Chairman, Committee on Appropriations
House of Representatives

Dear Mr. Chairman:

This is in response to your July 6, 1973, letter requesting that we investigate certain areas relative to the increasing percentage of Air Force aircraft not operationally ready due to supply (NORS).

This report discusses:

--The impact of aircraft NORS rates on combat capability.

--The reasons why parts were NORS.

--The application of exchangeable repair funds to the highest priority aircraft systems.

--The cost effectiveness of reducing the overall NORS rate.

--NORS rates as logistics support indicators and the factors which affect them.

As agreed, we obtained written comments from the Air Force only on portions of this report. However, we did discuss our findings and conclusions with Air Force officials.

We are sending copies of this report to the Secretary of Defense and to the Secretary of the Air Force.

Sincerely yours,

Comptroller General
of the United States

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ABBREVIATIONS

AFLC	Air Force Logistics Command
GAO	General Accounting Office
NORM	Not operationally ready due to maintenance
NORS	Not operationally ready due to supply
OR	Operationally ready

COMPTROLLER GENERAL'S REPORT TO THE COMMITTEE ON APPROPRIATIONS HOUSE OF REPRESENTATIVES

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D I G E S T

WHY THE REVIEW WAS MADE

In fiscal years 1972 and 1973, the Air Force requested the Committee to reprogram funds into maintenance to reduce the aircraft not operationally ready due to supply (NORS) rate. A lack of funds to repair exchangeable spare parts was cited as a cause of the increased NORS rate, so the reprogramed funds were requested specifically for such repairs. The Air Force stated that the increasing NORS rate was impairing combat capability and reducing readiness.

The Committee asked GAO to review this area and to provide information for evaluating future similar reprograming requests.

As agreed, GAO obtained written comments from the Air Force only on portions of this report. However, GAO did discuss its findings and conclusions with Air Force officials.

FINDINGS AND CONCLUSIONS

GAO analyzed a sample of 316 parts which had caused NORS hours on 13 aircraft systems and found that a lack of funds was not the primary cause. NORS was usually caused by unexpected part failures, late repair of parts, and modification or updating of parts. (See p. 6.)

Also, some NORS time is expected since all items are not stocked at all bases--thus, the time it takes an item to move through the supply system represents a certain percentage of the NORS rate. (See p. 8.)

Although GAO was unable to determine exactly how the reprogramed funds were spent, they were spent on activities within the depot maintenance program, primarily on exchangeable spares for high-priority aircraft systems.

No direct correlation existed between the application of funds to repair exchangeable spares and NORS rates. In some cases, expenditures increased and the NORS rate went down; in other cases, expenditures increased and the NORS rate went up.

As to whether the increasing NORS rate was impairing combat capability and reducing readiness, Air Force officials said the NORS rate by itself is not a measure of combat readiness but is only one measure of logistics support. (See p. 15.)

GAO analyzed the value and usefulness of NORS in determining logistics support. The analysis showed that if NORS rates are to be meaningful, other factors must be considered. Supply practices should be considered because a NORS situation can be eliminated if base officials obtain parts from another aircraft (cannibalize) or from war reserve stocks. Age of an aircraft system can also affect its NORS rate. For instance, new aircraft systems are expected to have high NORS rates because procuring large quantities of spare parts is uneconomical until they are proved reliable. (See p. 16.)

GAO found several deficiencies in the NORS reporting system which affected the accuracy of NORS rates. For example, because the definition of a NORS aircraft was unclear, commands lacked uniformity when reporting NORS aircraft. Many problems GAO identified in the reporting system had been recognized by the Air Force, which revised the system effective October 1, 1973. (See p. 18.)

GAO noted that aircraft not operationally ready due to maintenance (NORM) represented a much larger percentage of total aircraft availability than NORS aircraft. Since NORS, NORM, and operational readiness make up the total available hours for aircraft, GAO believes there may be greater opportunities for increasing aircraft operational readiness by reducing NORM rather than NORS time. The Air Force disagreed but said no trade-off studies had been made concerning NORM versus NORS. (See p. 19.)

During testimony on the fiscal year 1973 request, Air Force officials said their goal for the overall NORS rates was 3 percent. GAO believes this rate would not be cost effective for a peacetime mission, because a direct relationship does not exist between exchangeable spares repair funds and the NORS rate and because the cost of buying and stocking the additional spares needed to reduce the rate would be exorbitant. (See p. 14.)

RECOMMENDATIONS

The Secretary of the Air Force should:

--Study the relative economies of reducing NORM rather than NORS time.

--Develop operational readiness (OR), NORM, and NORS standards for each type of aircraft on the basis of the aircraft systems' ages.

--Closely monitor data generated by the revised operational performance reporting system to insure that the system is clearly understood and properly implemented.

--Justify future reprograming requests to increase OR by individual aircraft system.

MATTERS FOR CONSIDERATION BY THE COMMITTEE

The Committee may wish to discuss the following questions with the Air Force.

--How critical is the impact of NORS rates on combat readiness?

--Are additional funds necessary to increase supply support to adequately respond to a contingency?

CHAPTER 1

INTRODUCTION

As requested by the Chairman, House Committee on Appropriations, we have reviewed Air Force aircraft not operationally ready due to supply (NORS) rates. Specifically, the Committee asked that we review the:

--Actual NORS rates for fiscal years 1971, 1972, and 1973. (See p. 4.)

--Causes of NORS. (See p. 6.)

--Application of funds to the most critical maintenance problems. (See p. 11.)

--Cost effectiveness of reducing NORS to 3 percent. (See p. 14.)

--Impact of NORS on Air Force readiness. (See p. 15.)

WHAT IS NORS?

Both aircraft and spare parts can be referred to as NORS.

An aircraft is classified as NORS when no further maintenance work can be done to make it operationally ready until the required supply items become available at the work site through the supply system or from other sources at the base. The NORS rate for an aircraft system is the percentage of NORS aircraft in that system during a given period.

A part is classified as NORS when it is not available at the base and causes an aircraft to be NORS. NORS part-hours are measured from the time the part is unavailable until the maintenance activity receives it.

NORS part-hours and NORS aircraft time are not directly relatable, because an aircraft can have more than one NORS part at any given time. Also a NORS aircraft rate can be terminated by using alternative supply sources, but a NORS part accumulates hours until it is received by maintenance through the supply system.

HOW ARE NORS RATES RECORDED?

To keep management informed of the operational status of aircraft in its inventory, the Air Force established the Standard Aerospace Vehicle and Equipment Status Reporting System. Under this daily reporting system, aircraft are classified hourly into one of the following categories.

--Operationally ready (OR) aircraft capable of performing at least one of their primary missions.

--Not operationally ready due to maintenance (NORM) aircraft.

--NORS aircraft.

Each of these categories is expressed as a percentage; when totaled, the categories equal 100 percent of available operational time. For example, on a given day a base assigned a squadron of T-38s might report the operational status of these aircraft as 73 percent OR, 21 percent NORM, and 6 percent NORS.

The Air Force does not currently have standards for the operational categories; however, in the past it used standards of 71 percent OR, 24 percent NORM, and 5 percent NORS. The standards represented objectives for operational performance, and large deviations from the standards served as management indicators of potential problems.

OPERATIONAL RATES

The chart below shows the OR, NORM, and NORS rates reported in fiscal years 1971, 1972, and 1973. (See app. II for NORS rates by aircraft systems.)

	Rates (percent) in fiscal year		
	1971	1972	1973
OR (note a)	73.9	72.1	70.7
NORM (note a)	21.1	22.1	23.1
NORS	5.0	5.8	6.2
	100.0	100.0	100.0

[a]OR and NORM rates were computed from monthly averages and then rounded.

The operational status reporting system was revised on October 1, 1973, to improve the usefulness and accuracy of data within the system. The findings and conclusions in this report relate to the system before its revision.

SCOPE OF REVIEW

We discussed NORS with Air Force officials and reviewed records and documents related to NORS. We did not look into the impact which NORS rates would have in a contingency or wartime environment.

We made our review at the following locations.

--Headquarters, U.S. Air Force
  Washington, D.C.

--Tyndall Air Force Base
  Florida

--San Antonio Air Materiel Area
  Kelly Air Force Base, Texas

--Sacramento Air Materiel Area
  McClellan Air Force Base, California

--Oklahoma City Air Materiel Area
  Tinker Air Force Base, Oklahoma

--Headquarters, Air Force Logistics Command
  Wright-Patterson Air Force Base, Ohio

--Randolph Air Force Base
  Texas

--Nellis Air Force Base
  Nevada

--Arizona Air National Guard
  Arizona

--Castle Air Force Base
  California

CHAPTER 2

CAUSES OF NORS

In May 1973 the Air Force testified before the House Appropriations Committee that the recent increase in the NORS rate resulted largely from a lack of funds to repair exchangeable spare parts.

We analyzed the reasons why NORS occurred on 316 parts which had caused NORS part-hours on 13 aircraft systems. (See app. III.) These parts accumulated 313,408 NORS part-hours and represented about 34 percent of the total NORS part-hours accumulated by the 13 systems during a sample month.

Of the 316 parts, 98 were low-cost, nonreparable, and are thrown away after use. Since these parts do not enter the repair cycle, their short supply is not related to a lack of repair dollars. The remaining 218 parts were exchangeable and were subject to repair. Lack of funds to repair exchangeable parts did not cause NORS on these parts; as shown below, NORS was attributable to what we consider common, recurring logistics problems.

Reason for NORS	Number of items	NORS part-hours
Modification or updating of parts	11	13,697
Late repair of parts	79	120,946
Air Force contract administration	19	17,111
Standard order-to-shipment time	50	31,855
Unexpected failures of parts	39	40,421
Other	20	13,660
Total	218	237,691

MODIFICATION OR UPDATING OF PARTS

When the number of assets taken out of the supply system for modification reduces the remaining inventory below demands, NORS can occur.

For example, the rudder assembly on the F-111 experienced delamination, due to moisture between the layers of metal, and had to be modified. The removal of the parts from the supply system and the resulting delay in returning them caused 636 NORS part-hours in a month. Shipping delays contributed to this time because the rudder was too big to be shipped by available aircraft and usually had to be trucked.

Another example of a modification causing NORS was on the digital computers for the C-5A. These computers were sent to the vendor for a modification which would double the computers' memory cores. A supply shortage resulted and caused the accumulation of 2,500 NORS part-hours during July 1973.

LATE REPAIR OF PARTS

NORS can also occur when contractors cannot meet their repair schedules for various reasons. For example, the Government contracted with a firm in Oklahoma to repair fuel and oxygen indicators used on T-38 aircraft. In May 1973 the contract was terminated when the firm defaulted and declared bankruptcy. Although an emergency contract was awarded to another firm, the production delay caused over 21,000 NORS part-hours on the indicators during July 1973.

In several other cases contractors were unable to obtain needed repair parts from subcontractors. For example, the fuel-boost hydraulic motor on A-7 aircraft accumulated 5,529 NORS part-hours in a month because the subcontractor was late in supplying a bearing needed for the overhaul kit.

In addition, such things as difficulty in employing skilled personnel, natural disasters, and unforeseen events caused contractors not to meet repair schedules.

AIR FORCE CONTRACT ADMINISTRATION

Parts shortages can also result from delays in contract awards or negotiations. In one case, the Air Force initiated procurement of a needed item in July 1972. Because the vendor wanted to negotiate basic overhead rates, the contract was not awarded until April 1973. As a result of the 9-month delay, 2,585 NORS part-hours accumulated during July 1973.

In the same month the trailing edge of an F-105 wing flap, an exchangeable part essential for flight, logged 146 NORS part-hours. Although funds were available, the Air Force had been unsuccessful in its attempt (between April and October 1973) to find a contractor to repair the part.

STANDARD ORDER-TO-SHIPMENT TIME

In 1968 the Air Force decided to reduce the range and quantity of spare-part inventories stocked at each base. To insure minimum delay in requisitioning NORS parts, the Air Force established a standard maximum time of 8 days for the order-to-shipment process between bases and supply sources. This standard applied to requisitions placed in the continental United States that had high-priority designators 01 through 03, in which NORS items fall. In practice, a base needing a part would first screen its own base supply and then requisition the part from a centrally stocked location. Thus, conceptually, if all parts had to be obtained from supply sources outside the base and if at least one part per aircraft failed each month, the deficient aircraft would have a monthly NORS rate of about 27 percent (8 days÷30 days x 100=27 percent).

We did not review in detail the average time it takes to fill NORS requisitions; however, we made other tests to ascertain whether the logistic system was responsive. Our review at two Air Force bases showed that 94 of 113 (83 percent) NORS incidents were eliminated within 8 days. Similarly, an October 1973 report showed that 267 of 641 (42 percent) incidents on the C-5A were corrected within 8 days.

As discussed in chapter 4, alternative supply sources are available to base officials. Consequently, aircraft NORS rates are lower than they would be if the maintenance activity were dependent solely on the supply system.

UNEXPECTED PARTS FAILURES

The number of spare parts to be kept in supply is based on expected failure rates of the parts. When the number of failures exceeds the expected rates, demand can exceed supply which, in turn, can cause NORS.

For example, C-5A fuel valve assemblies overheated and needed to be repaired more frequently than expected. Because the Air Force had not anticipated the problem, it had not planned for enough spare parts to repair the valve. Consequently, the fuel valve accumulated 4,500 NORS part-hours during July 1973.

In another case the chaff dispenser cover on F-111 aircraft had a design deficiency which caused numerous in-flight losses of the cover. The failure rate was higher than anticipated, so the managing depot could not adequately support the aircraft. A change in design ultimately cleared the problem. This part accounted for 304 NORS part-hours in July 1973.

OTHER CAUSES OF NORS

Although the majority of reasons for NORS were identifiable with one of the five situations already discussed, other causes were noted.

--A part, originally thought to be reparable at the base, was not. Since no serviceable parts were on hand, the part had to be returned to the depot for repair.

--Improper requisitioning procedures were used at the base, which delayed receipt of the part.

--A requisition for routine stock replenishment was not placed at the proper time.

--Bases did not promptly submit parts to the depot for repair.

CHAPTER 3

EXPENDITURE OF FUNDS FOR DEPOT MAINTENANCE

In fiscal years 1972 and 1973, the Air Force requested that $85.2 million be reprogramed from procurement and stock funds to depot maintenance for repairing exchangeable spares. These requests were justified on the basis of a rising NORS rate. The Air Force received $57.7 million of the requested reprogramed funds.

The approval for the 1973 request specified that the funds be applied to high-priority activities. Although we were unable to determine exactly where the reprogramed funds were spent, they were spent on activities within the depot maintenance program, primarily on exchangeable spares for high-priority aircraft systems. We found, however, that no direct correlation existed between the application of funds to repair exchangeable spares and NORS rates.

REPROGRAMED FUNDS APPLIED TO EXCHANGEABLES

Of the $2,681 million which the Air Force spent for depot maintenance in fiscal years 1972 and 1973, the Air Force Logistics Command (AFLC) spent about $2,049 million (see chart below) and was reimbursed for the remaining $632 million by other activities, such as the Air Force Reserve, Air National Guard, Military Airlift Command, and Air Force Systems Command.

Category	Depot maintenance 1972	Depot maintenance 1973	Total
	(000 omitted)		
Aircraft maintenance	$ 282,007	$233,261	$ 515,268
Missile maintenance	4,853	5,175	10,028
Engine maintenance	167,618	137,892	305,510
Other major items	29,313	40,194	69,507
Exchangeable spares	525,410	536,736	1,062,146
Area and base support and local manufacture	46,938	39,216	86,154
Total	$1,056,139	$992,474	$2,048,613

In both fiscal years, the Air Force requested and received approval to reprogram funds from procurement and stock-fund appropriations to the operation and maintenance appropriation for AFLC's depot maintenance program. The Air Force received approval to reprogram $30 million in 1972 and $27.7 million in 1973 for repairing exchangeable spares. Air Force documents indicated that the reprogramed funds were applied to the depot maintenance program, and we noted that the largest increases between original depot maintenance budget authorizations and actual obligations were for repairing exchangeable spares. (See app. IV.)

FUNDS APPLIED TO HIGH-PRIORITY ACTIVITIES

To ascertain whether funds were applied to high-priority activities, we analyzed AFLC expenditures for depot repairs of exchangeable spares in 1971, 1972, and 1973. These expenditures, which totaled $1,534 million, were for repairing exchangeable spares for aircraft, missiles, and other end-items. Most of the expenditures, however, were for repairing aircraft exchangeables.

The Air Force has about 53 aircraft systems in its operating inventory. These aircraft are not assigned priority ratings; such ratings are assigned to using units. Aircraft are referred to as first- or second-line systems, depending on the priority of the using unit or the purpose and extent of their use.

We reviewed 14 aircraft systems, as shown on page 12. Of these, 10 are first-line systems and 4 are second-line systems.

Our analysis showed that AFLC exchangeable spares funds were applied to each of these systems except the C-5A. The other nine first-line systems reviewed received about $765 million, or 50 percent of AFLC's funds spent for exchangeable spares during the 3 fiscal years. Three highly active aircraft--the B-52, F-4, and C-135--received 36 percent of these funds. The four second-line systems received about $9 million, or 0.57 percent, of these funds.

	Exchangeable spares expenditures in fiscal year (note a)				Percent of total exchangeable repairs in 1971-73
	1971	1972	1973	Total	
	(000 omitted)				
First-line systems (10) selected:					
A-7	$ 2,774	$ 6,340	$ 11,818	$ 20,932	1.37
B-52	72,415	87,253	97,602	257,270	16.77
C-5 (note b)	8,686	19,136	44,333	72,155	(c)
C-135	31,846	42,771	42,970	117,587	7.66
F-4	37,250	69,293	64,548	171,091	11.15
F-105	5,964	6,080	4,315	16,359	1.07
F-106	15,689	18,610	17,434	51,733	3.37
F-111	11,376	21,346	37,224	69,946	4.56
FB-111	3,251	6,038	7,341	16,630	1.08
T-38	12,169	16,850	14,734	43,753	2.85
Total	192,734	274,581	297,986	765,301	49.88
Second-line systems (4) selected:					
A-37	550	528	209	1,287	0.08
C-97	806	357	235	1,398	.09
C-131	1,356	1,275	985	3,616	.24
F-104	564	789	1,139	2,492	.16
Total	3,276	2,949	2,568	8,793	.57
Systems (39) not selected:	276,325	247,880	236,182	760,387	49.55
Total (53)	$472,335	$525,410	$536,736	$1,534,481	100.00

[a]Calculated by AFLC from the best available information.

[b]Maintenance of this aircraft is paid for by other commands and is not included in AFLC totals. Data is shown for comparison only.

[c]Not applicable.

IMPACT OF EXCHANGEABLE SPARES REPAIR EXPENDITURES ON NORS RATES

The Air Force testified that the increase in the overall NORS rate was caused by a lack of funds to repair exchangeable spares. It suggested that an increase in such funds would tend to decrease the NORS rate and that a decrease in funds would tend to increase that rate.

To determine the impact of exchangeable spares repair expenditures on NORS rates in fiscal years 1972 and 1973, we analyzed the effects that increases or decreases in expenditures had on NORS rates for the 14 aircraft reviewed. (See app. V.) Our analysis showed that there was no direct relationship in all instances between the amount of funds spent on repairing exchangeables and NORS rates. For all

systems combined, the total expenditures increased each year, as did the overall NORS rate. In 28 instances, there was no predictable pattern between the amount spent and NORS rates.

In 17 instances--6 in 1972 and 11 in 1973--NORS rates reacted as the Air Force suggested; that is, inversely to expenditures.

In 11 instances--8 in 1972 and 3 in 1973--the level of expenditures for exchangeable spares did not affect NORS rates in the way the Air Force suggested. In 10 of the 11 instances, NORS rates increased when expenditures increased. For example, in fiscal year 1972 expenditures for the T-38 system increased 38.9 percent and the NORS rate increased from 5.7 percent to 8 percent.

AFLC officials told us that they had made a similar analysis and that their results were compatible with ours.

INDIVIDUAL VERSUS OVERALL NORS RATES

Even though some systems' NORS rates decreased when funds increased, their impact on the overall NORS rate was marginal. For example, from 1972 to 1973 the C-5A funds for exchangeable spares were increased over $25 million to about $44 million yet the C-5A NORS rate was reduced only from 16.1 to 15.9 percent. This reduction did not affect the overall NORS rate. Even if the C-5A's rate was reduced to zero, the overall rate would be reduced by only 0.1 percent.

On the other hand, the T-38 expenditures decreased in 1973 when only $14.7 million was spent, yet this NORS rate decreased by 1.6 percent, from 8 to 6.4 percent. Therefore, the $17.7 million spent had a much greater impact on the overall NORS rates than did the much larger amount spent on the C-5A system.

Because the overall NORS rate is based on about 53 aircraft systems, it can be relatively insensitive to fluctuations by individual systems' NORS rates. The degree of sensitivity depends on the different number of aircraft in the system. For example, the T-38 has over 900 aircraft while the C-5A has only 79. Obviously, those systems with the greatest number of aircraft have the greatest influence

on the overall NORS rate. Consequently, any application of funds based solely on reducing the overall NORS rate can be misleading.

COST EFFECTIVENESS OF REDUCING THE NORS RATE

During testimony on the 1973 reprograming request, Air Force officials stated that their goal for the overall NORS rate was 3 percent. Further discussions with Air Force officials indicated that, in their opinion, it would not be cost effective to reduce the rate to that level.

We discussed with Air Force officials the feasibility of developing a model which would test the cost effectiveness of reducing the rate to 3 percent. We were told that such a model would be extremely difficult to develop because of the variety of factors which would have to be considered and the number of assumptions which would have to be made. After exploring many possible approaches to developing such a model, we concluded that the Air Force's observations were correct.

The Air Force agrees that the costs involved for again reaching a 3-percent NORS rate would be exorbitant and would far exceed the benefits. This is primarily because it would be uneconomical to procure and stock at each base all the necessary spare parts, including insurance and low-demand items, even if identifiable.

CHAPTER 4

NORS RATES AS MEASURES OF COMBAT READINESS AND LOGISTICS SUPPORT

During hearings on the reprograming requests, the Air Force implied that a strong relationship existed between its overall NORS rate and the level of combat readiness. However, NORS rates are used as management indicators of logistics support and are not a measure of combat readiness. NORS rates are considered, however, in the readiness rating system and therefore affect the rating along with many other factors.

NORS--A FACTOR OF COMBAT-READINESS RATINGS

The degree to which a unit is able to perform its mission is measured by a combat-readiness system approved by the Joint Chiefs of Staff. This system provides daily reports which assess a combat unit's capability to perform the mission for which it was organized. The elements measured are (1) personnel, (2) equipment and supplies on hand, (3) equipment readiness (NORS affects this area), and (4) training. Readiness ratings used are:

--C-1. Fully combat ready.

--C-2. Substantially combat ready with minor deficiencies.

--C-3. Marginally combat ready with major deficiencies severely limiting performance.

--C-4. Not combat ready; incapable of performing assigned mission.

A synopsis of the readiness reporting criteria for aircraft is shown in appendix VI.

A unit's equipment readiness rating depends on the number of OR aircraft. Because the number of aircraft not OR is a combination of those which are NORM and NORS, a NORS rate in itself does not automatically dictate the readiness rating. However, an extremely high percentage of NORS aircraft no doubt would affect the rating.

Furthermore, even if we assumed that all of a unit's equipment was OR, the unit would not necessarily have a high readiness rating, because a unit's overall rating can be no higher than the lowest rated element. For example, a unit's equipment readiness rating may be C-1, but if one of the other measured elements is rated lower, for such reasons as a shortage in manpower or a lack of training, the overall readiness rating will be lower.

Although Air Force officials agreed with our observations on the relationship of NORS rates to readiness ratings, they believed that the current level of NORS aircraft would impair their ability to respond to a prolonged conflict. Since our review did not address the impact of NORS aircraft under prolonged conflict, the Committee may wish to further discuss this area with the Air Force.

FACTORS AFFECTING NORS RATES AS A LOGISTICS-SUPPORT INDICATOR

NORS rates are intended to serve as a management indicator of logistics support. Our review showed that NORS rates, by and of themselves, are not very meaningful logistics-support indicators because the reported rates can be affected by a variety of factors, such as

--alternative sources of supply,

--age of the aircraft system, and

--deficiencies in the NORS reporting system.

In addition, the number of NORM aircraft is three times greater than that of NORS aircraft. Accordingly, if the objective of the Air Force is to increase the percentage of OR aircraft, we believe greater potential exists to reduce NORM rather than NORS time.

Alternative supply sources

Rather than requisition a part from a supply system and have to wait about 8 days before receiving it, base officials can obtain it from another aircraft (cannibalize it) or from war reserve stocks. The degree to which these supply sources are used will affect the reported NORS rate and indicate its criticality.

Cannibalization is the authorized removal of a component from one aircraft for installation on another to meet priority requirements. This practice lowers the aircraft NORS rate by shifting NORS time to aircraft which are already in a NORM or NORS status.

This procedure, although costly, does improve the operational readiness of a system since it reduces the number of high-cost end-items that are grounded. For example, in September 1973 a Strategic Air Command base kept a KC-135 in NORM status for 5 days. During this period parts were cannibalized for use on NORS aircraft. This technique makes parts available in a few hours for NORS aircraft, as opposed to the days it takes to receive a part from a depot. The individual parts, however, would still accumulate NORS hours until received.

War reserve material is that quantity of stock required, in addition to that required for normal peacetime operations, to insure logistic support during contingency or wartime missions for a specified time. It includes munitions, consumables, spare parts, repair parts, and other items to support personnel and equipment during wartime.

Like using cannibalized parts, use of war reserves parts, if available on base, lowers the NORS rate because it makes the aircraft available sooner than it would have been had the base waited to obtain the parts from a central storage point. During a recent 4-month period at a Tactical Air Command base, about 15 percent of the NORS on the F-111 aircraft were eliminated by using war reserve material.

Age of aircraft systems

The age of the aircraft system, in addition to the impact of alternative supply sources, can drastically affect the NORS rate.

New systems

New systems, such as the A-7 and the C-5A, experience high NORS rates in their first years of deployment, because many components do not perform as predicted and have to be modified and improved. Therefore, it may be more economical to incur a high NORS rate than to procure large quantities

of spare parts which may become technologically obsolete. A recent reveiw of the C-5A aircraft showed that the monthly NORS rate was often as high as 16 percent. The Air Force said it is aware of this situation and expects the NORS rate to range between 15 and 20 percent until reliability of components is attained.

Mature systems

By contrast, the NORS rates for established systems, such as the F-100, the C-141, and the T-37, are in the 3- to 5-percent range and fluctuate very little. In our opinion the Air Force has considerable experience with part life for these systems and is in a better position to make decisions on spare parts requirements for aircraft support. In addition, established systems have completed most of their major modification programs, so the Air Force can procure a full range of spare parts with less chance of their becoming obsolete due to engineering changes.

Older systems

The NORS rate for such aircraft as the B-52, which have been in the inventory for a long time, may experience sudden fluctuations because such aircraft are being modified to add new technological improvements. Also, the parts that fail for the first time as a result of age have had no prior demands and no part-life data so the existing spare-parts inventory is inadequate. Additionally, it is often very difficult to find a manufacturer which can provide replacement parts which have not been in demand. As a result, unpredictable failures can cause rapid increases in the NORS rate until an adequate supply source can be located or until the parts are manufactured.

The Air Force recognizes that acceptable levels of NORS may differ by aircraft systems and has been considering developing variable NORS standards for each type of aircraft.

Inaccuracy in NORS reporting

Inconsistent NORS reporting practices caused inaccurate NORS data. The Air Force recognized this problem and changed the reporting format effective October 1, 1973.

Because the definition of a NORS aircraft was ambiguous, certain commands classified aircraft as NORS even though they were capable of flight and other commands classified aircraft as NORS only when they were incapable of flight. As a result, (1) the NORS rates of similar aircraft systems assigned to separate commands were not comparable and (2) the meaningfulness of the overall NORS rate was distorted.

Base-level officials could manipulate the OR, NORM, and NORS rates to achieve desired percentage mixes. At several airbases we found that certain aircraft which were in fact NORS were classified as NORM and vice versa. This was a major reason for revising the reporting format.

Because command and base officials had lost confidence in the reporting system, the data entered into the system was not monitored properly and therefore its accuracy was reduced.

Importance of NORS versus NORM

NORM rather than NORS time accounts for the majority of aircraft downtime. In fiscal year 1973 the NORM rate was 23.1 percent; the NORS rate was 6.2 percent. [For a monthly comparison of these rates, see app. VII.]

In 1973 the Air Force had approximately 10,000 aircraft in its inventory and estimated that at any given time an average 600 aircraft were in NORS status. However, during the same period an average 2,300 aircraft were grounded in NORM status. Therefore, there appears to be greater opportunity to improve the OR rate by concentrating on reducing NORM rather than NORS time. At one Tactical and one Strategic Air Command base, we found that, in September 1973, no work was being done on their aircraft for about half of the time the aircraft were reported in NORM status. Air Force officials attributed idle time to the peacetime environment, a lack of skilled staff, a lack of tools and test equipment, inadequate scheduling of maintenance tasks, delays in obtaining parts from bases, and poor documentation.

The Air Force did not agree that a greater opportunity existed to increase OR time by reducing NORM instead of NORS time, because maintenance of an aircraft is a planned and inherent function in possessing aircraft. (See app. I.)

Since the Air Force has not made any formal studies on the relative economies of reducing NORM and NORS times, we believe it should make such studies.

CHAPTER 5

CONCLUSIONS, RECOMMENDATIONS, AND MATTERS FOR CONSIDERATION BY THE COMMITTEE

CONCLUSIONS

Causes of NORS

A lack of funds to repair exchangeables was not a major cause of NORS. NORS was caused by what we consider to be common, recurring logistics problems.

Use of maintenance funds

Although the Air Force spent more for repairing exchangeable spares in fiscal years 1972 and 1973 than it was originally authorized to spend, we were unable to determine whether these increases resulted from the reprogramed funds or from movements of funds within AFLC's depot maintenance program.

We believe that the majority of expenditures for repairing exchangeable spares was applied to first-line aircraft used by units with high priorities. Further, since a direct correlation does not always exist between the level of exchangeable spares funds spent and NORS rates and because some individual weapon systems impact the overall NORS rate more than others, we believe overall NORS rates should not be used as the sole basis for justifying additional funding to meet depot maintenance requirements.

Cost effectiveness of reducing NORS

In our opinion it would not be cost effective to reduce the overall NORS rate to 3 percent because a direct relationship does not necessarily exist between exchangeable spares repair funds and NORS rates. Also, the expense of buying and stocking additional spare parts at many locations is prohibitive.

Impact of NORS on readiness

Because the combat-readiness rating of a unit is only partially dependent on the number of NORS aircraft in the unit, a particular level of NORS cannot be directly equated to a particular readiness rating. Consequently, the impact of the increasing NORS rates on Air Force readiness cannot be quantified. However, we believe the present level of NORS is not having an adverse impact on readiness in the current peacetime environment.

NORS rates as management indicators

NORS rates are reported as part of a system established to keep Air Force management appraised of the operational status of aircraft in its inventory. As such, NORS rates were designed to provide general information concerning the logistical support for an aircraft system. We believe the rates are not meaningful, however, when considered alone because a variety of factors affect them. Therefore, the criticality of a particular NORS rate can be determined only after examining all the factors which can affect the rate.

RECOMMENDATIONS

We recommend that the Secretary of the Air Force:

--Study the relative economies of reducing NORM rather than NORS time.

--Develop OR, NORM, and NORS standards for each type of aircraft on the basis of the aircraft systems' ages.

--Closely monitor data generated by the revised operational performance reporting system to insure that the system is clearly understood and properly implemented.

--Justify future reprograming requests to increase OR by individual aircraft system.

MATTERS FOR CONSIDERATION BY THE COMMITTEE

The Committee may wish to discuss the following questions with the Air Force.

--How critical is the impact of NORS rates on combat readiness?

--Are additional funds necessary to increase supply support to adequately respond to a contingency?

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

18 DEC 1973

Mr. Werner Grosshans
Associate Director
Material Management Logistics and
Communications Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Grosshans:

This is in response to your letter of 15 November 1973 concerning the GAO review of aircraft not operationally ready - supply (NORS) rates in the Air Force.

Fundamental to any discussion of this subject is an understanding of the difference between operational readiness (OR) and combat capability. Operational readiness is simply a measure, expressed in percent, of the aircraft which are capable of performing their assigned missions. The OR rate is obtained by subtracting NORS and NORM percentages from 100.

Combat capability, on the other hand, concerns the ability of a unit to fulfill its specified mission. The OR rate is but one factor in determining combat capability. Other factors which influence combat capability include level of training, personnel availability, maintenance skills, available aircrew proficiency and availability, and equipment readiness.

This capability is measured by C-ratings which vary from complete capability to no capability to perform assigned missions. This capability is determined by the weak link approach; that is, comparing available aircraft, equipment, maintenance and aircrew personnel to those authorized to determine what portion of the mission can be performed.

The lack of supply support (NORS) has a direct effect on operational readiness rate and thus affects combat capability. The NORS rate is an indicator that some items are not available, and is but one indicator used to determine the health of the logistics system. As NORS

items appear, the inventory managers review other data to determine the cause of the NORS. They review the amount of unserviceable assets, the number of back orders in the system, the age of the back orders, the time between overhaul to determine if it has increased or decreased, the number of units in the system to see if they are sufficient to support the total stockage requirement, and the overhaul program for schedule and fund adequacy. They then take whatever management action is necessary to satisfy the NORS condition.

There are a number of actions that can be taken outside the supply system to influence the NORS rate and in the interest of reducing NORS impact on combat capability. One or more of these actions are frequently taken. For an example, an aircraft that is undergoing maintenance, or another NORS aircraft, would be cannibalized. Thus, it is quite possible for a NORM aircraft to be cannibalized for three or four items to eliminate a NORS condition on three or four other aircraft that day. Since an aircraft that is NORM is not reported as NORS, a NORS condition would not be reported. When an aircraft that is already NORS is cannibalized of three or four items to keep three or four other aircraft operational, only one aircraft would be reported as NORS. Thus, the consolidation of NORS from one aircraft to another is a common practice in order to provide additional operational aircraft.

Understandably, it is also common practice to accomplish unscheduled maintenance while an aircraft has an outstanding NORS requirement; thus, this aircraft would be reported in a NORM condition rather than a NORS condition. One of the results of these actions is the artificial reduction of the NORS rate. The significance of this reduction can be seen by comparing item NORS hours to the NORS rate. Recently, the item NORS hours approximated 90% of the total aircraft processed hours at the same time the NORS rate was approximately 7%.

During peacetime operations, it is essential to maintain serviceable assets in the pipeline in addition to computed base and depot stock levels in order to meet contingency commitments. In this regard, it is significant that over the past several years the Air Force has taken action to reduce the range and quantity of spares in the inventory. This was made possible through better asset visibility and distribution control, and the shorter

APPENDIX II

NORS RATES BY AIRCRAFT SYSTEM

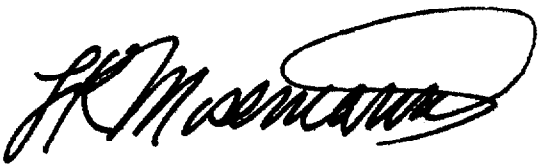
Aircraft system	NORS rates (percent) by fiscal year		
	1971	1972	1973
A-1	3.1	4.4	5.5
A-7	14.0	9.0	7.1
A-37	4.8	5.7	6.4
B-26	1.9	.6	a-
B-52	6.2	6.0	9.9
B-57	7.2	6.7	12.1
B-66	4.7	5.7	6.3
B-111	23.3	14.8	9.2
C-5	13.7	16.1	15.9
C-6	.4	.2	-
C-7	4.4	4.4	4.0
C-9	.1	.4	11.4
C-47	4.8	4.7	6.6
C-54	5.1	5.1	8.2
C-97	4.5	4.6	6.4
C-118	5.4	6.6	7.8
C-119	5.1	5.1	3.7
C-121	4.3	5.1	6.0
C-123	5.3	5.6	7.2
C-124	3.9	3.7	1.9
C-130	5.0	5.2	5.4
C-131	6.8	6.9	7.6
C-133	3.7	6.7	-
C-135	4.9	5.3	6.4
C-137	a-	.2	-
C-140	1.2	1.4	2.0
C-141	3.7	4.8	4.5
F-4	3.8	4.0	4.9
F-5	3.9	4.0	3.4
F-84	2.4	1.8	-
F-86	.2	-	-
F-100	4.9	4.5	3.8
F-101	4.3	7.5	5.6
F-102	2.7	3.8	5.4
F-104	4.1	3.4	2.2
F-105	6.6	6.9	6.6
F-106	6.2	6.2	7.4

shipping times made possible by use of airlift. A basic premise for the reduction of stock levels was that reparable items would be repaired promptly. Without serviceable assets the capability to support increased flying hours and sorties is jeopardized. Serviceable stocks in the pipeline and full stock levels are the minimum base required to support a contingency until repair lines can be expanded and/or production increased. For example, if we were flying 20 hours per aircraft per month in peacetime and experience NORS conditions, it is obvious that adequate serviceable (depot/base/pipeline) stocks are not available. Thus, a surge to 40 hours per month could not be met. Also, those items that were in limited serviceable stock (although NORS were not occurring at the 20 hours per month rate) would become critical and would most probably throw the system into a NORS condition. Therefore, full and timely funds are required in order to maintain a minimal serviceable level in order to prevent NORS and uninterrupted supply support.

Funding to reduce NORM rather than NORS is not practical. Maintenance of aircraft is a planned and inherent function in possessing aircraft. We are continually reviewing requirements such as maintenance and inspection intervals to effect the best utilization of personnel and reduce NORM time.

We have not located any trade-off studies concerning NORM versus NORS.

Sincerely



L. K. MOSEMANN II
Deputy for Supply and Maintenance

APPENDIX III

NORS PART-HOURS REVIEWED

Aircraft system	Total NORS part-hours for 25 items	Total NORS part-hours for 1 month--all parts	Percent of NORS total part-hours reviewed
C-5A	35,239	87,682	40
F-106	14,590	36,071	40
T-38	65,024	129,465	50
A-37	9,096	12,267	74
C-131	10,042	18,289	54
B-111	12,301	28,176	43
F-111	[a]9,962	38,077	26
F-100	9,432	17,900	53
F-105	10,233	23,197	44
A-7	37,942	67,705	56
B-52	53,338	219,845	24
C-97	8,657	12,602	69
C-135	37,552	216,987	17
Total	313,408	908,263	34

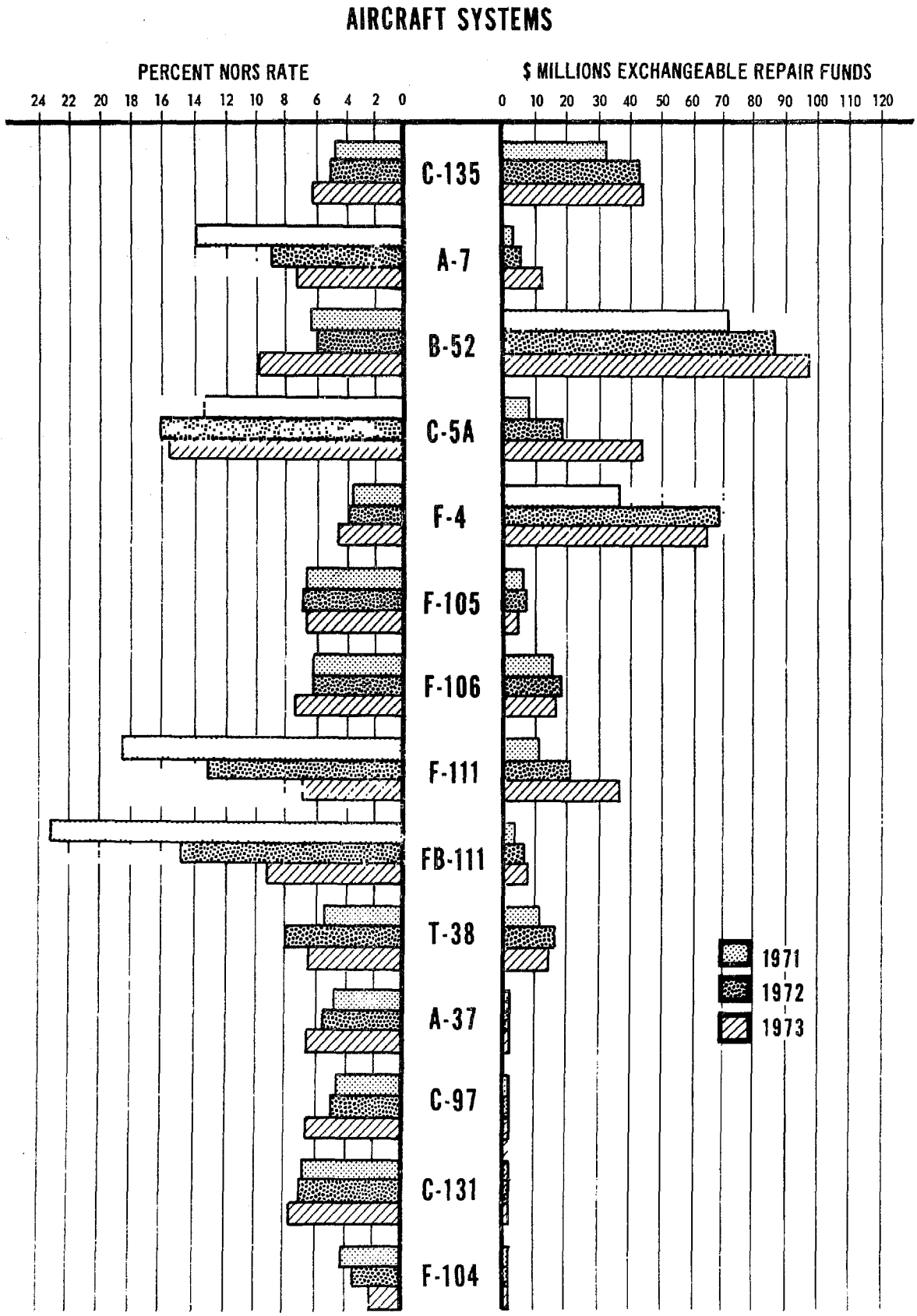
[a]We reviewed only 16 items for this system.

Aircraft system	NORS rates (percent) by fiscal year 1971	1972	1973
F-111	18.6	13.1	6.8
H-1	7.7	10.0	8.2
H-3	7.3	7.0	7.5
H-19	10.3	6.4	-
H-21	2.6	-	-
H-34	[a]	8.8	6.9
H-43	4.6	6.2	6.0
H-53	7.4	8.0	9.3
O-1	1.1	[a]	-
O-2	3.9	4.3	7.4
T-28	3.7	3.2	3.1
T-29	6.7	8.2	8.9
T-33	5.7	7.0	7.8
T-37	3.8	4.3	5.0
T-38	5.7	8.0	6.4
T-39	7.6	7.8	7.4
T-41	[a]	[a]	[a]
U-1	10.4	4.0	3.6
U-3	4.5	4.0	6.9
U-4	2.5	15.1	14.5
U-	11.1	10.2	-
U-10	4.3	2.6	2.3
U-16	4.3	9.3	8.0
U-22	16.7	12.1	7.2
V-10	3.8	4.9	5.5
Yearly average	5.0	5.8	6.2

[a]Aircraft were in the inventory but no NORS hours were recorded.

APPENDIX V

NORS RATES VERSUS EXCHANGEABLE SPARES REPAIR FUNDS

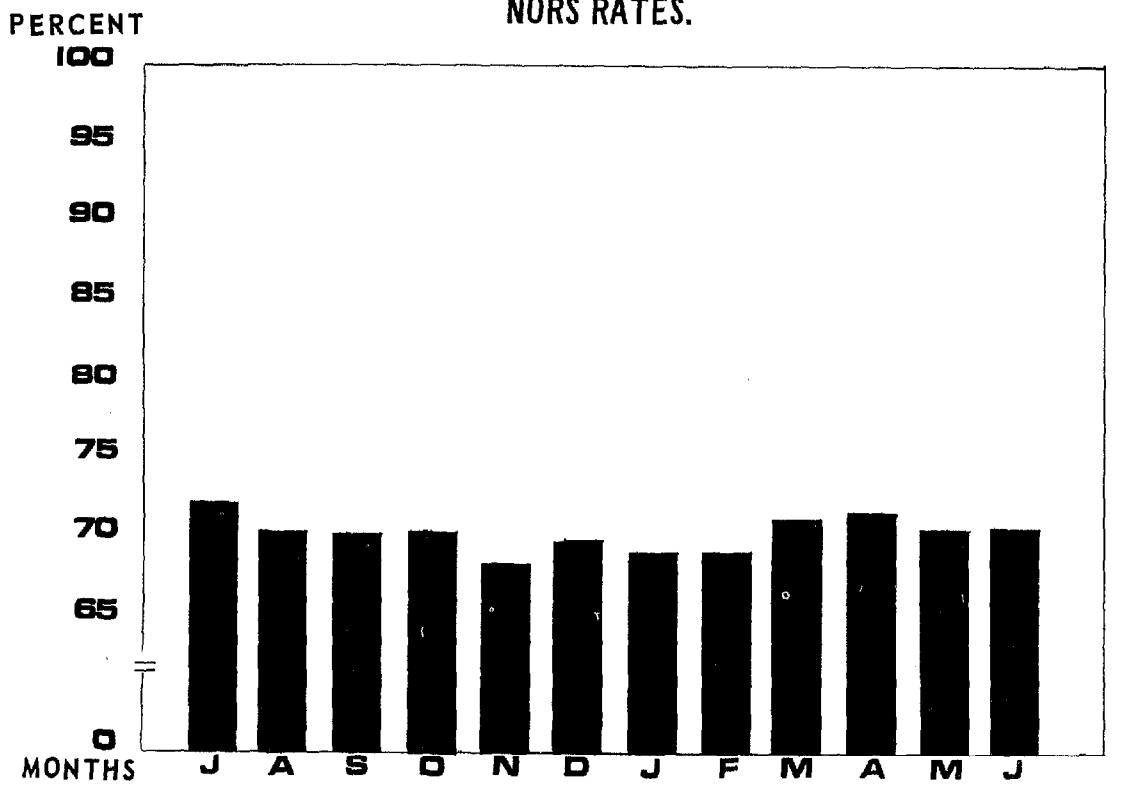


AFLC DEPOT MAINTENANCE PROGRAM FUNDS

Fiscal year	Aircraft maintenance	Missile maintenance	Engine maintenance	Other major end-items	Exchangeable spares repair	Area and base and manufacturing	Total
	(000 omitted)						
1972:							
Beginning authorization	$301,132	$ 6,296	$168,567	$ 47,560	$446,908	$42,816	$1,013,279
Ending obligations	282,007	4,853	167,618	29,313	525,410	46,938	1,056,139
Variance over or under (-)	$-19,125	$-1,416	$ -949	$-18,247	$ 78,502	4,122	42,860
1973:							
Beginning authorization	$230,480	$ 6,121	$144,973	$ 22,175	$500,80	$39,416	$ 944,045
Ending obligations	233,261	5,175	137,892	40,194	536,736	39,216	992,474
Variance over or under (-)	$ 2,781	$ -946	$ -7,081	$ 18,019	$ 35,856	$ -200	$ 48,429

APPENDIX VII

FISCAL YEAR 1973 OR, NORM, AND NORS RATES.



NORM AND NORS RATES