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**REPORT TO THE
JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES**

72-0338

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**Review Of F-14
Aircraft Costs B-168664**

Department of the Navy

**BY THE COMPTROLLER GENERAL
OF THE UNITED STATES**

SEPT. 3 1971

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

B-168664

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Dear Mr. Chairman:

This is our response to your letters of July 6 and August 9, 1971, on the subject of the problems being encountered on the Navy's F-14 aircraft program.

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Before discussing the F-14 specifically, we would like to offer a few observations about the various estimates involved in acquiring weapons systems that apply in varying degrees to them all.

In the beginning of any new weapon system development there tends to be a certain amount of bias on the part of both the military service that wants to deploy the new system and the contractors that want to manufacture and sell that system. This bias may result in unrealistically low estimates of the cost to acquire the system, optimistic estimates of the time it will take to develop and produce the system and optimistic estimates of the performance that will be provided to the operating forces. There are two fundamental factors contributing to this situation.

First, there is the competition for the limited Department of Defense funds among the various service advocates of military weapon systems. In order to win this competition the advocate attempts to demonstrate that its proposed weapon system will be the most effective from the standpoint of costs, schedule, and performance. In demonstrating this, the advocate is optimistic in its predictions of what it will cost, how long it will take, and the performance that will be achieved. To do otherwise might jeopardize approval of the program funding. The resulting funding levels that are approved tend to ignore unforeseen technical as well as economic contingencies.

Second, when the contractors compete for the resulting weapon system contract, they are placed in a position of having to propose a cost that is within the already optimistically low funding level. Therefore, the contractors, like the military advocates, are motivated to a high degree of optimism in predicting solutions to development problems, performance and schedule guarantees, and the costs. To do otherwise could mean the loss of a multi-billion dollar contract.

It seems to us that these factors could well have been present in the F-14 program although their very nature makes it impossible to determine to what extent, if any, they were influential.

We have prepared our response in a format to cover the specific points outlined in your August 9th letter.

AIRFRAME COSTS

What are the factors attributed to a ceiling price reduction of more than \$400 million during final contract negotiations?

At the request of a Navy review team in March 1971, Grumman calculated its reduction as \$474 million. This figure takes into consideration the fact that the original proposal and the prices finally negotiated are based on somewhat different work statements. Grumman analyzed the \$474 million as follows:

	(millions)
Elimination of general and administrative expenses applied to Government-furnished equipment	\$112
Reduction of procurement cost estimate	197
Reduction of ceiling margins on Grumman's cost	165
	<u>\$474</u>

In relating this reduction to Grumman's projected loss on the F-14 program, it should be borne in mind that the loss estimate of \$367.4 million is based on a 313-aircraft buy whereas the reduction of \$474 million was based on a 469-aircraft buy. Grumman estimates a loss of \$556 million if it were to produce 469 aircraft under the present contract terms.

Did Grumman fail to tie up airframe subcontractors with firm contracts until well after award of the F-14 prime contract?

We reviewed 11 of the larger subcontracts included in the current estimate because their prices were significantly higher than the prices estimated for them in Grumman's proposal. Their current total price, based on 313 aircraft, is about \$464 million. This represents about 67 percent of Grumman's present estimate for subcontracted material. Grumman procurement personnel issued invitations to quote to prospective suppliers within an average of 11 calendar days after documents, needed by the subcontractors in order to prepare their proposals, had been prepared by other Grumman departments.

For these 11 subcontracts, an average of 2.8 months elapsed from the date of the F-14 contract to the dates of the invitations to quote; 1.4 months elapsed from the dates of the invitations to quote to their closing dates as amended; and 1.9 months elapsed between closing dates of the invitations to quote to the award dates. Thus, in total, there was an average of 6.1 months time between the award of the prime contract to the award of the subcontracts.

The F-14 Project Manager indicated that he did not view as exceptional Grumman's failure to have had definitive subcontracts prior to the date of prime contract award.

Grumman furnished letters from several subcontractors which indicate these subcontractors desire relief or upward price adjustments caused by spiraling inflation and reduced business. Therefore, the possibility of further subcontract cost increases still exists.

Currently, estimated subcontract costs are higher than indicated in Grumman's proposal primarily for three reasons: (1) the effects of inflation and reduced business base on the subcontractors, (2) underestimating of subcontract costs by Grumman, and (3) changes in the scope of work required of the subcontractors.

What are the factors attributed to extraordinary inflation and a decline in the originally forecast business base at Grumman?

Grumman's analysis of inflation and reduced business base for lots IV through VII, the annual options scheduled to be exercised this October and every October thereafter until 1974, reflects an estimated increase of \$234 million. This is composed of \$103 million attributed to inflation plus \$131 million attributed to a reduced business base. Enclosure II shows the primary reasons for Grumman's business base reduction. Enclosure III gives an indication of the extent of this reduction.

The figure of \$234 million does not take into account the effects of inflation and reduced business base as it concerns subcontractors. Grumman has performed a study with its major subcontractors which indicates that inflation and reduced business at subcontractors will increase Grumman's material costs by about \$282 million for lots IV through VII.

The total increase of \$516 million (\$282 million plus \$234 million) constitutes about 75 percent of the overall cost estimate increase of \$692 million shown for lots IV through VII.

What is the General Accounting Office's analysis of the Grumman airframe cost projections presented to the Government earlier this year, including: (a) an explanation of the assumptions made by Grumman in arriving at those projections; (b) other factors which might influence their validity; and (c) an explanation of the work done by GAO and the Navy to validate those projections, together with the results thereof?

The cost projections prepared by Grumman are premised on judgmental estimates and predictions of future economic and business conditions which understandably can be subject to significant change. The projections envision significant reductions in future Grumman business and continued inflation. The recent 90-day wage and price freeze and some type of further controls may have an impact on inflation.

At the time of the F-14 proposal, Grumman expected overall business to remain constant throughout the life of the contract. It now expects its overall business to decline sharply. Such forecasts can change drastically in the volatile aerospace industry.

Grumman's projection of a \$367 million loss was made in March 1971 and was based on a quantity of 313 F-14A aircraft. It was predicated on the following basic assumptions:

- that there will be continuous production. Any stretch or gap in the production schedule will necessitate new estimates.
- that no significant changes as a result of the flight test program will occur. According to the Navy, changes generally result from flight test programs and due to the complexity of the F-14, they could be major.
- that \$40 million is sufficient to cover any demands by subcontractors for upward adjustments to their option ceiling prices due to loss of business base or other problems. As indicated elsewhere in this letter, certain subcontractors have written Grumman requesting price adjustments.

We are attempting to verify the Grumman cost projections. Our initial efforts have been concerned with ascertaining the reasons for growth in costs of major subcontracted items. We are tracing the costs of selected items from amounts included for them in Grumman's proposal, through the initial subcontract prices negotiated, to the current prices, then to estimated ultimate prices. This work is still in its early stages.

In March and April 1971, a special Navy team reviewed the cost status of the F-14 program at Grumman. It concluded that Grumman could remain in a viable position on the F-14 program through calendar year 1973 despite an expected loss on lot IV aircraft unless certain

adverse conditions occurred. It concluded the company was financially able to produce 48 aircraft under lot IV in any case.

The Navy is now conducting a "SHOULD COST" study at Grumman to assist in pointing out areas of cost reduction not only on the F-14 program, but on all other Navy programs. The "SHOULD COST" study results will not be known until later this year.

What is Grumman's present position with respect to its willingness to incur and ability to absorb a loss on the F-14 program?

Grumman officials declined to estimate the amount of loss the company could bear on the F-14 program. They contend that they and their subcontractors have made substantial investments in the F-14 program and expect to make a fair return on producing an aircraft which can meet contractually specified performance milestones. Grumman officials indicated to us that the company would not continue production of the F-14 aircraft at a loss; however, by letter dated July 27, 1971, we understand that the company advised the Department of Defense that it would accept an order for 48 aircraft under option lot IV as provided by the contract.

^{c2} In testimony to the House Armed Services Committee, ^{H 500}
the Navy indicated that Grumman could offset much of its projected \$363 million airframe loss for lots III-VII with \$58 million of profits on spares and support items and \$176 million of profit on other business. What is the source of this data?

This data was prepared by a Naval Air Systems Command cost team that reviewed applicable records reflecting the overall status of Navy programs and corporate posture at Grumman during March and April 1971.

What profit rate does this assume on spares and support and how, if at all, does this rate differ from both the rate provided for under the Grumman-Navy contract and the rate assumed in previous F-14 SAR's?

No precise profit rates on spares and support were used. The Navy cost team estimated that Grumman's loss on the F-14 contract for 301 production aircraft, including profits from support work, would be \$308.7 million. Profit from other Grumman corporate programs over the period of F-14 production was estimated at \$176.4 million. The net loss of \$132.3 million would be about \$66 million after taxes. These estimates assume a pessimistic outlook on Grumman's business base, with little improvement in its sales position. The Navy feels Grumman could bear this loss, if necessary.

We discussed these estimates with members of the Navy team who participated in their preparation. They advised that in estimating the \$176.4 million profit on other corporate programs they had relied heavily on their judgment concerning future Navy work at Grumman. The Navy has traditionally been a primary Grumman customer. The officials we talked with emphasized that all the figures cited in the preceding paragraphs are merely broad estimates. They stated that no detailed breakdown exists.

What are the different sources of the \$176 million in profit on other business, and how much of the other business is firmly under contract at the present time?

The members of the Navy cost review team advised us that their basis for \$176 million profit in other business was highly judgmental and used what they termed "backlog analysis" of other Navy programs at Grumman. The team did not use precise evaluation methods and they did not attempt to quantify the risks. The above estimate of future profits might be high because potential overruns on other programs were not a factor in the estimate.

What is Grumman's own position on the accuracy of this Navy data?

We were advised that it is Grumman's firm corporate policy to refrain from preparing or releasing any projections of sales and income because it believes the very nature of defense business makes such projections highly hypothetical.

In light of Grumman's overall financial condition what is the maximum loss the company could expect to bear without filing for bankruptcy?

Bankruptcy is a statutory proceeding (Title 11 U.S.C.) which may occur, subject to approval of a Federal District Court, when a debtor is no longer able to pay its debts. In order to pay its debts, Grumman could take a variety of actions, such as the borrowing of additional funds, sale of assets, reduction of personnel, and/or discontinuing unproductive operations. Therefore, it is impossible for the General Accounting Office to predict what actions Grumman might take, if necessary, in order to continue the F-14 program and avoid insolvency. For this reason we are unable to say at what point, in terms of a dollar loss on the F-14 contract, Grumman would be forced to enter into bankruptcy proceedings.

What are the assumptions underlying present Navy estimates of unit airframe costs?

As shown in enclosure V, the Navy estimates a \$5.1 million airframe unit flyaway cost for a 301 airframe production program. This estimate

assumes that ceiling prices under the existing contract will not be broken and that abnormal inflation of \$151 million will occur.

ENGINE COSTS

The Navy has now indicated that it is presently planning on an F-14 program which does not include the use of "B" engines for the foreseeable future. How firm is the Navy's decision to abandon the "B" engines, at least for the first 301 production aircraft?

The Navy advised us that it has, for the time being, cancelled plans for a "B" version of the F-14 aircraft in the current program of 301 production aircraft; therefore, no production units of the advanced technology engine, which would have been used in the "B" version, will be purchased by the Navy in the near future. This means that the options under the Navy's production contract for this engine will not be exercised. Future Navy planning estimates, including those contained in the Selected Acquisition Report (SAR), will be based on buying F-14A aircraft only.

The Navy is continuing its participation with the Air Force in developing the new engine. The Navy advised us that it wanted time to accomplish more testing of the new engine before it committed itself to production. It advised us that when the "B" engine has been subjected to sufficient additional testing to satisfy the Navy as to its readiness for use, plans may be changed again to provide for its use in a "B" version aircraft. A production contract for the new engine could be awarded as early as 1974, we were told.

Work is also continuing at Grumman on changes to the airframe design necessary to accommodate the "B" engine. This work, priced at about \$30 million, was provided for under a change to the Grumman contract ordered prior to the decision to delete firm plans for the F-14B. We were advised that this work was allowed to continue since the costs involved had been largely incurred by the time the decision was made.

The greater thrust of the advanced technology engine would give the F-14B significantly more "dogfight" capability than the F-14A; however, the Navy takes the position that the F-14A will be superior to any potential enemy fighter aircraft in a dogfight. The F-14 Project Manager advised that actual performance of the "A" engine is about 12 to 15 percent better in all performance areas than called for in the design specifications.

Has use of the P-100 engine as a substitute been completely ruled out?

The Navy advised us that there are no plans to replace the advanced technology engine with another engine. We were told that consideration

had been given some time ago to using the TF-30-P100 engine for this purpose but that the decision had been made against it. The P-100 engine was developed originally for use on the F-111 program.

What part did each of the following factors play in the decision to drop the "B" engines: schedule slippage and cost growth in the development program; expectation of an interface problem with the airframe; and the Government's negotiating position with Grumman?

Except for the schedule slippages caused by the Navy's decision to perform more testing, the records at Pratt and Whitney's Florida Research and Development Center show that the "B" engine development program is generally on schedule. All major contractual milestones, as of June 1971, have been met. However, cost growth has been experienced.

The development contract has three line items: (1) the development itself, (2) fabrication of prototypes and support of flight tests, and (3) initial production quantities of the Air Force version of the engine. In July 1971, agreement was reached to increase the estimated cost of the development line item from \$271.5 million to \$393.7 million, an increase of \$122.2 million. The Navy and Air Force will bear \$110 million of this increase and the contractor will bear the remainder under the cost-plus-incentive-fee arrangement applicable to this portion of the contract.

Development covered under the contract carries the program from its inception in March 1970 through qualification testing scheduled for completion in June 1973. Contractor officials advised us that experience on prior programs indicated that component improvement costs in the 12 months following qualification testing may be as great as cost experienced in the 12 months before. The component improvement program is a contract option which has not yet been exercised.

We have not determined whether or not there would be a serious interface problem in mating the "B" engine to the F-14 airframe. However, the present Grumman contract is based on F-14A's only and there would be a contract change to cover the added production costs of the F-14B. This would be a change in the scope of work and would require price adjustments.

How legitimate were the three "B" engine-related cost problems I referred to in my speech, and would their likely effect be as I indicate if a decision were made later to equip F-14 aircraft with "B" engines?

This problem relates to your estimate of an \$800,000 F-14 unit cost increase over past Navy projections if "B" engines are costed at

ceiling rather than target. The average target price and ceiling price for each engine over the first three optional lots are about \$800,000 and \$1,100,000 respectively, or a difference of \$300,000 per engine. This would amount to a difference of \$600,000 per aircraft (2 X \$300,000) rather than the \$800,000 you suggest.

What additional costs would be incurred at that time because a restructured "B" engine production contract would have to be negotiated?

We do not know the answer to this question.

What are the costs, contractual and reprogramming aspects of the F-14A engines?

The initial quantity of engines for use in production units of the F-14A was procured under a fixed-price-incentive-successive-targets contract awarded in February 1970. This contract covered the Navy's calendar year 1971 buy of "A" engines (37 engines) as well as of several other types of Pratt & Whitney engines. The initial unit target price for the "A" engines was about \$715,500. This contract has been negated because the Navy subsequently decided to buy fewer than the minimum quantities specified in the contract. New prices for this buy must therefore be negotiated.

In June 1971 the contractor proposed a unit price of approximately \$977,000 for the 1971 buy of "A" engines. We were provided with cost information showing that the average unit cost of this buy was about \$1,000,000. The contractor attributes the cost growth to a change in accounting, to a reduced business base and to a rise in material costs. The accounting change and reduced business base are discussed further below.

The 1972 buy of 67 engines was included in a contract awarded in January 1971. Again, the contract type is fixed-price-incentive-successive-targets. Initial target prices have not been established. The contract provides, however, for provisional billing prices of \$1,150,000 per engine.

In June 1971 the Navy reprogrammed funds (subject to congressional veto) amounting to \$39 million from other programs to cover cost growth on "A" engines. Approximately \$7 million of this amount is related to research and development. The remaining \$32 million is applicable to production, including over \$5 million for spares. The same reprogramming action included amounts for other Pratt & Whitney engines.

About 63 percent of the cost growth at Pratt & Whitney was described in the reprogramming document as being applicable to decreased engine production levels and to unanticipated inflation. The remaining

37 percent was attributed to the accounting change previously mentioned. Details concerning the reduced business base and increased inflation are not provided in the reprogramming document. The accounting change is said to result in a more precise identification of costs by engine type. Under the old system certain direct labor and material costs tended to be averaged over all types of engines produced by Pratt & Whitney. Under the new system relatively new engines such as the "A" engine will bear a larger share of costs. This accounting change was described as being at the instigation of the Government.

Since "A" engines are being procured on an annual basis, as is customary for aircraft engines, the reduced business base and high inflation rates are likely to have a continuing effect on prices. In view of the \$977,000 unit price proposed for the 1971 buy and of the indicated unit price of \$1.15 million for the 1972 buy, the \$1.9 million included in the current Navy estimate for two engines for each airframe will not be sufficient. (See enclosure V.)

AVIONICS COSTS

To what extent are avionics costs firmly tied down under existing contracts?

Most production avionics for the complete F-14 program are not covered by definitized contractual agreements. However AWG-9 weapon control system production is covered by not-to-exceed ceiling price options in a definitized prototype production contract. The AWG-9 accounts for about 85 percent of the total F-14 avionics flyaway unit cost. Practically all of the other avionics are "off-the-shelf" items which are used on various other Navy aircraft.

The contractual arrangements for the AWG-9 are similar to those for the airframe in that ceiling priced multi-year production lot options have been provided. The prototype production contract for the AWG-9 provides for seven annual lot options beginning with fiscal year 1971. Like the airframe contract the AWG-9 option provision specifies maximum and minimum quantities for each year and provides a formula for determining the applicable ceiling price for any selected option quantity.

You indicated that the AWG-9 contract is a fixed-price incentive contract with successive reset provisions. The prototype production contract provided for a single target price reset. Only the prototype effort target price was to be reset, and the production lot options, provided for in the same contract, were not subject to the reset provision.

Is the Navy making a should-cost study of the AWG-9?

The Navy advised us that it is not making a should-cost study with respect to the AWG-9.

What are the increases in AWG-9 ceiling prices per unit as a result of reducing the quantity for a 301 aircraft purchase?

Under the option provision, the average AWG-9 unit ceiling price could range from \$1.597 million to \$2.511 million based on maximum versus minimum quantity seven year programs (889 and 285 systems respectively). Program periods of different lengths and quantities could have substantially different average unit ceiling prices. For example, the AWG-9 program to correspond with the 301 F-14 program which you mentioned, would extend through only five option periods under the AWG-9 contract and would have an average unit ceiling price of \$2.1 million. The differences between the above unit prices are the effect of quantity variations and do not constitute cost growth. The Navy's estimate for the average AWG-9 unit target price, based on 301 F-14 systems, is \$2 million of the \$2.3 million avionics estimate, and based on current agreements and projections, this estimated unit price appears to be realistic. (See enclosure V.)

The unit prices above are the average flyaway prices and include hardware production, engineering-type services, and allowances for engineering change proposals and expected inflation. Not included in this price are spares, provisioning services, support services and equipment.

Commencing with the fiscal year 1973 (third option) procurement, adjustments to ceiling prices may be applied for prospective options if the actual inflation exceeds the rates provided for in the contract. Determinations of abnormal inflation are to be based on data published by the Department of Labor, Bureau of Labor Statistics, and will occur if the labor index increases at other than 5 percent a year, plus or minus 4 cents, and the material index increases at other than 2 percent a year, plus or minus one point.

The Navy exercised the first AWG-9 production option in October 1970, for a quantity of 38 systems. In exercising the option the contractor was authorized to proceed with production under the option ceiling price limitation. As of August 1, 1971, a definitive target price for the first option lot had not been negotiated.

The Navy has also notified the contractor that it intends to exercise the second production option, as scheduled, in October 1971 for a quantity of 50 AWG-9's (above the minimum option quantity).

For both of these options the contractor has submitted price proposals for target prices below the option ceiling prices. The proposed unit target price for the first option was \$2.79 million. The unit ceiling price for the quantity purchased under that option was \$3.04 million. Relative to the second option the proposed unit target price was \$2.10 million whereas the ceiling price was \$2.36 million.

Documentation which we examined indicates that the contractor is generally meeting cost objectives on the AWG-9 prototype production effort. Data also showed that deliveries of these units are being made on schedule. The regular production units also appear to be on schedule and to be meeting cost objectives.

What are the increases in other avionics?

The carrier aircraft inertial navigation system (CAINS) is the second most costly avionics subsystem.

CAINS production is under fixed-price options to the development contract (options for fiscal years 1971 and 1972). We understand the contractor has overrun the target cost for the development effort and has experienced costs in excess of the option prices on the two production lots, which together provide for 37 CAINS sets. The average contract price of these sets is \$53,477 each.

The Navy is currently evaluating the contractor's response to a request for quotation for follow-on production. We were informed that the price proposed for minimum quantities was \$86,121 per set. We were advised by a Government official at the supplier's plant that although lower costs per set could be expected for higher quantities, the price would not be as low as the current prices.

The text of your speech contains the comment that internal Navy cost projections for the total avionics package have jumped from \$2.6 million to \$4.3 million per plane during the last year. The F-14 Project Manager denies this. He states further that all avionics equipment is on target and is projected to remain so.

SPARES AND SUPPORT ITEMS

What is the basis for the Navy's estimates for spares and support items?

The SAR estimate for spares based on 463 production units shows \$820 million. (See enclosure V.) This was a very early estimate prepared in 1968 before the prime contract was awarded. The March 1971 estimate based on 710 production units shows \$833 million for spares. We inquired as to why there was not a greater difference between these two cost figures since they were predicated on substantially different planned aircraft buys. The individuals we discussed this matter with indicated that they were unable to discuss the early estimate since they no longer had the necessary documentation. We were told that the F-14 spares and support estimates had been subjected to "special analyses" which resulted in downward adjustments. In the case of spares the adjustment was apparently substantial. The Navy termed this a "scrubbing"

process. This event occurred in mid-1969, and was performed, we understand, at the instigation of the Deputy Chief of Naval Operations (Air). The March 1971 estimate based on 710 aircraft and the current estimate based on 301 production units reflect these adjustments.

The scrubbed estimates were predicated on the elimination of two Navy installations as base support sites for the F-14 aircraft. In addition, the level of planned base support at two other sites was reduced. Also, a reduced unit flying-hours-per-month factor was used in the calculations.

The estimate for spares based on a 301 aircraft buy is \$514 million. This figure appears to be reasonable in comparison with the estimate of \$833 million based on 710 aircraft.

The history of estimates for the support item titled "Training Equipment and Other" is similar to that described for initial spares.

The other support item is ground support equipment. As can be seen by reviewing enclosure V, the amount estimated for this item seems to bear a logical relationship to aircraft flyaway costs; that is, the amount estimated for ground support equipment has gone up as a percentage of flyaway costs as the planned number of aircraft has gone down. Because of this fact we did not review the estimate for ground support equipment further.

What is the extent to which prices for spares and support items are firmly established under existing contracts?

The estimates for spares and support items are not based on firmly established contract prices. The F-14 program has not reached the point when such contracts would be placed. The pricing of these estimates is based, to a considerable extent, on experience gained on prior similar Navy aircraft programs and on aircraft flyaway costs. The F-4 program is considered the most similar to the F-14.

SCHEDULE SLIPPAGE

What price increases might be expected, in the opinion of both the Navy and Grumman, if it became necessary to reduce the presently projected lot IV buy (a) to 20-30 aircraft, with a 5-month lot III stretch, or (b) to zero aircraft, with a 12-month lot III stretch?

The Navy plans to exercise option lot IV as scheduled in the contract and, as mentioned previously, Grumman has advised the Department of Defense that it will accept an order for 48 aircraft under lot IV. This is the minimum quantity permitted under this option. Grumman earlier prepared cost estimates of various stretchouts for

lot III. For a 12-month lot III stretch and a zero aircraft lot IV buy, Grumman estimated a lot III cost increase of \$77.4 million. This did not include the cost impact of a similar stretchout of the aircraft engines and avionics and was premised on the purchase of 60 aircraft under lot V. Other estimates prepared by Grumman showed costs ranging from \$20 million to \$107 million for a stretchout of lot III for 6 or 18 months.

It should be recognized that any change which results in a buy of less than 48 aircraft for lot IV would negate present contractual ceiling prices for that and all subsequent optional lots and would thus require new pricing arrangements.

How do these estimates compare with the estimated increase which the GAO, on the basis of its experience with other aircraft programs, might expect to find?

We do not have the information needed to make meaningful comparisons of the estimates to stretch the F-14 schedule with the costs to stretch prior aircraft programs. However, it is reasonable to assume that costs will increase whenever there is a schedule stretchout or other delay.

* * * *

As you recognized in your August 9th letter, it is not possible to predict with any degree of certainty the ultimate production unit cost of the F-14. There are too many variables and too many unknowns.

Our comments with respect to the cost elements comprising your estimate of \$18 to \$20 million for 301 aircraft are presented in enclosure I. Enclosures IV and V show current Navy estimates of production unit cost.


Enclosures II and III to this letter contain information which the contractor considers to be confidential, the disclosure of which may be in violation of 18 U.S.C. 1905.

Given the time constraints of a September 1, 1971 deadline and the complexity of the F-14 program, we have tried to provide you as much data as possible.

We plan to make no further distribution of this letter unless copies are specifically requested, and then copies will be distributed

only after your agreement has been obtained or public announcement has been made by you concerning the contents of the report.

Sincerely yours,


Acting Comptroller General
of the United States

Enclosures

CI + R

The Honorable William Proxmire, Chairman
Joint Economic Committee
Congress of the United States

ANALYSIS OF PRODUCTION UNIT COST
PROJECTION BASED ON 301 AIRCRAFT
(Millions of Dollars)

<u>Increased Cost Factors</u>	<u>Amount of Increase</u>	<u>Cumulative Total</u>	<u>GAO Comments</u>
Base estimate		\$12.3	This figure is in agreement with information provided by the Navy when reduced by "B" engine related costs. See footnote 1 of enclosure IV.
Costs above ceiling	\$ 1.7	14.0	About \$.5 million of this amount can be assigned to abnormal economic escalation which will be picked up by the Government under the contract. The remaining \$1.2 million is based on the assumption that the Government will bear the cost of the Grumman overrun. This may or may not happen. We have no specific information which would indicate that the Government will assume this cost. As mentioned on page 5 of the letter, Grumman has advised the Department of Defense that it will accept an order for lot IV as provided by the contract.
Airframe cost of the "B" engine	.2	14.2	The F-14B program has been canceled, however, the Navy estimated the recurring airframe costs brought about by the new engine would have been \$.1 million. In addition to this recurring cost there would have been about \$15 million in non-recurring production costs. See footnote 2 on enclosure IV. Grumman estimated a recurring cost of \$.126 million.
Cost spread between contract target and ceiling for "B" engine	.8	15.0	As indicated on page 9 of our letter, this figure would have been about \$.6 million.
Cost to retrofit F-14A's with "B" engines	.3	15.3	The Navy estimated roughly the same unit amount. See enclosure IV.

<p>Cost growth on avionics</p>	<p>1.7</p>	<p>17.0</p>	<p>This amount is cited as coming from a Navy estimate. The F-14 Project Manager denied the validity of this figure. He stated that there is no cost growth on avionics items. On the AWG-9 fire control system there has been an increase in the estimate, however, this increase is due to a decrease in the quantity planned for purchase (see page 11 of the letter). In any event the increase is taken into consideration in the \$12.2 Navy base estimate.</p>
<p>Additional costs due to schedule slippage</p>	<p>1.0</p>	<p>18.0</p>	<p>The Navy plans to exercise option lot IV as scheduled in the contract. As mentioned in the letter Grumman has agreed to accept an order under lot IV, thus, there should be no schedule slippage. Grumman estimated a 12-month stretchout under lot III and a zero buy for lot IV would be about \$77.4 million. This is applicable to the airframe only.</p>
<p>Contingencies: Concurrence, "B" engine contract default, GFE contract defaults, Grumman subcontractor defaults</p>	<p>2.0</p>	<p>20.0</p>	<p>We recognize that there are contingencies in the F-14 program which could result in substantial additional costs, however, we are unable to estimate the amount of such costs or to evaluate validity of the \$2.0 million cited.</p>
	<p><u>\$7.7</u></p>	<p><u>\$20.0</u></p>	

Enclosures II and III have been omitted from this copy since they contain information which the contractor considers confidential business data. The public disclosure of such data may be in violation of 18 U.S.C. 1905.

PRODUCTION UNIT COST
COMPARISON CHART
(Millions of Dollars)

	Senator Proxmire's Estimate		Navy's Estimate		Navy's Current Position	
	(54 A's, 247 B's)		(54 A's, 247 B's)		(301 A's)	
<u>301 A/C</u>	<u>Cost</u>	<u>Unit Price</u>	<u>Cost</u>	<u>Unit Price</u>	<u>Cost</u>	<u>Unit Price</u>
Base Estimate	\$3705.0	\$12.3 ^{1/}	\$3705.0	\$12.3	\$3663.0	\$12.2 ^{1/}
*Abn. Escl. GAC	151.0	.5	151.0	.5	151.0	.5
*GAC Cost	363.9	1.2	--			
Subtotal	<u>4219.9</u>	<u>14.0</u>	<u>3856.0</u>	<u>12.8</u>	<u>3814.0</u>	<u>12.7</u>
"B" Engine Interface	60.2	.2	40.0 ^{2/}	.1		
Engine Cost	240.8	.8	64.0	.2		
Retrofit "A" to "B"	90.3	.3	76.0	.3		
Subtotal	<u>4611.2</u>	<u>15.3</u>	<u>4036.0</u>	<u>13.4</u>	<u>3814.0</u>	<u>12.7</u>
Avionics Growth	511.7	1.7				
No FY 72 Buy	300.0	1.0				
Contingency	600.0	2.0				
 Concurrency						
"B" Engine Contract default						
*GFE Contract defaults						
*GAC Subcontractor defaults						
 Total	 <u><u>\$6022.9</u></u>	 <u><u>\$20.0</u></u>	 <u><u>\$4036.0</u></u>	 <u><u>\$13.4</u></u>	 <u><u>\$3814.0</u></u>	 <u><u>\$12.7</u></u>

^{1/} The \$.1 million difference between Senator Proxmire's base estimate and the Navy's is attributed by the Navy to the fact that the \$12.3 million figure reflects amounts included for the F-14B. Part of the difference is due to rounding.

^{2/} About \$15 million of this amount is nonrecurring production costs. The remainder is recurring costs of about \$.1 million per aircraft for 247 aircraft.

* Grumman Aerospace Corporation (GAC) and Government-furnished Equipment (GFE)

COMPARISON OF VARIOUS NAVY COST
ESTIMATES ON F-14 PROGRAM
(Dollars in millions)

	<u>JANUARY 1969</u> <u>1/</u>			<u>MARCH 1971</u> <u>2/</u>			<u>JULY 1971</u> <u>3/</u>		
	<u>Cost</u>	<u>Unit</u>	<u>Percent of Flyaway</u>	<u>Cost</u>	<u>Unit</u>	<u>Percent of Flyaway</u>	<u>Cost</u>	<u>Unit</u>	<u>Percent of Flyaway</u>
<u>PRODUCTION COST</u>									
Number of production units	<u>463</u>			<u>710</u>			<u>301</u>		
<u>FLYAWAY COST</u>									
Airframe	\$2003	\$ 4.3	52.2	\$2715	\$ 3.8	49.2	\$15457/	\$ 5.1	54.5
Engines & Accessories	753	1.6	19.6	1296	1.8	23.5	5574/	1.9	19.6
Electronics(avionics)	1034	2.2	27.0	1426	2.0	25.9	7028/	2.3	24.8
Armament & other									
Government--Furnished equipment	<u>47</u>	<u>.1</u>	<u>1.2</u>	<u>75</u>	<u>.1</u>	<u>1.4</u>	<u>31</u>	<u>.1</u>	<u>1.1</u>
	<u>3837</u>	<u>8.2</u>	<u>100.0</u>	<u>5512</u>	<u>7.7</u>	<u>100.0</u>	<u>2835</u>	<u>9.4</u>	<u>100.0</u>
<u>SUPPORT AND INITIAL SPARES</u>									
Ground support equipment	314	.7	8.2	402	.6	7.3	35710/	1.2	12.6
Training & other equip-ment	221	.5	5.7	2326/	.3	4.2	108	.4	3.8
Initial spares	820	1.8	21.4	8336/	1.2	15.1	514	1.7	18.1
TOTAL PRODUCTION	<u>5192</u>	<u>\$11.2</u>	<u>135.3</u>	<u>6979</u>	<u>\$ 9.8</u>	<u>126.6</u>	<u>3814</u>	<u>\$12.7</u>	<u>134.5</u>
DEVELOPMENT COST	974			1393			13935/		
MILITARY CONSTRUCTION	-0-			5			59/		
Total F-14 program	<u>\$6166</u>	<u>\$13.1</u>		<u>\$8377</u>	<u>\$11.6</u>		<u>\$5212</u>	<u>\$16.7</u>	
Total number of units	<u>469</u>			<u>722</u>			<u>313</u>		

Footnotes: (See following page)

FOOTNOTES TO NAVY F-14 COST ESTIMATES

- 1/ The January 1969 estimate was premised on buying all F-14A models.
- 2/ The March 1971 estimate was premised on buying 66 F-14A's and 656 F-14B's.
- 3/ The July 1971 estimate was premised on buying all F-14A models.
- 4/ Does not include a \$39 million reprogramming action for F-14A engines.
- 5/ Does not include amounts to be negotiated for stretch-out of F-14B engine development schedule.
- 6/ The original estimates were higher, but Navy officials "scrubbed" those estimates down to the amount shown, \$833 million.
- 7/ This amount (\$1545 million) assumes the original ceiling prices established with Grumman Aerospace Corp. in February 1969 will not be renegotiated upward.
- 8/ This amount (\$702 million) provides for the AWG-9 system at or near target price while prior estimates were at or near ceiling price. The AWG-9 accounts for about 85 percent of the electronics cost in the F-14.
- 9/ This amount (\$5212 million) includes a provision for abnormal economic inflation while prior estimates do not provide for abnormal economic inflation.
- 10/ This amount (\$357 million) provides for higher than anticipated support costs for the special ground support equipment for the AWG-9. The special ground support equipment for the AWG-9 accounts for about \$160 million.

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