RELEASED

B-168664

SEP 14 1973

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

Dear Mr. Chairman:

We have reviewed the two cost studies pertaining to the F-15 aircraft program as requested in your letter of April 19, 1973. The studies were (1) "F-15 Independent Parametric Cost Analysis," September 1972, by the Air Force's Aeronautical Systems Division (ASD) and (2) an Office of the Secretary of Defense (OSD) Cost Analysis Improvement Group (CAIG) estimate of October 1972.

SCOPE

We looked into the methodology, models, data, and assumptions the Air Force and CAIG used in their studies and in developing their cost estimates and the circumstances surrounding the estimates' preparation. Where appropriate, we have made some observations on the procedures followed by the two organizations. As agreed in discussions with your office, we did not attempt to develop a separate estimate of the cost of the program.

We discussed these studies with the staff of the Deputy Director for Resources and Analysis, OSD; ASD; the System Program Office (SPO); and Headquarters, Air Force Comptroller. We examined documents which these organizations and your office supplied.

PARAMETRIC ESTIMATING

Parametric estimates are developed by dividing the system under study into a set of elements and relating the cost of each element to a set of characteristics; for example, the cost of an engine to the thrust produced by the engine. The

basic premise of this procedure is that costs are related in an approximate but quantifiable way to physical and performance characteristics. The parametric technique relies heavily upon the use of data from previous programs for similar equipment. When adequate detailed data is not available, an estimator must rely on assumptions and percentage factoring.

Parametric estimating uses statistical techniques to develop a relationship of cost to system characteristics, and these estimates are subject to statistical errors which can normally be as high as 33 percent. Errors can also occur in parametric estimates if an inaccurate or inappropriate data base is used or if the required mathematical factors are misestimated.

Prior to the availability of actual data on the cost of manufacture it is usually impossible to identify the size of an error in an estimate. Therefore it is essential to evaluate the reasonableness of an estimate in light of the model, data base, and assumptions employed. Consequently, it is important to realize that one estimate cannot establish that another is right or wrong.

We previously recommended that cost estimates be presented in ranges rather than as a specific figure.[1] The Government Procurement Commission's recent report on acquisition of major systems also recommended that program costs be estimated within a probable range until the system reaches the final development phase.[2]

DOD adoption of parametric cost estimating techniques

On December 7, 1971, the Deputy Secretary of Defense issued a memorandum to the Secretaries of the military

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[1]"Cost Growth in Major Weapon Systems" (B-163058, Mar. 26, 1973).

[2]"Report of the Commission on Government Procurement," Vol. 2, part C, December 1972.

departments which directed that an independent parametric cost analysis be incorporated into each presentation to the Defense System Acquisition Review Council (DSARC). He felt that such estimates would serve an important function during concept formulation and at the time the Department of Defense (DOD) makes its major commitment of funds for development and initial production. In January 1972, the Secretary of Defense established CAIG to review the Services' estimates and to develop uniform parametric cost estimating criteria for DOD units.

The Air Force implemented the Deputy Secretary of Defense's instructions on February 17, 1972, by directing its Air Force System Command (AFSC) to perform independent parametric cost analysis to support DSARC review. The F-15 was one of the first programs to undergo this type of review.

PURPOSE OF ASD AND CAIG F-15 ESTIMATES

In September 1972 the F-15 acquisition program was in the full-scale development phase when the ASD parametric analysis was performed. The analysis was to assist DSARC in deciding in October 1972 whether to authorize procurement of long lead items for production aircraft. CAIG reviewed the ASD estimate and prepared its own. The two cost analyses were considered again at a DSARC meeting in February 1973 when procurement of the first production aircraft was authorized.

AIR FORCE INDEPENDENT COST ESTIMATE

The "F-15 Independent Parametric Cost Analysis" was completed in September 1972 by ASD. ASD analysts claimed they contacted SPO only to obtain basic information and SPO did not attempt to influence the outcome of the study.

The parametric analysis was accomplished only for the procurement portion of the program. ASD adopted the Selected Acquisition Reports (SAR) estimate for research, development, test and evaluation (RDT&E) rather than computing a separate estimate because the DSARC meeting was scheduled for production

decisions and 96 percent of the RDT&E cost had been programed through fiscal year 1974 and was assumed to be reasonably indicative of the development cost.

The procurement estimate was prepared using models developed for determining costs of the major segments of the weapon system; i.e., airframe, engine, and avionics. The armament estimate used data from the manufacturer's June 30, 1972, "Cost Information Report" and the "Air Force Cost Performance Report." Contractual unit costs, engineering estimates, Air Force experience, and percentage factors were used for training equipment. Ground support cost was judgmental and was estimated after discussion with technical personnel.

Three estimates of the expected procurement cost in acquiring the planned 729 production aircraft were developed--a different source of airframe data was used for each estimate. Case II was developed by using recorded data from the experience of the contractor (McDonnell Douglas Corporation) in aircraft manufacturing and was ASD's preferred estimate for that reason.

ASD Cost Estimates

	Case I	Case II	Case III
	(000,000 omitted)		
Procurement cost	$6,266	$6,334	$6,230
SAR R&D cost (note a)	1,754	1,754	1,754
Total program cost (note a)	$8,020	$8,088	$7,984

[a]Does not include $244 million component improvement cost for the engine.

CAIG REPORT AND COST ESTIMATE

CAIG was briefed on the Air Force's independent parametric analysis and commented to DSARC in October 1972. At that time

CAIG also completed and submitted a separate study for the program which included development and procurement estimates. This study did not assume the SAR development cost estimate as ASD had.

A summary comparison of the CAIG study with the ASD parametric estimate follows; for comparison, we have included some data in the schedule and on pages 14 and 15 on the current SAR estimates.

Comparison of ASD and CAIG Estimates

	ASD case II	CAIG	CAIG-ASD difference	June 30, 1972, SAR
	(000,000 omitted)			
Development	[a]$1,754	$2,064	+$ 310	$1,754
Procurement:				
Airframe	2,238	2,744	+ 506	2,080
Propulsion	[b]1,555	[c]1,988	+ 433	[b]1,439
Avionics and Armament	1,420	1,606	186	1,422
Support and Spares	1,121	1,324	+ 203	1,107
	[b]$8,088	[c]$9,726	+$1,638	[b]$7,802

[a]SAR estimate used.

[b]Does not include $244 million engine component improvement cost programed by SPO.

[c]Includes $311 million component improvement cost and engineering effort.

EXPLANATION OF DIFFERENCES IN CAIG-ASD ESTIMATES

The difference between ASD's and CAIG's estimated total program costs is $1,638 million. There is also a $1,924 million difference between the CAIG estimate and the SAR estimate of June 30, 1972. The difference in both instances is due in part to the Air Force's not including component improvement cost in its estimate while CAIG estimated that cost at $311 million and included it in its estimate.

Development cost, $310 million

The CAIG estimate for aircraft development is $310 million higher than ASD's estimate. The difference in estimates illustrates how different assumptions by estimators can lead to significant variances in the analyses.

ASD did not develop an estimate of development cost but instead adopted the SAR estimate on the basis that 96 percent of the RDT&E cost has been programed through fiscal year 1974. However, only 54 percent of the RDT&E funds had actually been spent when ASD made the estimate. There were still uncertainties about development because the engine had not been approved for production, the one RDT&E aircraft manufactured had just begun flight tests, and most of the flight test program and major subsystem (avionics and armament) integration lay ahead.

CAIG criticized the ASD adoption of the SAR development estimate and pointed out that ASD had assumed that the SAR development estimate included all nonrecurring costs except $32 million for tooling. CAIG believed that not all nonrecurring costs occur during development because sizable costs for tooling and engineering occur during production and are prorated over the early production units.

The ASD assumption was based on its opinion that the F-15 program is structured differently than previous aircraft development and production programs. Practices cited which would significantly reduce the amount of nonrecurring costs

during production were the "hardware" demonstration concept, comprehensive prototyping of major subsystems, flight testing before procurement commitment, and predominately "hard-tooling" during the development phase.

At this time we are unable to determine which of the assumptions is more nearly correct. However, it is likely that some nonrecurring costs can be expected later in the program.

Procurement cost estimates

Airframe, $506 million

The $506 million higher CAIG estimate for airframe costs accounts for about 37 percent of the procurement cost variance in the two studies. ASD presented three parametric estimates of airframe cost in its study, one of which (case II) was designated as the preferred estimate. It was based upon cost data from two previous McDonnell Douglas fighter aircraft programs, the F-101 and F-4. Estimators made maximum use of the company's experience in terms of man-hour requirements, learning curves, and labor rates. The preferred airframe estimate was the highest of the three ASD estimates exceeding the SAR estimate by about 7 percent.

The CAIG airframe estimate was prepared using a RAND Corporation model with a data base of 29 assorted types of military aircraft, including: jet fighters of various ages, jet bombers, jet turboprop transports, and piston engine tranports. Due to different data bases that were used, the ASD estimate projects that airframe unit costs will reduce faster with quantity than the CAIG study does (a more favorable learning curve). This difference accounts for $113 million of the total difference in airframe costs.

The selection of aircraft for a data base and the choice of key parameters is determined by the estimator's judgment. CAIG chose to use 29 aircraft going back a number of years to

provide a wide spread in aircraft characteristics. ASD opted for two, both McDonnell built fighters, believing this choice more realistic. The difference in dollar value between these choices is not readily determined.

A $100 million difference occurred because ASD calculated the material cost at $57 per pound of aircraft weight as opposed to a $67 to $69 per pound range used by CAIG.

A $138 million difference in the airframe cost estimates is primarily due to differences in assumptions over the extent to which the cost of nonrecurring engineering is completed at the end of the development phase.

The remaining difference in airframe cost appears to be due to factors used to estimate the higher cost of using titanium in place of aluminum and differences in the models.

The RAND Corporation report on parametric estimating from which the CAIG chose its airframe model points out that greater estimating uncertainty occurs when the cost models are applied to aircraft whose technology or performance lies outside of the sample data base. Considerable new technology is being incorporated into the F-15; for example, greater use of titanium material, which places it outside the sample. To compensate for this, CAIG used a correction factor developed outside the airframe data base using SR-71 aircraft experience.

Propulsion, $433 million

CAIG's estimated engine procurement cost was $189 million higher than ASD's estimate. This, together with a $244 million component improvement cost, not included in the ASD estimate, resulted in a total difference of $433 million. ASD and CAIG used the same data base of 30 different gas turbine engines for their estimates. Two slightly different versions of the RAND Corporation engine parametric estimating models were employed, although CAIG's version had more parameters. The standard error of estimation for the two models was nearly the same but ASD's version had slightly smaller errors and gave a lower cost for the engine.

CAIG criticized ASD's engine estimate because it did not provide for product improvement and development cost after the engine passed its Military Qualification Test (MQT). ASD assumed that engine experience will remain relatively fixed and require less engineering following MQT. CAIG stated that experience shows over one-third of engine development occurs after MQT and ASD's estimate should have included about $244 million (identified in SAR) for engine product improvement. CAIG estimated future engine product improvement costs at $311 million.

Avionics and armament, $186 million

The CAIG procurement estimate is $186 million higher than the ASD estimate. ASD, after running tests to validate its performance, used a detailed avionics parametric cost model developed by the Radio Corporation of America. The CAIG estimate is based on a cost per pound basis using F-111A aircraft fire control, Mark II avionics equipment cost experience, and cost experience for avionics installed in other modern fighter aircraft. CAIG representatives intended to refine their avionics estimate because they lacked confidence in it.

ASD based its armament estimate on data in the June 1972 "Cost Information Report" and "Cost Performance Report." CAIG accepted this estimate without change.

Support and Spares, $203 million

ASD estimates for aerospace ground equipment and training equipment were based on existing detailed plans from the F-15 program office. Estimates were increased by certain percentages to account for items not yet identified and for anticipated engineering change orders. Spares cost were estimated by taking fixed percentages of the procurement cost of the supported element. CAIG estimated higher procurement costs for the total program. The application of standard factors for support and spares to this higher amount resulted in the $203 million variance between the two estimates.

COMMENTS ON ESTIMATES

Generally ASD and CAIG used reasonable assumptions and methodology in developing their parametric cost estimates. We feel improvements can be made to certain components of each estimate and some agreement is needed. They include:

1. ASD's independently assessing RDT&E cost instead of assuming the SAR estimate. There is sufficient difference between the programed amount and the completed amount of RDT&E to challenge the assumption that the development program is far enough along to preclude any cost growth.

2. Resolving the basic airframe weight of the aircraft used as data sources. There is a difference of opinion as to whether all the weight and cost of contractor-furnished electronics equipment was removed from the airframe weight to obtain the basic weight and cost. This discrepancy affects not only estimates of airframe material costs, but all airframe costs, and many related costs proportional to airframe costs (e.g. inflation.)

3. CAIG's revising the titanium correction factor and the avionics estimate. CAIG has new cost data from the development of the Navy F-14, an aircraft which is close to the F-15 in titanium content. CAIG reported using it together with new data obtained from McDonnell Douglas in reviewing their cost estimate. CAIG also is not satisfied with their avionics methodology and is looking for an alternative.

4. Agreeing on the basic engine characteristic values (e.g., thrust, turbine inlet temperature) that will be used in the parametric engine model. Propulsion estimates will still differ, however, because of the different models used.

The only important differences between the CAIG and ASD estimates not affected by these needed improvements and agreements

are the learning rates for airframe production. Learning rate differences are due to disparate aircraft data bases, and unless one changes to the other's base, this difference will remain. Though the ASD data base may appear to be more closely related to fighter aircraft and draws upon the experience of McDonnell Douglas, there is no assurance that it is better than RAND's base.

It is likely that if redetermined, the revised Air Force and CAIG estimates will again exceed the SAR estimate of June 30, 1972. The Development Concept Papers threshold costs are about 17 percent above the SAR cost. In view of overhead and inflation uncertainties identified in the risk analysis portion of the parametric study and the 20 to 33 percent statistical uncertainties in the parametric estimates, there is a distinct possibility that the Development Concept Papers threshold costs will be reached sometime during the life of the program.

DSARC reaction to the cost estimates

The ASD "F-15 Independent Parametric Cost Analysis" was prepared for submission to DSARC at a meeting held in October 1972. CAIG was briefed on this analysis approximately a week before the meeting and prepared a cost estimate for submission to DSARC. Despite the $1,638 million difference between the ASD and CAIG estimates in program cost, DSARC expressed little concern at that time.

Before a DSARC meeting on February 15, 1973, the Chairman of CAIG said "* * * there is no cost issue at the February 15 DSARC." The DSARC decision to be made at the meeting was described as concerned specifically with production of the first wing of 107 aircraft and "Neither the Air Force independent nor the CAIG estimates that actual costs will exceed the ceiling." The CAIG Chairman said, "It is possible, however, that a cost issue may arise at succeeding F-15 DSARCs (during CY 1974) in which subsequent buys are considered."

Following the February 1973 DSARC meeting, the Deputy Secretary of Defense directed the Air Force and CAIG to update their October 1972 F-15 total program cost analyses and report their findings to the Chairman of DSARC by June 30, 1973. The Comptroller of the Air Force office advised us in June that ASD and CAIG had coordinated efforts and were updating their estimates. The updated estimates were presented to DSARC on August 14, 1973. DSARC directed further study with the results to be presented to DSARC in approximately three weeks.

Need for cost analysis

In a previous report[1] to the Congress we pointed out that realistic cost estimating is indispensable to both the Congress and agency management for selecting and evaluating a new weapon system and for cost control during a system's acquisition process. While reviewing 47 weapon system acquisitions, we determined that $6.7 billion, or 43 percent of the cost growth which had occurred from development estimates to current estimates, was classified in the "estimating changes" category. We recommended that the Secretary of Defense develop and implement DOD-wide guidance necessary to provide a basis for a disciplined cost estimating process. Cited as particularly important was an independent review of cost estimates, including judgments by top officials on the need for realism in the cost estimates used in making major decisions.

The Assistant Secretary of Defense for Systems Analysis[2] said the Deputy Secretary of Defense had issued a memorandum requiring the Services to prepare an independent parametric estimate prior to the convening of the DSARC. Further, the Assistant Secretary of Defense for Systems Analysis was to insure that these estimates were properly reviewed and evaluated.

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[1]"Theory and Practice of Cost Estimating for Major Acquisitions" (B-163058, July 24, 1972).

[2]Since redesignated Director of Defense Program Analysis and Evaluation.

Inflation and cost growth

We did not review the ASD and CAIG estimates to determine if their inflation factors followed the Office of Management and Budget and OSD Comptroller guidelines. However, we were informed that DOD guidance[1] states that estimates for weapon systems will reflect anticipated price changes based on specific data, when available. When specific data are not available price increases will be determined on the basis of price level indexes. ASD said it used this approach in its independent estimate. ASD used F-15 labor rates for the airframe through 1976 and 5-percent inflation thereafter. Varying inflation factors were used for the other components; i.e., engine, 4 percent and avionics, 5 percent. The specific factors used are taken from "Cost Research Report No. 110"[2] which contains the official numbers to be used by ASD, including SPO's and the independent cost estimates.

CAIG informed us that it used the Air Force inflation factors in the aggregate.

SAR COST ESTIMATE

We reviewed the methodology, assumptions, and data used in preparing the SAR estimate (p. 5) by interviewing F-15 SPO officials and examining contracts, proposals, and other documentation provided by SPO. We attempted to determine the basis for the current SAR estimate of June 30, 1972. Although we examined program cost estimates, our review did not include verification of the accuracy of support data for all estimates.

SAR development estimate

The June 30, 1972, current estimate was $1,753.7 million. This estimate was based primarily on (1) contract prices

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[1]"DOD Budget Manual 7110-1-M," August 1972.

[2]Cost Research Report No. 110, "Historical and Forecasted Aeronautical Cost Indices," Cost Analysis Div., ASD Comptroller, January 1972.

negotiated with the airframe and engine contractors, (2) completed contracts for the conceptual and definition phases, (3) estimates for an Electronic Countermeasures study and a simulator not yet covered by contractual agreement, (4) completed effort and estimates by other Air Force test organizations of future test support activity, and (5) reserves.[1]

The estimate includes the following major elements:

Cost element	Estimate
	(millions)
Weapon system	$1,168.8
Engines	373.1
Other	211.8
Total	$1,753.7

SAR procurement estimate

The June 30, 1972, current estimate for procurement was $6,048.3 million. This estimate was based primarily on (1) learning curve projections of the initial negotiated target prices and later data furnished by the airframe contractor, (2) negotiated target prices for lots 2 and 3 and planning estimates proposed by the engine contractor for lots 4 to 8, (3) application of factors to the air vehicle and other estimates for peculiar support and initial spares, and (4) reserves.[2]

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[1]SPO prefers "programmed for effort not yet on contract."

[2]The Air Force uses the term "provisions for engineering change orders."

Major procurement estimate elements are as follows.

Cost element	Estimate
	(millions)
Airframe	$2,079.8
Electronics (avionics)	1,254.7
Armament	144.0
Other	23.5
	3,502.0
Engines	1,439.0
Air vehicle estimate	4,941.0
Peculiar support	591.9
Initial spares	515.4
Procurement estimate as of 6-30-72	$6,048.3

Observations

On the basis of prices renegotiated for engine lot 2 in February 1972, it appears that the SAR engine estimate may be understated. Since cost estimates for spare engines, modules, and the required quantities depend on this estimate, the initial spares estimate may also be understated.

We believe the SPO should reevaluate the estimates for engines, initial spare engines, and module requirements. The $14.5 million procurement reserve included in the engine estimate does not appear adequate.

As of June 30, 1972, the total RDT&E estimate was $1,753.7 million and the procurement estimate was $6,048.3 million. The remaining available reserves were $54.3 million and $417.9 million respectively.

CONCLUSIONS

The variance in the ASD and CAIG estimates should not be considered indicative at this time that any of the three existing estimates (SAR, ASD, CAIG) are inaccurate. Parametric estimating is an analytical technique subject to variances in findings because of differences in the type and source of data, assumptions, and models employed by different persons studying the same weapon system. As the developer of the RAND model used in the ASD airframe estimate cautioned--the cost estimating relationships are primarily intended for long-range planning studies and are not suitable for short-run financial management or control of airframe procurement.

DOD use of independent cost analysis is new, and improvements in its applications through experience are necessary. The Secretary of Defense in his letter establishing CAIG directed that Services and CAIG work closely together in developing uniform criteria for cost estimates. This practice should be encouraged.

Review of the Services' and CAIG independent estimates could be of considerable assistance to the Congressional Committees concerned with appropriations for major weapon systems. We recommend that the Chairman request the Secretary of of Defense provide the Services' and CAIG independent estimates as well as the SAR estimates to the Committees. The Chairman should also request that the services explain differences in these estimates and the reasons therefor.

Please advise me if we can further assist you in this matter. If you desire further information, we will be pleased to meet with you or your staff.

Sincerely yours,

Elmer B. Staats

Comptroller General
of the United States

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

74-0420

LOGISTICS AND COMMUNICATIONS DIVISION

B-146856

SEP 12 1973

The Honorable
The Secretary of Defense

Attention: Assistant Secretary of Defense
(Installations and Logistics)

Dear Mr. Secretary:

Beginning in January 1973, GAO visited selected Army, Navy, and Air Force installations to evaluate their procedures for providing common handtools to civilian and military personnel. During calendar year 1972, the Department of Defense (DOD) purchased handtools valued at about $25 million for new requirements or for replacements of worn, lost, or stolen tools.

The services used primarily two methods of issuing and controlling these tools: (1) issuing a toolkit to each worker and making him accountable for it and (2) issuing composite toolkits (CTKs) to various maintenance units and making supervisors accountable for them. Because of the sizable savings and other benefits by using CTKs, we are bringing this to your attention for possible use throughout DOD.

An individual toolkit contains all the common handtools, such as screwdrivers, wrenches, hammers, and pliers, which a worker needs. It can also contain tools unique to a trade or a worker's skill and tools normally issued as a kit. Generally, these kits are neither shared with other workers in the same vicinity nor used by other workers during a follow-on shift. Tools are replaced on a one-for-one basis when they are lost or broken; but no records are kept because of their low unit cost.

CTKs eliminate individual toolboxes, reduce the number of tools required, and provide greater control over them.

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Typically, CTKs are designed according to task location and contain sufficient numbers and types of tools to support the needs of a group of workers. They are generally made up of shadow boards (boards with silhouettes of each tool) for easier inventorying.

Several Air Force commands, including the Air Training Command (ATC), Tactical Air Command, and the Air Force Logistics Command (AFLC), have, to some extent, adopted the CTK concept.

ATC recently tested CTKs in both field and organizational maintenance squadrons at Randolph Air Force Base. Test results showed that CTKs (1) worked equally well in shops and on the flight line and (2) could be easily adapted to the civil engineers and communications maintenance activities. As a result of the test, ATC instructed its activities to start using CTKs by April 1973.

A Tactical Air Command Wing at Nellis Air Force Base has been using CTKs for about 3 years. It replaced 1,150 individual toolboxes with 170 CTKs. Total tools issued decreased from 215,400 to 51,600.

AFLC first tested CTKs at the Oklahoma City Air Materiel Area in 1972. The results included:

--No record of foreign object damage during test.

--A daily record, by shift, of tool control and ready inventory.

--A more complete set of tools than had been available to each worker.

--Surplus tools which allowed for faster replacement of unserviceable tools.

--Potential savings in tool inventory.

In April 1973 AFLC advised its other Air Materiel Areas to use, without exception, CTKs for civilian and military workers in AFLC maintenance activities for the following reasons:

1. To reduce tool procurement by eliminating individual toolboxes, minimize the time required for tool inventory, and insure maximum use.

2. To minimize foreign object damage by "at a glance" tool inventories and thus insure that no tools are left in the aircraft or engine.

3. To increase productivity by making tools readily available to the user.

The decision of the above Air Force commands to use CTKs instead of individual kits has resulted in verified decreased costs, improved tool control, and improved performance. It is possible that similar results could be expected if all appropriate DOD maintenance activities used CTKs. For example, other Air Force commands, the Navy, and the Army use individual kits even though they perform functions indentical or similar to those of other activities already using CTKs.

--Maintenance officials at Castle Air Force Base, a Strategic Air Command (SAC) base, said they would be interested in using CTKs in their maintenance operations but could not do so without headquarters instructions. They said they would welcome any system that would control tool losses and reduce foreign object damage.

Using CTKs would significantly reduce costs. Since maintenance chiefs at both field and organizational maintenance squadrons estimate only 60 percent of their men work on the largest shift, at least 40 percent of the 900 individual kits are now idle. They also estimate only 20 to 30 percent of the tools in a typical individual kit are used during a shift.

SAC initially tested CTKs at the squadron level at Beale Air Force Base. A SAC official said CTKs worked so well--even during development--that the squadron continued using them. SAC plans another test in 1974 of CTKs; if results are favorable, all SAC bases may use them.

--A training squadron at Lemoore Naval Air Station has been using CTKs. Two other squadrons are in various stages of implementing the CTK concept but 18 operational squardons are still using individual kits.

--At the Naval Air Rework Facility, Alameda, California, an official estimated that between 2,000 and 2,500 individual kits were issued. This facility overhauls and repairs aircraft, engines, and components much the same as Air Force depot maintenance activities which are now converting to CTKs. According to the AFLC study, using CTKs could reduce the number of handtools by about 60 percent and toolboxes by about 80 percent.

--At Sharpe Army Depot, the Directorate of Maintenance overhauls and repairs helicopters, fixed-wing aircraft, engines, and heavy equipment. This Directorate said that it had issued individual kits to about 500 civilian employees. Here also they are performing functions similar to those of the Air Force maintenance activities which have been directed to use CTKs. The Army Aeronautical Depot Maintenance Center at Corpus Christi, Texas, and Tooele Army Depot, Utah, issued about 2,200 and 1,000 individual tool kits, respectively, to maintenance employees.

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We plan no further work on this subject at this time. Using CTKs is an effective alternative to issuing individual toolkits, and we believe that substantial savings are possible if DOD expanded CTK use at other selected Army, Navy and Air Force maintenance and support activities.

We are bringing this matter to your attention and shall appreciate receiving your comments. If you, or any members of your staff, have any questions, we shall be pleased to discuss them in greater detail.

Sincerely yours,

F. J. Shafer

Fred J. Shafer
Director