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

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The Honorable William Proxmire
Chairman, Subcommittee on
Priorities and Economy in Government
Joint Economic Committee
Congress of the United States

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Dear Mr. Chairman:

This is in response to your letter of May 18, 1973, concerning operations and maintenance practices for the C-5A aircraft. You asked us to determine the validity of eight allegations relating to flight operations and to determine the past, present, and future daily use rates for the C-5A; the current cost estimates to correct aircraft deficiencies; and the estimated annual operations and maintenance costs.

We found that:

- The Military Airlift Command does require that all C-5A aircraft fly every 20 days.
- Parts are being removed from one C-5A and installed on another so it could fly.
- A shortage of spares for the C-5A aircraft exists.
- MAC aircrews have been physically present while the aircraft were undergoing final repairs in preparation for flights.

We could not substantiate the allegations that unsafe aircraft were flown or that new engine pylons were cracked. We also found no evidence that removing parts from one aircraft and installing them on another created a safety hazard. To the extent feasible, we attempted to show the impact that these practices have had on C-5A operations.

Information on the specific allegations and the additional data you requested are summarized in enclosure I.

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We have informally discussed the contents of this report with Air Force officials. As your staff requested, however, we have obtained formal Air Force comments on the spare parts shortage and on the decreased daily use of the aircraft.

We do not plan to distribute this report further unless you agree or publicly announce its contents.

We trust that the information responds to your request. Please advise us if additional information is needed or if we can be of further assistance.

Sincerely yours,

A handwritten signature in black ink, appearing to read "James B. Argets". The signature is written in a cursive style with a large initial "J".

Comptroller General
of the United States

Enclosures - 3

INFORMATION ON ALLEGATIONS AND QUESTIONS CONCERNING
C-5A AIRCREW, MAINTENANCE, AND OPERATIONS POLICIES

SCOPE

We made our review at Travis Air Force Base (AFB), California; Dover AFB, Delaware; San Antonio Air Materiel Area, Texas; Military Airlift Command Headquarters, Illinois; and Wright-Patterson AFB, Ohio.

BACKGROUND

Lockheed Aircraft Corporation has produced the 81 C-5A aircraft which were contracted for by the Air Force. Two of the aircraft were destroyed by fire in 1970. As of June 30, 1973, the remaining 79 aircraft were assigned to the following activities.

<u>Activity</u>	<u>Number of aircraft</u>
Military Airlift Command (MAC)	76
Lockheed (aircraft Nos. 3 and 8)	2
Air Force Flight Test Center (aircraft No. 68)	<u>1</u>
Total	<u>79</u>

The 76 aircraft in the MAC fleet were assigned to the following AFBs.

<u>AFB</u>	<u>Aircraft assigned</u>
Travis	33
Dover	22
Charleston, South Carolina	16
Altus, Oklahoma (note a)	<u>5</u>
Total	<u>76</u>

^aAircraft assigned to Altus are used for training. The remaining 71 aircraft are involved in airlift operations.

The two aircraft assigned to Lockheed have not been officially delivered to the Air Force. Aircraft No. 3, in Lockheed's flight test program, was scheduled to be refurbished starting July 1973 and was to be returned to the flight test program in early 1974. Aircraft No. 8 is being refurbished and is scheduled for delivery to MAC in early 1974.

REQUIREMENT THAT C-5A AIRCRAFT FLY
ONCE EVERY 20 DAYS

In September 1971 MAC established a policy requiring all C-5A aircraft in its fleet to fly every 20 days. In April 1972 this requirement was expanded to include all aircraft in the MAC fleet. The intent of this policy was to prevent maintenance personnel from using certain aircraft as a permanent source of needed parts to maintain the remainder of the fleet.

FREQUENT CANNIBALIZATION

At the two MAC bases we visited, Travis and Dover, C-5A aircraft were being cannibalized so other C-5A aircraft could fly. This was a common practice at both locations. In several instances 20 or more parts were removed from a C-5A aircraft in a month, and in one instance 49 parts were removed. The table below shows the degree to which cannibalization occurred on the aircraft at these bases.

<u>Month</u>	<u>Number of aircraft on hand</u>	<u>Number of parts cannibalized</u>	<u>Average number of cannibali- zations per aircraft</u>
Jan.	39	405	10.4
Feb.	41	307	7.5
Mar.	44	365	8.3
Apr.	46	485	10.5

Officials at both bases felt spare parts shortages had caused the large number of cannibalizations. In May 1973 the Commander of MAC informed the Commander of the Air Force Logistics Command that the 20-day policy was partly responsible. To reduce the maintenance hours spent on cannibalization, MAC initiated a test program at Travis AFB. The

program will change the fly requirement for C-5As to at least once every 40 days and will limit the number of cannibalizations per aircraft to 35.

SPARE PARTS SHORTAGE

Spare parts for the C-5As are in short supply and this shortage is the primary cause of aircraft being not operationally ready for supply (NORS). The Air Force standard for NORS for aircraft is 5 percent. Air Force officials explained, however, that it is not uncommon for new weapon systems to experience NORS rates higher than 5 percent in their first few years of operations. During the first 11 months of fiscal year 1973, the average NORS rate for C-5As in the MAC fleet was about 17 percent.

The Air Force obtained the 20 parts that caused the most NORS hours during June 1973 from 15 manufacturers. The principal reasons for the short supply of these parts were: (1) the item was sent to the vendor for update and turn-around time exceeded standard repair time, (2) item did not achieve projected service life, and (3) there were deficiencies in original provisioning. Enclosure II lists their manufacturers and suppliers and their unit costs.

In a letter dated August 17, 1973 (see enc. III), the Air Force explained that the current NORS rate was primarily a result of low reliability experienced on certain parts during initial operation and testing of the aircraft, the Air Force recognized that the low reliability of these parts would have to be improved; therefore, it decided to procure only a limited amount of those parts. As a result, the Air Force said, the C-5A NORS rate will continue to be 15 to 20 percent until the parts are updated.

MAINTENANCE FOR CANNIBALIZATION

Cannibalization increases maintenance because of the duplicative effort involved in removing and replacing parts. Presented below are the estimated maintenance man-hours spent to cannibalize MAC's C-5A fleet between June 1, 1972, and May 31, 1973.

<u>AFB</u>	<u>Maintenance man-hours</u>
Travis	18,588
Dover	7,508
Charleston	<u>8,290</u>
Total	<u>34,386</u>

We estimated the cost of these man-hours at about \$410,000. We were unable to determine what portion of this cost was a direct result of the 20-day fly requirement.

We did not find any indications that cannibalizations had created a safety hazard to flight crews.

ALLEGATION THAT AIRCREWS WERE FORCED
TO FLY UNSAFE AIRCRAFT TO MEET
THE 20-DAY REQUIREMENT

Of the 76 aircrew and maintenance personnel interviewed, 72 told us that unsafe aircraft had not been flown to satisfy the 20-day requirement. The four who disagreed based their comments on the fact that supervisory maintenance personnel had downgraded the importance of aircraft defects from a grounding to a nongrounding condition. Only two of the four individuals were able to identify flight dates and aircraft numbers for the alleged unsafe flights.

In one instance the alleged unsafe condition was caused by a faulty landing gear. We were told that, because the aircraft had been grounded for 34 days, maintenance symbols for the landing-gear problem had been downgraded so the aircraft could be flown.

We found that the aircraft had been grounded for 34 days and was flown locally for 30 minutes on the date indicated. A review of the maintenance records showed that seven maintenance discrepancy symbols grounding the aircraft had been downgraded to permit the flight. However, none of these discrepancy symbols were concerned with the landing gear or its instrumentation.

We discussed each of the downgraded symbols with the maintenance officer. He indicated that the downgraded discrepancies had not affected the safety of the flight.

In the other alleged instance, a maintenance symbol had also been downgraded so the aircraft could fly. The maintenance officer and the aircraft commander informed us that the downgraded symbol did not involve flight safety.

Maintenance procedures allow a supervisor to change a defect from a grounding to a nongrounding condition if, in his judgment, the defect is not a safety hazard for the particular flight. MAC policy clearly stipulates that the final responsibility for the safe conduct of a mission rests with the aircraft commander; if he believes an unsafe condition exists, the mission is to be delayed, diverted, or rerouted.

ALLEGATION THAT AIRCREWS WERE DIRECTED
TO FLY DEFECTIVE C-5A AIRCRAFT

Of the 55 crewmembers interviewed, 52 stated that they knew of no instances in which orders had been given to fly defective aircraft to avoid late takeoffs. The other three related two separate instances in which they believed such orders had been given. We were unable to substantiate that the condition of the aircraft at the time of the flights was defective. As mentioned earlier the aircraft commander has the ultimate authority for accepting or rejecting the aircraft. According to the aircraft commanders we interviewed, they fully understood their authority and would not accept a defective aircraft that was unsafe.

ALLEGATION THAT AIRCREWS WERE PRESENT WHILE
C-5As WERE REPAIRED

MAC policy requires that, if an aircraft is unable to depart within 6 hours after the aircrew reports for duty, the aircrew is allowed 12 hours to rest. The aircraft commander must approve all exceptions to his policy. When an aircraft commander decides to wait more than 6 hours, the total time his crew waits (from the time they report) and the length of the flight cannot exceed 24 hours.

Crewmembers related many instances in which aircraft commanders decided to wait beyond 6 hours. But in no instance did the crew exceed its 24-hour duty day. Some reasons given for waiting beyond 6 hours are:

- MACs were reluctant to cancel a flight once it was scheduled.
- If aircrews were present, maintenance personnel felt a greater urgency to repair the aircraft.
- The flying time to next stop was short.
- The mission was for mercy.
- It was not advisable to leave the aircraft on the ground in Thailand for an extended period.

ALLEGATION THAT NEW ENGINE PYLONS
CONTAIN CRACKS

As of June 30, 1973, new engine pylons had been installed on 73 of the 79 C-5A aircraft. Discussions with Air Force officials and a review of maintenance records showed no indication of cracks in these pylons.

DAILY USE RATES

Before the Subcommittee on Military Airlift of the House Committee on Armed Services in January 1970, Air Force officials testified that they were planning a daily use rate of 6.25 hours for the C-5As. In its report dated June 24, 1970, the Subcommittee stated that the Secretary of the Air Force should reexamine the justifications for this rate.

After reexamining the rate, the Air Force testified before the Subcommittee on Aviation of the Senate Committee on Commerce in September 1971 that it was experiencing 2.33 hours in July and only a slightly higher rate for August and September. The Air Force testified that it hoped the C-5A-use rate would ultimately be similar to the 4.25 hours daily projected for the C-141. The Subcommittee discussed the possibility of further reductions in flying hours but the Air Force maintained this would be the minimum rate to maintain proficiency and readiness.

In the Air Force reply to us dated August 17, 1973, it now said proficiency and readiness can be maintained with a lower daily hourly rate.

The chart below shows the actual and programmed daily use rates for the C-5A.

Daily use hours

<u>Fiscal year</u>	<u>Programed</u>	<u>Actual</u>	<u>Average number of aircraft possessed</u>
1971	2.50	2.15	17
1972	2.53	1.90	40
1973	2.23	2.07	61
1974	^a 2.79	-	^b 70

^aIncluded in this figure is 0.80 hours for the Reserve Associate Program.

^bAlthough 71 aircraft are assigned to the airlift mission, 1 is command support aircraft--spare.

When we asked why the daily use rate of the C-5As has not been as great as projected, the Air Force stated (see enc. III) that the peacetime rate for MAC aircraft is established on the basis of providing only those peacetime training hours that will (1) insure readiness of the total MAC system and (2) enable response to the full range of contingency airlift missions specified by Joint Chiefs of Staff war plans. As Southeast Asia requirements decreased and budgetary constraints were imposed, MAC crew ratios and associated support manning were reduced to a level which would provide a peacetime readiness posture capable of meeting wartime requirements.

MAC RESERVE ASSOCIATE PROGRAM

Your staff also requested we obtain general information on the MAC Reserve Associate Program relating to the C-5A.

In 1966 MAC initiated a study to determine the requirements for its Reserve forces. The study revealed that, if the Reserve program continued as scheduled, the Reserve airlift units would be flying obsolete piston-powered planes during the 1970s, while active duty units would be flying jets--C-141 and C-5A aircraft.

As a result of the study, the Reserve Associate Program was developed and was eventually approved by the Department of Defense in October 1967. This program provides aircrews, maintenance support, and aerial port operations augmentation to the MAC force. When fully activated, an Associate Airlift Squadron, including maintenance and support personnel, will be working with each of MAC's airlift squadrons. The Reserve Associate units are organized at the same locations and share the flying and maintenance of the equipment with the active duty units.

In April 1968 the first Associate unit was commissioned at Norton AFB, California. By July 1973 there were 16 Reserve Associate units--13 C-141 squadrons, 2 C-5A squadrons, and 1 C-9 (aeromedical) squadron. Two additional C-5A squadrons are proposed for fiscal year 1974.

Reserve Associates first started flying the C-5A with active duty personnel in April 1973. MAC did not record the percentage of total flying hours which these flights represented. In July 1973 a separate Reserve Associate flying-hour program was established for the C-5A at an average daily use rate of 0.80 hours.

The Reserve Associate Program is the only program of its kind in the Department of Defense.

COST TO CORRECT C-5A DEFICIENCIES

In June 1972 the Air Force estimated it would cost \$259 million to correct deficiencies in the C-5A. The most current estimate of \$273 million was made in February 1973. The major cost categories are shown below.

	<u>Estimated cost</u>
	(000,000 omitted)
Engineering changes approved	\$164
Engineering changes in process	14
Projected changes for deficiencies identified before end of warranty	53
Update of avionics subsystems	<u>42</u>
Total	<u>\$273</u>

Fifty-one percent of the cost to correct deficiencies is attributable to the five areas of the aircraft shown below.

<u>Area</u>	<u>Estimated cost</u>
	(millions)
Wing	\$ 46.5
Control avionics	33.0
Guidance	25.7
Fuselage	19.9
Landing gear	<u>14.6</u>
Total	<u>\$139.7</u>

Air Force officials told us that the February 1973 estimate was not comparable to their June 1972 estimate, primarily because:

- A \$45 million provision for changes to be proposed by an Independent Structural Review Team was included in the June 1972 estimate but excluded from the February 1973 estimate.
- The June 1972 estimate did not include the estimated cost of modifications from January 1, 1975, through June 30, 1977, but the February 1973 estimate did.

The February 1973 estimate excluded all costs associated with the Review Team's proposals because the Air Force believed that these costs should be considered as a follow-on effort to the acquisition phase of the aircraft and not cost to correct deficiencies.

ANNUAL OPERATIONS AND MAINTENANCE COSTS

MAC provided us with operations and maintenance costs for the C-5A aircraft; it provided exact costs for the aircraft used for airlifts and estimated costs for the aircraft used for training. As discussed with your staff, we did not attempt to verify these costs, which are presented below.

Direct Costs for Operation and Maintenance
of the C-5As as Identified by MAC (note a)

<u>Cost category</u>	<u>Fiscal year</u>		
	<u>1971</u>	<u>1972</u>	<u>1973</u> <u>(9 months)</u>
	(000 omitted)		
Depot maintenance:			
Airframes	\$ -	\$ 145	\$ 9,299
Engines	153	11,478	11,392
Gas turbine units	220	905	365
Exchangeables	2,754	15,564	19,216
Area support	44	486	30
In-service engineering	-	-	4,200
Base maintenance:			
Purchased maintenance	110	413	403
Wake Island	-	-	228
Civilian personnel	1,198	5,169	4,113
Aviation petroleum, oil, and lubricants	5,212	12,013	14,972
Supplies	3,894	6,633	5,400
Equipment	162	181	133
Travel (temporary duty)	881	1,254	1,560
Other contractual	9	7	4
Contractor technical	15	677	632
Other expense	52	128	146
Military pay--direct	9,512	33,565	33,019
Depreciation	<u>54,211</u>	<u>93,244</u>	<u>109,513</u>
Total	<u>\$78,427</u>	<u>\$181,862</u>	<u>\$214,625</u>

^aThese costs do not include expenses of operating or maintaining passenger or cargo terminals or base services, i.e., utilities, facilities, and security administrative support.

LIST OF 20 SPARE PARTS WHICH CAUSEDTHE MOST NORS HOURS ON THEC-5A IN JUNE 1973

<u>Part</u>	<u>Unit cost</u>	<u>Current manufacturer and supplier</u>	<u>Date part will be in supply</u>	<u>NORS hours</u>	<u>Reason for shortage</u>
Flight direction computer	\$17,493.00	Bendix	Feb. 1974	2,703	Change in configuration necessitated input of reparable to vendor facilities for update. Turnaround time exceeds repair cycle time.
Valve assembly	270.83	Textron	Aug. 1973	2,275	Demand exceeded initial projections, and item has been undergoing configuration change.
Yaw computer	30,654.00	Honeywell	June 1973	1,779	Item is undergoing update requiring input of unmodified reparable to vendor, and turnaround time is longer than projected.
Control unit	313.00	Honeywell	Aug. 1973	1,564	Unit did not achieve projected life, causing shortage of spares and building of reparable.
Air turbine motor	17,355.00	Air Research	Jan. 1974	1,548	Part required update by vendor and turnaround time was estimated.
Hydraulic valve cartridge	423.00	Parker Hannifin	Mar. 1974	1,494	Condemnation exceeded original estimates.
Remote control	471.90	Technical Associates	Oct. 1973	1,399	Shortage of spare parts.
Liquid transmitter	119.57	Simmons Precision Co.	Oct. 1973	1,203	Item experienced technical problems.
Asymmetry brake	2,460.00	Kelsey Hayes	Aug. 1973	1,031	Item did not meet service life originally expected.
Air duct hose	4.03	H. K. Porter	Sept. 1973	826	Increased demands for item.
Receiver transmitter	22,010.00	Litton Industries	Aug. 1973	819	Unit required update causing extended vendor turnaround time beyond that required for normal base-level repair.
Roll positioner	1,517.00	Sterer Engineering	Oct. 1973	811	Quality problem of part used in repair of this item caused temporary support problem in field.
Kit	72.55	Walter Kidde	Feb. 1974	805	Repair vendor had difficulty in acquiring some parts from subvendor.
Fuel control	2,771.00	Air Research	Sept. 1973	805	Spares are not being repaired because spares from Southeast Asia are being given priority.
Release unit	2,368.75	Canadian Commercial	Sept. 1973	790	Service life less than anticipated.
Isolation valve	1,934.00	Air Research	Nov. 1973	774	Shortage of actuator depot repair kits, and position indicator switches in valve motors are becoming contaminated.
Bushing	67.73	Lockheed	July 1974	696	Insufficient assets initially procured.
Hydraulic valve	50.00	^a Defense Supply Agency	July 1973	696	No initial provisioning made--thought to be nonuse item.
Accelerometer	619.70	Lockheed	Oct. 1973	696	Initial provisioning deficiency due to understated provisioning factors.
Straight tube adapter	7.76	Parker Hannifin	July 1973	696	Item not stocked because of light demand. Demand increased, so item is now being stocked.

^a Current manufacturer was not identified because item was procured from the Defense Supply Agency.

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

17 AUG 1973

Dear Mr. Grosshans

The Secretary of the Air Force has asked me to reply to your letter of August 2, 1973 concerning maintenance, utilization and flightcrew policies for the C-5A aircraft (Code 947049). The following information is provided for the two points outlined in your letter.

The C-5A NORs rate has been paced by low reliability items. During initial operation and testing high failure rates were experienced. Based on these factors, a full range and depth of spares were not requested for procurement to avoid a sizeable investment in low reliability components. The low reliability items are currently undergoing an update program to provide increased reliability and stability. These items also affect the depot organic repair capability as a full range of test equipment and repair parts will not be procured until configuration stabilizes. As a result, the C-5A NORs rate will continue to range between 15 - 20% until the update program is completed and reliability is attained.

The peacetime utilization rate for the MAC strategic airlift force is established on the basis of providing only those peacetime training hours that will assure readiness of the total MAC system so as to be able to respond to the full range of contingency airlift missions specified by JCS war plans. As Southeast Asia requirements decreased and budgetary constraints were imposed, MAC crew ratios and associated support manning were reduced to a level which, under peacetime conditions, would provide a readiness posture capable of meeting wartime requirements. The size of the active MAC force was determined so that it, together with the full capacity of Reserve Associate Units and the capacity of those suitable US civil aircraft which the Department of Transportation will allocate to the Civil Reserve Air Fleet (CRAF), can meet peak contingency airlift needs. Defense policies in this regard, have been articulated before both the Subcommittee on Military Airlift of the House Committee on Armed Services and the Subcommittee on Aviation of the Senate Committee on Commerce.

During the FY-73 and FY-74 budget deliberations, the Air Force made a concentrated assessment of all MAC training requirements. Particular attention was given to establishing a minimum peacetime posture and

flying hour rate that would (1) include the wartime contribution of mobilized Reserve Associate Units as they become operational with attendant decreases in active force manning and peacetime training requirements, (2) provide incentives that encourage CRAF participants to modernize with cargo-capable aircraft needed to support Defense wartime requirements, and (3) recognize the importance of the C-5 in terms of investment and value as a national wartime asset by assigning highly experienced supervisors and aircrews to insure effective management and peacetime readiness of the force. Assigning only experienced aircrews to the C-5 program reduces upgrade training and annual flying hour requirements and has the effect of reducing the C-5 utilization rate, thereby lengthening the life of the aircraft and conserving its capability for the primary wartime mission. Thus, the Air Force was able to reduce the planned C-5 utilization rate to 2.79 in FY-74. That rate, however, will not be fully attained until the end of FY-74 when all C-5 Reserve Associate Units are organized.

We will provide any additional information you may desire.

Sincerely



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