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POTENTIAL REDUCTIONS IN AIRCRAFT OPERATION AND MAINTENANCE COST--ETC(U)
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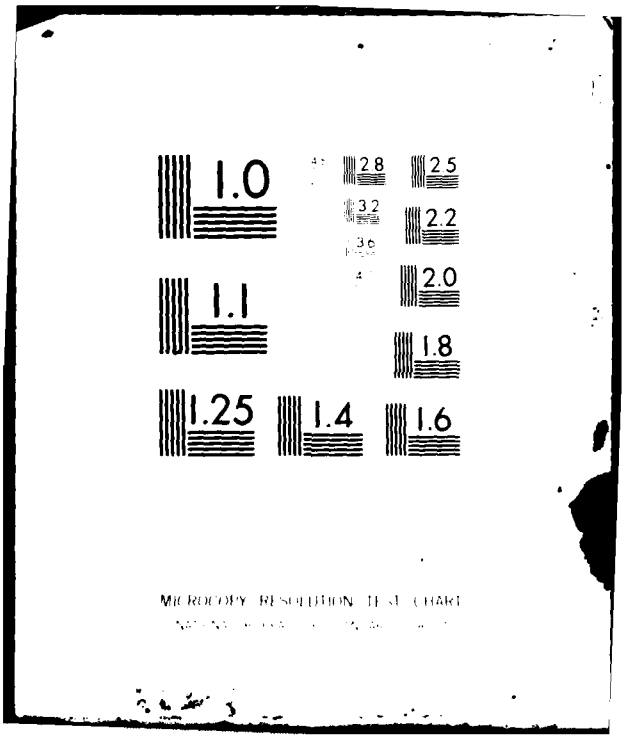
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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

LEVEL II

OCTOBER 27, 1981

B-204813

The Honorable Joseph P. Addabbo
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

Dear Mr. Chairman:

Subject: Potential Reductions In Aircraft Operation and Maintenance Costs by Using Thrust Computing Support Equipment (PLRD-82-4)

Your January 16, 1981, letter asked us to evaluate Department of Defense efforts to save fuel and reduce maintenance cost on turbine jet engines through thrust/power management. In addition, you asked us to study the feasibility of using certain equipment which has the capability of measuring the thrust of engines while installed in aircraft. This report addresses our evaluation of the thrust measuring equipment. A separate report on the overall review of thrust/power management will be sent to you at a later date.

We conducted our review at the San Antonio Air Logistics Center, Kelly Air Force Base, Texas; Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio; Headquarters, Air Training Command, Randolph Air Force Base, Texas; Laughlin Air Force Base, Texas; Headquarters, U.S. Air Force, Washington, D.C.; Naval Air Systems Command, Washington, D.C.; and the Computing Devices Company, Ottawa, Canada.

We interviewed Air Force officials and contractor representatives, reviewed documentation pertaining to the key events in the evaluation of the thrust computing system program, reviewed test data and analyses by Air Force and contractor engineers, and observed the operation of the thrust computing system.

Our analyses show that the accurate measurement and setting of thrust for installed jet engines is of vital importance not only for aircraft readiness and safety but also for operation and maintenance cost reductions. Although test results indicate that a system is available that can perform such measurements, the services have not been using it. The Air Force has conducted extensive tests that will measure thrust for installed J85-5 engines, but has not implemented a system. The Navy has not performed any tests to determine whether its aircraft jet engines might benefit from such a system.

(943117)

AIR FORCE PLANS IMPLEMENTATION OF THRUST MEASURING EQUIPMENT FOR J85-5 ENGINES

On May 27, 1981, we sent a letter to the Secretary of the Air Force (see app. I) identifying our concerns about an Air Force thrust management program for the T-38/J85-5 weapon system. This program involved the testing of thrust computing support equipment, developed by the Computing Devices Company, a division of Control Data Canada, Ltd. We informed the Secretary that for the past 12 years, the Air Force has spent about $1.9 million testing and evaluating this equipment without reaching a "go/no-go" decision.

On July 15, 1981, the Secretary replied to our letter. (See app. II.) He said that the Air Force had decided to fully implement the system on its more than 2,050 J85-5 engines, beginning with those at Laughlin Air Force Base, Texas. During this initial modification phase, installed engine thrust trim requirements will be defined and system benefits will be verified. He also said that if the system functions as well as expected on the J85-5 engines, a program will be initiated for the J79 engines and application to other engines will be considered. He assured us that high-level management action is being taken to prevent further delays in the thrust computing program.

FUNDING OF THE SYSTEM IS STILL IN DOUBT

The contractor estimates the cost of buying and installing the thrust computing support equipment on the J85-5 engines at $8 million. Although the Secretary has assured us that the equipment will be installed on the engines, funds have not been made available. Air Force officials informed us that fiscal year 1981 funds are no longer available and that fiscal years 1982 and 1983 funds may be the only source of funding, which could further delay implementation of the system another 1 or 2 years. Such a delay could result in the system not being implemented because the contractor, who has already experienced a 2-year funding delay, has expressed an unwillingness to hold the program open much longer.

We believe that implementation of the system on the J85-5 engines at Laughlin will result in significant benefits. For example, engines trimmed to the minimum required installed thrust operate at significantly lower temperatures, which increases engine life and improves operational readiness. Also, safety of flight

could be enhanced, particularly on takeoff, due to the ability to readily check and and set installed engines to the required thrust. In addition, the contractor projects annual savings of approximately $10 million in the operations and maintenance of the J85-5 engines, as follows:

Fuel $5.5 million
Parts $2.9 million
Labor $1.6 million

Officials at the Air Force Air Training Command, San Antonio, Texas, strongly concur with the benefits of the system. On the basis of their extensive testing of the system, they concluded that annual savings would be about $4.7 million in hot section parts for their J85-5 engines.

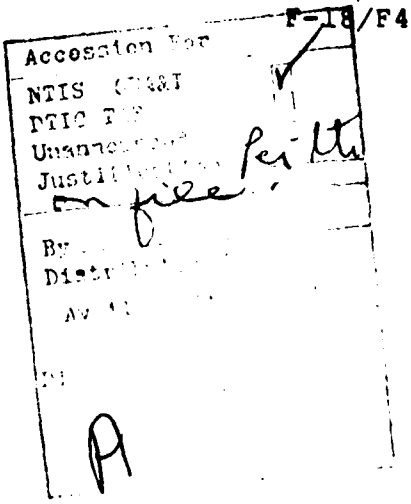
According to officials at the Air Force Logistics Command, San Antonio, Texas, implementation of the system fleetwide will not affect depot maintenance operations because the engines will be modified at the bases. It is planned that implementation will begin with modification on J85-5 engines at Laughlin Air Force Base, Texas.

The system may also provide the same benefits for the J79 engines. The contractor estimates the cost of implementation at $15 million and projects annual savings of about $20 million. The Air Force, however, has not developed plans for implementation on the J79 engines.

POTENTIAL FOR OTHER ENGINES

The contractor believes that the types of aircraft which would benefit most from application of the thrust computing support equipment are those with variable nozzle afterburning turbojet or turbofan engines. A list of aircraft and engines where the system application would be most beneficial is as follows:

Air Force and Air National Guard	Navy and Marine Corps
F-4/J79	F-4/J79
F-5/J85	F-5/J85
F-15/F100	F-14/TF30
F-16/F100	F-18/F404
F-111/TF30	
T-38/J85	



Other major types of aircraft and engines where the thrust computing system benefits are possible but have not yet been quantified through trim studies or service evaluations, are as follows:

Air Force and Air National Guard	Navy and Marine Corps
F105/J75	A-6/J52
F106/J75	A-7/TF41
KC-135/TF33,J57	S-3/TF34
B-52/TF33,J57	AV-8A/Pe103
C-141/TF33	T-2/J85
A-37/J85	F-8/J57
C-5A/TF39	
A-7/TF41	
A-10/TF34	

CONCLUSIONS

Although the Air Force has decided to implement the thrust computing system for its J85-5 engines, the system may not be implemented due to a lack of funding. If funds are not made available soon, the system may never be implemented. If this occurs, the Air Force will lose millions of dollars already invested in the program in addition to the millions in projected savings. But, more importantly, failure to implement the system may reduce aircraft readiness.

The Navy has not tested or evaluated the system for its fleet of turbine jet engines. According to the contractor, the system can offer similar significant benefits for Navy aircraft engines.

RECOMMENDATIONS

We recommend that the Secretary of Defense direct the Secretary of the Air Force to:

--Ensure that adequate plans are prepared to monitor implementation of the thrust computing support equipment for the J85-5 engines at Laughlin Air Force Base and to verify and evaluate the benefits of the system.

--Develop a plan to assure that the system will be timely implemented on the J79 engines if the system functions as well as expected on the J85-5 engines.

We further recommend that the Secretary of Defense direct the Secretaries of the Air Force and Navy to coordinate their efforts in evaluating the thrust computing system on variable nozzle afterburning jet aircraft engines. Such an exchange of information will prevent duplication of test and evaluation efforts between the services.

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We did not solicit comments on this report from the Secretary of Defense or the Secretaries of the Air Force and the Navy because we had previously discussed the thrust computing system problems in our letter to the Secretary of the Air Force and received a reply. (See apps. I and II.) We are sending copies of this report to the Secretary of Defense, the Secretaries of the Air Force and Navy, and other interested parties.

Sincerely yours,

Charles A. Bowsher

Comptroller General
of the United States

APPENDIX I

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

PROCUREMENT, LOGISTICS,
AND READINESS DIVISION

MAY 27 1981

The Honorable Verne Orr
The Secretary of the Air Force

Dear Mr. Secretary:

The U.S. General Accounting Office is currently reviewing Department of Defense efforts to save fuel and reduce maintenance costs on aircraft turbine/jet engines through thrust/power management (assignment code 943487). During the course of this review, we have identified some matters concerning an Air Force thrust management program for the T-38/J85-5 weapon system which we believe warrants your immediate attention. These matters are detailed below.

BACKGROUND

The thrust management program, known as thrust computing system (TCS), has been under study by the Air Force and others for a number of years. Appendix I presents a chronology of major events dealing with TCS; the Air Force involvement in the program; and the experience of other agencies with TCS. The chronology shows that the Air Force has been involved in testing and evaluating this system for the last 12 years and has spent about $1,900,000 on the program. However, the Air Force has not yet reached a go/no-go decision on the system.

According to the contractor, Computing Devices Company, a division of Control Data Canada, Ltd., this system can provide annual operations and maintenance cost savings of about $10 million for the J85-5 engines. In addition, TCS may provide significant benefits to other turbine/jet engines. For example, the contractor claims this system can provide annual cost savings of $12.1 million for the J79 engines. The TCS also was tested by National Aeronautics and Space Administration (NASA) on two F-100 engines. NASA officials noted that the system works well and appears to have several operational applications as a trimming device, as a go/no-go indicator to the pilot, as an engine diagnostic tool, and as an input to an advanced propulsion control system.

Despite such potential benefits, the project remains highly controversial because some elements of the Air Force and the engine community do not agree with the benefits of the system.

In 1978, similar comments were expressed by the Director of Performance and Propulsion Research, at NASA's Hugh L. Dryden Flight Research Center. This official sensed a great deal of resistance to the TCS concept on the part of the propulsion technical community, both in industry and the government, because it threatens the established way of doing things and adversely affects company profits.

Current Air Force procedures require that J85-5 engines must be trimmed outside the airframe, or bare, to a required engine fuel flow rate. This procedure results in wide variances in thrust and exhaust gas temperature between engines. The variances are further amplified when engines are installed in aircraft due to variations in airframe inlets and other factors. The effect is that some engines are operating at higher thrust and temperature levels than required, thereby adversely impacting fuel consumption and the service life of hot section parts.

According to the contractor and some Air Force officials, TCS allows trimming of a J85-5 engine to a required thrust level while installed in the airframe. In addition, it

--permits installed thrust levels to be accurately set and measured;

--reduces exhaust gas temperature thereby reducing consumption of hot section spare parts;

--can provide a new installed diagnostic function to assess engine and related thrust degradation, thus helping to eliminate unnecessary unscheduled engine removals; and

--can be used to support aircraft while deployed because TCS is light, compact, and readily suitable for deployment.

The Air Force tested and evaluated this system in 1977 and again in 1980 for the J85-5 engines. Considerable testing and evaluation has also been done for the J79 and F-100 engines.

In 1980, the Air Force Aeronautical Systems Division performed an evaluation of TCS for the J85-5 engines and reported the system was not accurate and beneficial. Subsequently, however, serious questions were raised about the validity of this evaluation by both Computing Devices Company and some Air Force officials.

In 1981, the Air Force requested the J85-5 engine manufacturer, General Electric, to conduct an "objective" review of TCS. General Electric reported that TCS would not be cost effective. GAO does not believe that this evaluation can be considered objective in view of General Electric's position as engine manufacturer and the millions of dollars of spare parts it sells to the Air Force.

As of May 15, 1981, no decision had been made by the Air Force for fleet-wide implementation of TCS on the T-38/J85-5 engines.

MATTERS FOR CONSIDERATION

We believe extensive testing and evaluation on the TCS has been done by the Air Force and others to assess the benefits of the system. The program, however, has experienced delays as a result of disagreements and questionable management decisions. An impasse now exists. High level management attention is needed to prevent further delays. TCS appears to have significant potential for saving millions of dollars by reducing fuel consumption, hot section spare parts and maintenance costs. But more important, the system allows the accurate trimming of installed jet engines, a capability not presently available in the Air Force. TCS, we believe, may also fit the December 1980 statement of operational needs expressed by the Tactical Air Command for a system to trim installed F-100 engines on deployed aircraft.

We would appreciate having your written comments regarding the matters discussed in this letter within 30 days. We also would like to have you provide us with the data used in the General Electric evaluation and the support for their conclusions.

A copy of this letter is being sent to the Commanding General of the Air Force Logistics Command.

We also wish to acknowledge the cooperation and courtesies extended to our representatives during this ongoing review.

Sincerely yours,

Henry W. Connor
Associate Director

APPENDIX I

CHRONOLOGY OF SIGNIFICANT EVENTS RELATED TO THE THRUST COMPUTING PROGRAM

1969- The Air Force's Aeronautical Systems Division (ASD) contracted with Computing Devices Company (ComDev) to develop technology to determine installed jet engine gross thrust. This program was initiated and funded through the United States/Canada Defense Production Sharing Agreement (Contract #F33657-69-C-0733, contract cost: $578,000).

ComDev reported that it had developed a thrust computing system (TCS) for in-flight use on Canadian CF-5 aircraft. This system would identify variations in installed engine performance. The potential of trimming engines while installed was established. The system would:

--reduce installed thrust variations while still satisfying minimum installed thrust requirements; and

--reduce average fleet engine temperatures, thus reducing hot section spare parts requirements, unscheduled removals, and operating and maintenance costs.

1973- The original ASD contract was extended to develop gross thrust computing technology on a TF-30 engine of the type used in the F-111. Tests were conducted at the National Aeronautics and Space Administration's (NASA) Lewis Research Center to acquire calibration and verification data. The cost of this modification was $75,000. According to ComDev, the program successfully demonstrated that gross thrust could be accurately calculated over a portion of the simulated operating envelope of the TF-30 engine.

1974- General Electric became interested in the final development and sale of the thrust computing system. According to their business plan the system is usable on any gas turbine engine and would result in savings to the customer of 60 percent hot section spare parts. This action, however, was terminated when the business plan was rejected by General Electric's management.

1975- ComDev submitted an unsolicited proposal to the Air Force's San Antonio Air Logistics Center (SA-ALC) to conduct a service evaluation of gross thrust computation equipment for flight-line trimming of J85-5 engines in T-38 aircraft. The proposal was rejected by SA-ALC; subsequently, it was submitted to the Air Force Headquarters.

1976- The Air Force responded to the unsolicited proposal by initiating a service evaluation under a Productivity, Reliability, Availability, and Maintainability (PRAM) program (contract #F41608-76-C-1369; contract cost: $238,000).

1977- Test and evaluation was conducted at Laughlin AFB by ComDev.

ComDev issued a final report titled "Service Evaluation of Thrust Computing Support Equipment (TCSE) for Flight Line Trimming of J85-5 Engines in T-38 Aircraft." (This effort, later, became known as phase I.) ComDev found that:

--The thrust computing support equipment had a total uncertainty of ± 2.5 percent (at the 95 percent confidence level).

--Trimming the 12 J85-5 engines used in the test using the thrust computing support equipment produced a mean reduction in gross thrust of 78 lbs. and a decrease in the average exhaust gas temperature of 44 degrees Fahrenheit.

--Reduction in operating and support costs for the Air Force's T-38 fleet was expected to be about $5.1 million a year from increased engine life, fuel savings, and fewer engine removals.

1978- A program was initiated to evaluate TCS for the Canadian CF-5/J85-CAN-15 weapon system. Evaluation was conducted by the Canadian Armed Forces on 10 aircraft at Cold Lake, Alberta (contract # DSS 22SR3207233; contract cost: $473,000).

According to ComDev, two CF-5s were flight tested when both engines were trimmed installed to thrust using TCS. Engine temperature was reduced by an average of 61 degrees Fahrenheit. Canada's Aerospace Engineering and

Test Establishment concluded that no significant reduction in climb or acceleration performance resulted.

ComDev projected annual savings from $495,000 to $749,000 (depending on expected temperature reduction), with payback in 15-23 months after implementation. ComDev also identified other benefits derived from

--reduction in compressor stalls, which would reduce maintenance costs, engine wear, and improve flight safety and aircraft readiness; and

--engine diagnostics to assess thrust degradation and aid in detecting out-of-tolerance engine parameters.

1979 (February) The Air Force presented the results of the service evaluation in a PRAM final report. This report concluded that the evaluation was successful and showed that the mean exhaust gas temperature could be reduced from 34 to 51 degrees Fahrenheit. These reductions translate to increases in hot section parts life from approximately 20 percent to 37 percent. Net 5-year savings estimated for a 20 percent increase in hot section parts life was $15.3 million.

(April) SA-ALC accepted the results of the ComDev evaluation of the J85-5 engine. ASD, however, did not agree with the Air Force Logistics Command (AFLC) that the Laughlin AFB tests were conclusive.

The Air Force issued a final PRAM project report for application of TCS to the F100 engine. This work was done by ComDev at a cost of $55,000 to the Air Force. Conclusions from the study show: (1) there was a large F100 thrust variation in the field (±4 percent); (2) TCS can measure sea level static gross thrust on an uninstalled engine with an accuracy of approximately ± 2 percent); (3) TCS has potential for computing thrust in flight; and (4) if all engines could be trimmed to thrust, hot section life improvements could be realized by down trimming using TCS. The proposed trim concept was rejected for the F100 engine, however, because of the possibility of adverse operational impacts due to the sensitivy of the engine to engine pressure ratio (EPR), which is the basis for the current trim procedure.

(May) SA-ALC was directed by AFLC to procure the TCS for fleet-wide modification of Air Training Command (ATC) and Tactical Air Command (TAC) T-38 aircraft.

1979 (July) Disagreement between AFLC and ASD continued; procurement was postponed pending an indepth review to be conducted by SA-ALC.

(August-October) SA-ALC reviewed the contractor's final report for the Laughlin AFB tests. The review revealed that engines were possibly derated below the specification thrust. Based on this, AFLC, ASD, and SA-ALC agreed that the 1977 test was inconclusive.

SA-ALC recommended that the engine technical order be changed in order to reduce the average exhaust gas temperature at the test cell, without derating engines below the engine model specification thrust. It was hoped that the same benefits of TCS could be achieved without the additional cost of procuring TCS. The technical order changes were implemented in November 1979.

As a result of a conference between ASD, AFLC, SA-ALC, ATC, and TAC it was decided that the TCS could no longer be justified from a cost saving standpoint; however, it could be procured on the basis of command operational readiness. This justification would require additional testing.

SA-ALC, ATC, and ComDev met to discuss requirements of the additional testing - called phase II. Subsequently, ATC submitted to SA-ALC an outline for the phase II evaluation of TCS.

SA-ALC contracted with ComDev (contract #F41608-79-C-1040; contract cost $98,250) to fit, check, and upgrade TCS engine instrumentation kits on both J85-5 and J85-13 engines, and to develop an analysis procedure to establish installed target thrust lines.

(November) ComDev issued a final report titled "Feasibility and Cost Benefits of Trimming the USAF F-4/J79 Fleet to a computed Thrust." ComDev found that:

--The TCS offers the same baseline engine thrust at a temperature reduced by as much as 40 degrees Fahrenheit.

--This temperature reduction is estimated to save $12.1 annually in hot section parts, labor, and fuel consumed for the F-4/J79 fleet. This corresponds to an investment payback period of approximately 12 months after TCS implementation.

This effort was made under contract # FO 4611-78-C-0039, costing $253,000.

(December) Contractural Engineering Project for phase II was submitted to AFLC.

1980- Contractural Engineering Project for phase II approved
(January) by AFLC.

SA-ALC authorized ATC to do preliminary work for the testing to be done at Laughlin AFB.

(February- SA-ALC initiated and processed a purchase request with a
April) statement of work. Funds of $300,000 became available.

ComDev issued a final report titled "Thrust Computing System (TCS) for the NASA Highly Maneuverable Aircraft Technology (HiMAT) Vehicle's Propulsion System." This was an effort to develop in-flight gross thrust computation and was done under contract # NASA-2644, costing $100,000. ComDev reported that the TCS for HiMAT has the potential to provide good accuracy, within $\pm$ 2 percent over most of the flight envelope.

(May) The statement of work for phase II was re-written as a result of questions raised by procurement officials.

(June) Additional funds of $250,000 became available to support ComDev's estimated total cost of $550,000 for phase II. A new purchase request was prepared reprogramming funds for additional equipment costs.

ComDev signed a letter contract, #F41608-80-C-1331, not to exceed $550,000.

(July) SA-ALC, ATC, and ComDev met to discuss and agree on a program test plan for phase II.

Planned Program Schedule - Phase II

(August 1980) Contract finalized
(September 1980) Phase II testing complete
(November 1980) Data reduction and analysis complete
(December 1980) Final report issued
(January 1981) SA-ALC go/no-go recommendation for fleet-wide implementation of TCS.

(August) Testing underway at Laughlin AFB, Columbus AFB, and Reese AFB.

(September- Data analysis review meeting was held in Ottawa;
October) attending were SA-ALC, ASD, AFLC, ATC, and ComDev. The schedule was revised. Definition of the statement of work was still outstanding.

Installed engine tests were underway at Edwards AFB.

ASD issued a preliminary technical memorandum to SA-ALC concluding that "no clear advantage is

identifiable for the ComDev system." (This memorandum was issued before all testing was completed under phase II.)

1980- (November December) ComDev personnel were present at SA-ALC to discuss the trim-to-thrust line derivation; this discussion, however, did not take place for reasons unknown.

All testing for phase II was completed.

Twelve sets of engine instrumentation kits, a complete tooling kit, and a pressure test set were delivered by ComDev to SA-ALC. (All testing for phase II was done with prototype kits installed during phase I.)

1981- (January) ComDev issued its final report "Phase II Evaluation of Thrust Computing Support Equipment on Installed J85-5 Engines in T-38A Aircraft." ComDev found that:

--TCS measurements of gross thrust on uninstalled engines at military power are accurate within ± 2.2 percent at the 95 percent confidence level.

--Installed thrust measurements with TCS were confirmed using the Edwards AFB aircraft thrust stand to be within ± 2.2 percent at the 95 percent confidence level.

--Engines installed in six randomly chosen aircraft showed thrust variations ranging in a 10.2 percent band. This confirms the installed thrust spreads found in the 1977 Phase I TCS evaluation.

--The new technical order trimming procedure implemented by the USAF in November 1979, resulted in at least 40 percent of the Laughlin AFB engines having installed thrust levels below the Northrop degraded installed thrust line.

--Regardless of the installed minimum thrust level chosen for trimming, the TCS trim-to-thrust method will show at least a 28 degrees Fahrenheit exhaust gas temperature reduction compared to bare trimming procedures.

--The TCS trim-to-thrust method can provide operational flexibility by permitting the installed level to be accurately set.

--TCS can provide a new installed diagnostic capability to assess thrust degradation--a key indicator of hot section distress.

--TCS trim to installed thrust implementation throughout the USAF T-38 fleet would result in annual operation and maintenance savings of approximately $10 million, with a payback period of approximately 10 months after fleet implementation.

(February) ASD issues the final technical memorandum on their evaluation of TCS for the T-38/J85-5. ASD concludes that TCS is not as accurate as claimed by ComDev; they further questioned "* * * the contractor's ability to provide an accurate and unbiased evaluation of their product's capability * * *." As a result, ASD recommended that any future TCS testing be conducted by a competent independent agency such as the engine manufacturer.

1981- Statement of work revision E was finally approved.
(March) Letter contract definitized in the amount of $539,709. General Electric issues a letter to SA-ALC concluding that TCS will not be cost effective for the J85-5 engine. (This evaluation was provided at the request of SA-ALC.)

(April) Two meetings were held, attended by SA-ALC, ATC, ASD, AFLC, and ComDev, during which were discussed the contractor's concern over the correctness of the ASD analysis. According to ComDev, ASD made serious errors and omissions in its analysis which invalidates the conclusions drawn.

SA-ALC will make a final recommendation on a go/no-go decision for fleet-wide implementation of TSC no later than May 1, 1981.

It appears that the go/no-go decision will again be postponed, this time to May 31, 1981.

APPENDIX II

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

15 JUL 1981

Mr. Donald J. Horan
Director Procurement,
Logistics and Readiness Division
U.S. General Accounting Office
441 G Street, N.W.
Washington DC 20548

Dear Mr. Horan:

This is in reply to your letter to the Secretary of the Air Force regarding your report dated May 27, 1981 on the Air Force Thrust Management Program for T-38/J85-5 Weapon System OSD Case #5712 (GAO Code number 943487).

We have reviewed the subject GAO report and concur that an inordinate amount of time has been expended in evaluating the capability and benefits of the Thrust Computing System (TCS). There have been some differences of engineering opinion which had to be resolved before a decision could be made to spend $10 million to modify the J85-5 inventory of more than 2050 engines. Program delays occurred when Computer Devices Company, the Air Force Aeronautical Systems Division (ASD), and General Electric, working independently of one another, arrived at three different sets of conclusions from the analysis of test data. The major disagreements were in the areas of installation effects, static vs. dynamic effects, equipment accuracy, and the analysis of the raw test data itself. The impasse has been resolved, and a go-ahead decision on the system has been made.

We propose to fully implement TCS, beginning with Laughlin AFB, TX. During the initial phase of modification, installed thrust trim requirements will be defined and system benefits verified. The program will be monitored for possible application on other engines. Preliminary work has been accomplished on the J79 and if the TCS functions as well as expected on the J85-5, a program will be initiated for the J79.

We appreciate your interest in the Air Force's efforts to save fuel and reduce maintenance cost on aircraft engines. Please be assured

APPENDIX II

that high level management action is being taken to prevent further delays in the TCS program. Attached is the General Electric evaluation you requested.

Sincerely,

L. K. HOSTMANN II
Deputy Assistant Secretary
(Logistics)

1 Atch
General Electric Evaluation


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