REPORT TO THE CHAIRMAN, PREPAREDNESS INVESTIGATING SUBCOMMITTEE, SENATE COMMITTEE ON ARMED SERVICES

Contractual Features And Related Matters In The S-3A Aircraft Program B-163058

Department of the Navy

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

MARCH 29, 1971

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

B-163058

Dear Mr. Chairman:

This is our report on contractual features and related matters in the Navy's S-3A aircraft program. Our review was made in response to your request dated July 9, 1970. The significant contents of the report are summarized in the digest which is bound in the report.

During the course of our review we provided copies of our report draft to representatives of the Department of Defense and the Department of the Navy for review and discussion. We did not submit the report to officials of the Department of Defense for written comments.

We plan to make no further distribution of this report 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,

Comptroller General
of the United States

The Honorable John C. Stennis, Chairman
Preparedness Investigating Subcommittee
Committee on Armed Services
United States Senate

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WHY THE REVIEW WAS MADE

The Chairman of the Preparedness Investigating Subcommittee, Senate Committee on Armed Services, asked the General Accounting Office (GAO) to assist the subcommittee in its analysis of the contractual features of the Navy's program for developing and producing a twin-jet, four-man-crew, carrier-based antisubmarine aircraft, the S-3A.

It was suggested that GAO include in its review areas of the structure of the contract, cost and pricing provisions, management controls, and extent of concurrency between development and production; that is, how much production is under way before development of the aircraft is completed.

FINDINGS AND CONCLUSIONS

Problems of inflexibility

Essentially the contract is a "total package procurement," in that development of the aircraft and its production are tied together in one contract which was awarded after one competition. The contractor is the Lockheed-California Company of the Lockheed Corporation.

From a strictly legal standpoint, the contract appears to protect the Government's interests adequately.

However, a possible vulnerable feature is that the contract may be tightly drawn in favor of the Government to an unrealistic degree. Unforeseen technical or financial problems, or both, may prove that to be true. (See p. 10.)

Development by its very nature involves uncertainty, and there should be flexibility in the early stages of a development program. That flexibility should include appropriate pricing provisions and allowance for alternative approaches, with costs and technical factors being continually assessed by the Government and the contractor.

When serious problems come to light in an inflexible contract situation, the attention of both parties tends to shift from the primary goal of

achieving an acceptable product. The contractor tends to search for ways to acquire additional funds, and the Government tends to concentrate on strict enforcement of the contract.

The situation can deteriorate until the highest officials of the Department of Defense, the Congress, or ultimately the courts must resolve the matter. By then, the Government is in an untenable position. It still needs the weapon system, and forcing the contractor out of business will not get it. The Government cannot easily begin again with a new contractor because that could bring prohibitive costs and delay; moreover, it is difficult to transfer technical and engineering knowledge from one contractor to another.

The only viable course is to introduce flexibility, belatedly, by ignoring the original tight contract terms, relaxing specifications realistically, and providing more money to get the job done.

Contract structure

The S-3A contract was developed in a period of transition between the former Department of Defense (DOD) administration and the present one. It contains features reflecting the procurement policies of both. On the one hand, it combines development and production in a single contract, and development is procured on a fixed-price incentive basis. (See p. 16.) On the other hand, it permits the Government to delay the start of various production phases until prescribed goals have been reached in development, or for 6 months, whichever is earlier. (See p. 22.) A full discussion of contractual features is in chapter 2, pages 8 to 42.

The optimism that was characteristic of previous major weapon acquisition programs seems to be present in the S-3A program. Department officials have testified that, at the start of any development program, there are "driving forces" that make for a lack of realism and for a sense of optimism. Planners tend to overstate the threat, which means overstated requirements. Technical people, in both industry and Government, are always optimistic about achieving performance characteristics, the length of time development will take, and cost. The Government wants the weapon system and the contractor wants to produce it, so both have incentive to underestimate costs so that the project will be approved.

Evidences of optimistic pricing and a tightly drawn contract include the following facts.

- --Navy's cost estimate for the development effort was about $45 million, or 11 percent higher than Lockheed's estimate. (See p. 13.)

- --Navy's cost estimate for production option lots was $60 million, or 6.5 percent higher than Lockheed's estimate. (See p. 13.)

- --Lockheed's price for the development effort was some $30 million lower than its competitor, although the Lockheed proposal offered a more sophisticated weapon system. (See p. 13.)

--The records of negotiation clearly indicate that the Navy expects Lockheed will experience costs over target on the development work. (See p. 13.)

--The basic aspects of the contract structure that impose substantial financial risks on the contractor are:

1. The development portion of the contract is on a fixed-price incentive basis. In any major weapon system development, there is a significant degree of technical uncertainty. If unexpected technical problems are encountered, the contractor must bear a major portion of the resulting financial burden.

2. The contract provides options for production quantities of aircraft under binding ceiling prices. Under such an arrangement, the contractor is subject to the effect or production of unexpected development problems.

Although the Navy did not obtain more favorable prices from Lockheed during negotiations, it did require certain provisions that had not been mentioned in the request for proposals. These provisions increased Lockheed's financial risks, yet they were accepted at no increase in price. The new provisions included the Variable Quantity Option provision and the Pricing of Changes clause. (See p. 14.)

Additionally, Lockheed had predicated its proposal on the inclusion in the contract of a clause providing for abnormal economic inflation adjustments to each of the production lot option prices. The Government agreed to adjustments for abnormal economic inflation only with respect to the last two option lots. Furthermore, the abnormal inflation coverage that was agreed to is incomplete. (See pp. 30 to 32.)

Management controls

The management controls for the S-3A include Navy and contractor project management organizations, a contractor performance measuring and reporting system, and various techniques for program assessment by top officials of DOD. Generally, the controls appear adequate, if properly applied.

Extent of concurrency

The extent of planned concurrency between development and production of the S-3A is described in chapter 4, pages 51 to 54.)

MATTERS FOR CONSIDERATION BY THE SUBCOMMITTEE

Potential problem areas are listed in chapter 5, pages 55 to 59. Some of the more important areas are described below.

Possible need for relief for contractor

The conservative pricing and tight structuring of the contract may force the contractor to seek relief from the Government in order to continue work. (See pp. 8 to 15.) Potential events that could precipitate such a need and, thus, should be monitored by the Subcommittee, are

--an increase in the rate of economic inflation or even a continuance of the present rate for a prolonged time (see p. 55);

--the occurrence of major development problems (see p. 55); and

--ordering by the Navy of minimum, or near minimum, quantities of the aircraft, as permitted under the production options (see p. 55.)

Production decision

A decision on whether the S-3A will go into production is scheduled in February or March 1972. That date may be premature and may not allow time for technical data from tests that would be available in a few months more to the decisionmakers. Also, it appears that the decision will be made in an atmosphere where program advocates are overly influential. GAO believes that consideration should be given to conducting an assessment of the S-3A, independent of program management, prior to the production decision. (See p. 56.)

Concurrency of development and production

Under the plan to start production before development is completed, there is the real possibility that, after many aircraft are manufactured or in production, tests will show that significant changes are needed to ensure an effective weapon system. Changes then would have to be made to completed or partially completed units and would require substantial additional amounts of time and money. (See p. 57.)

Responsibility for total system performance

The contract purports to impose total responsibility for performance of the S-3A system on the prime contractor (Lockheed). However, the Navy negotiator states that, under some circumstances, the Government must pay for modifying Government-furnished equipment so that it will be suitable for use in the S-3A. An attorney for the Naval Air Systems Command disagrees. The variance in interpretation indicates that a dispute may arise in that area. (See p. 58.)

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ABBREVIATIONS

ASPR	Armed Services Procurement Regulation
AWACS	Airborne Warning and Control System
DOD	Department of Defense
GAO	General Accounting Office

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CHAPTER 1

INTRODUCTION

The General Accounting Office has performed an analysis of the Department of the Navy contract for development and production of the S-3A aircraft weapon system. Our analysis was performed in response to the request dated July 9, 1970, from the Chairman, Preparedness Investigating Subcommittee, Committee on Armed Services, United States Senate. (See app. I.) In the same request, the Chairman also requested a similar analysis of the Department of the Air Force contract for development and production of the Airborne Warning and Control System (AWACS). The AWACS analysis is the subject of a separate report.

The Chairman expressed an interest in our opinions on the merits of the management and contractual aspects of the S-3A program and any potential problem areas that should be monitored. The Chairman wanted our analyses to include the areas of contractual structure, cost and pricing provisions, management controls and the extent of concurrency between development and production in the S-3A program.

THE S-3A MISSION

The mission of the S-3A is antisubmarine warfare: to seek and destroy hostile submarines. The S-3A is a twin-jet engine aircraft with a four-man crew, designed to operate from an aircraft carrier. The jet engines will be the newly developed TF-34-2 General Electric high-bypass turbofan engines developing about 9,000 pounds of thrust each.

The heart of the S-3A weapon system will be its highly sophisticated and complex avionics (aviation electronics) subsystems. For example, one of the key avionics subsystems is the Univac general-purpose digital computer. This computer will do such things as preflight checkout of other subsystems, navigational computations, tactical data processing, acoustic contacts classification, and weapon trajectories calculation and will indicate when one of the subsystems is malfunctioning.

We have included an illustration of the S-3A in order to describe the overall physical dimensions of the aircraft and point out such features as the folded wings and tail that are characteristic of carrier-based aircraft. (See fig. 1, p. 7.)

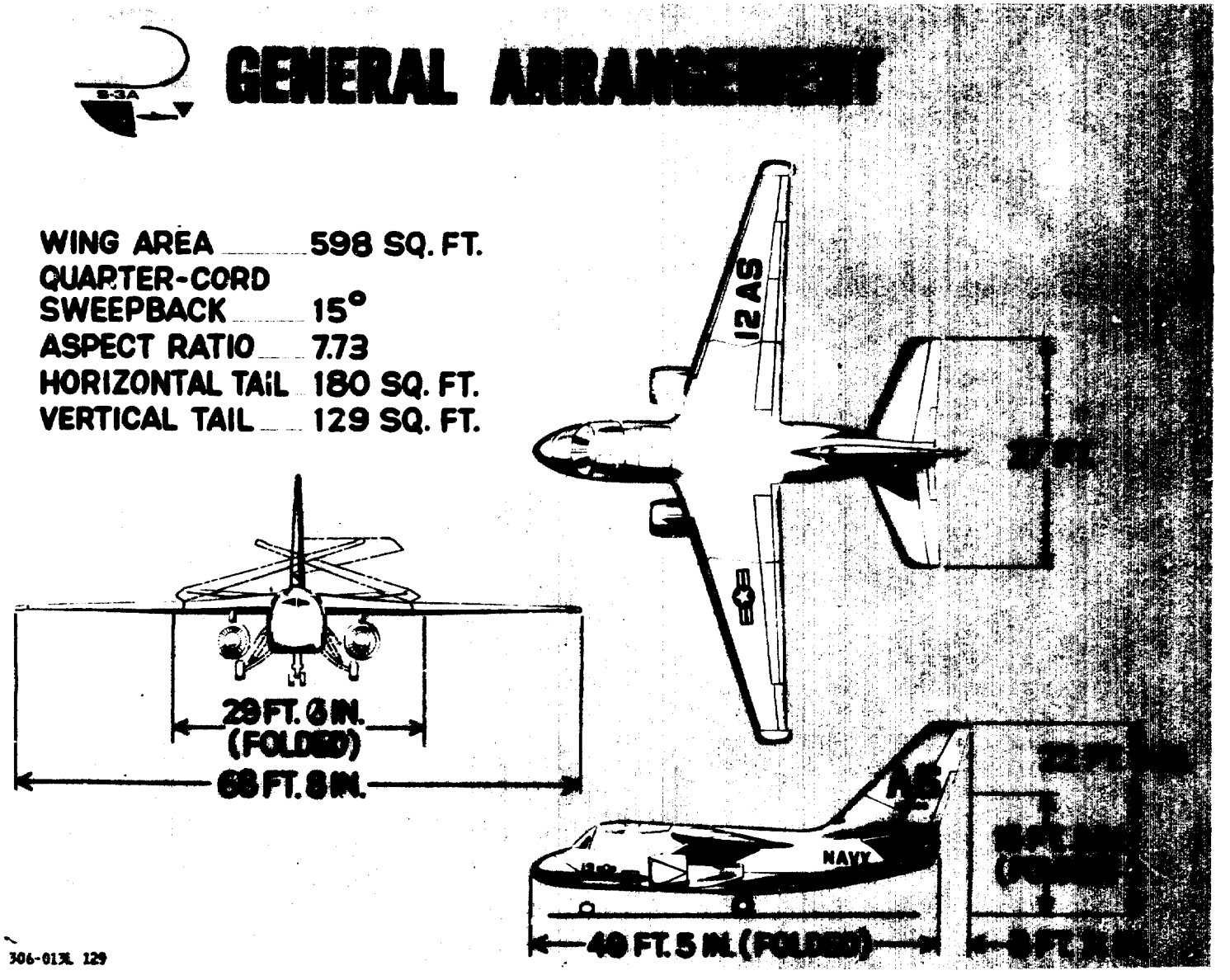
S-3A
GENERAL ARRANGEMENT
WING AREA 598 SQ. FT.
QUARTER-CORD SWEEPBACK 15°
ASPECT RATIO 7.73
HORIZONTAL TAIL 180 SQ. FT.
VERTICAL TAIL 129 SQ. FT.
29 FT. 6 IN. (FOLDED)
68 FT. 8 IN.
NAVY
40 FT. 5 IN. (FOLDED)
306-013L 129

Figure 1

CHAPTER 2

CONTRACTUAL ARRANGEMENTS

CONTRACT AWARD BACKGROUND

In late December 1967 the Navy issued requests for proposals to the aircraft industry. Five major defense contractors responded. Two of these contractors, the Convair Division of General Dynamics and the Lockheed-California Company of the Lockheed Corporation, were awarded contracts for contract definition in August 1968 and were requested to submit firm cost and technical proposals for engineering development and production of the S-3A.

In August 1969 Lockheed was declared the winner of the competition and was awarded a fixed-price incentive contract for the engineering development of the S-3A and for six research and development aircraft at a ceiling price of $461 million. The contract also includes five options for additional aircraft. The first option lot (contract lot II) for two additional research and development aircraft was exercised on October 1, 1970. The other four options are for production aircraft.

The contract was originally structured so that eight research and development aircraft were included in a single lot. However, for funding reasons, two of the research and development aircraft were placed in a second lot before contract award, with six aircraft remaining in lot I.

The S-3A weapon system contract was the result of intensive competition during the contract definition phase. In 1969, which has been labeled by the financial community as a disaster year for the aerospace industry, the competition was intensive because both contractors were seeking the award of a contract for development and production of the S-3A weapon system valued at about $1.7 billion.

In a procurement environment such as this, the Government has considerable bargaining power in establishing contract terms and conditions. Each contender tends to acquiesce to the Government's conditions for fear that the other

contractor will accept and that this will result in the loss of the multibillion-dollar procurement prize to the reluctant contractor. The Government and defense contractors are well aware of the hazards of this procurement system. Both competitors for the S-3A program had encountered significant problems on prior Government programs: General Dynamics with its F-111 program and Lockheed with its C-5A transport, AH-56A Cheyenne helicopter, and Short Range Attack Missile motor programs.

The optimism that has characterized prior major weapon acquisition programs also seems to be present in the S-3A program. At congressional hearings DOD officials have testified that, at the beginning of any new development program, there are "driving forces" which make for a lack of realism and a sense of optimism. Planners tend to overstate the threat, which means overstated requirements. Then the technical people, both in industry and in Government, are always optimistic about the performance characteristics they can achieve, how long the development will take, and what it will cost. The user wants the new weapon system and the contractor wants to produce it, so both have a great incentive to underestimate the cost so that the project will be approved.

OVERALL MERITS OF CONTRACTUAL ARRANGEMENTS

From a strictly legal point of view, we are of the opinion that the S-3A contractual instrument adequately protects the interest of the Government in that, except for the matter discussed on page 38, there are no obvious "loopholes" or ambiguities providing an opportunity for the contractor to evade the apparent intent of the contract clauses. It is our opinion that, if the S-3A contract does contain a vulnerable feature, it is the possibility that unforeseen technical and/or financial problems may prove that the contract is too tightly drawn in favor of the Government.

The ultimate purpose of a contractual instrument is to define the rights and duties of the respective parties and, at least in Government contracts, to equitably allocate the financial risks to be assumed by the parties. A contract which places undue risk on the contractor--either by means of contract type or by means of too tightly drawn risk-allocating clauses--may fail because it will not allow delivery of an acceptable product within contractual limitations. The result of such a contract is that the Government pays more than the contractual price for the end product and possibly more than the price for which the end product could have been secured had a more realistic contract originally been entered into. Thus, the recent proposed "restructuring" of the C-5A contract into a "fixed loss" contract, in effect, ignores the terms of the original contract document to allow delivery of an acceptable end product. While the financial pressure forcing such restructuring stems, in part, from the reduced levels of both defense and commercial business, the pressure may also be said to stem, at least in part, from overburdensome contracts.

The apparent economy of a tightly drawn, tightly priced contract, therefore, may be illusory because the total cost to the Government may exceed the contractually stated amounts by the amount necessary to deliver acceptable end-items to the Government in the event extracontractual relief is agreed upon. Further, the efficiency of the contractor and, therefore, the interests of the Government, may decrease to a marked extent as contractor officials direct their attention to the problem of searching out ways to acquire additional funds, either by claims or changes within the

contract scope or by building a case for extracontractual assistance outside its scope. This management concentration on contractual concerns, as opposed to the more important concern of developing and producing an acceptable product, can also spread to Government management as more emphasis is placed on holding the contractor strictly to his contract rather than on using reason and judgment to arrive at equitable solutions to problems.

As indicated in the previous section, the S-3A contract was negotiated in a highly competitive atmosphere. The result was that the contractor made concessions to the Government which otherwise might have been resisted. The S-3A contract, at least on paper, is a "tough" one, preserving to the Government the right to require performance within contractual cost constraints. The problem of "buy in"--the quoting of overoptimistic cost, schedule, and performance estimates with the hope of recouping during performance by means of changes--appears to have been prevented by the use of the modified-total-package-contract type requiring cost ceilings for development and production and the inclusion of a Pricing of Changes clause designed to control contractor-initiated changes.

It remains to be seen, however, whether cost estimates made under the pressure of strong competition for Government business together with contractual terms barring later recoupment will become problems in the S-3A contract. Lockheed has indicated confidence in its cost figures and its ability to meet schedule and performance requirements while remaining under ceiling. However, the conservative nature of Lockheed's cost proposal, the use of a fixed-price incentive features for the development portion of a contract calling for inclusion of a sophisticated avionics package in a carrier-based airplane, the options for production quantities of aircraft under binding ceiling prices, and the failure to provide for adjustment in the case of abnormal escalation in the economy until the 5th contract year, could all combine with Lockheed's already precarious financial condition to create a situation where extracontractual assistance may be necessary to allow completion of the contract. (Lockheed's financial report shows a net loss, after taxes, of $32.6 million in 1969. Final settlement with DOD to limit its losses under the C-5A and Cheyenne programs is still pending.)

We emphasize that we do not anticipate that this will be the case. However, it is our opinion that, if the contract becomes a problem in the S-3A procurement, it will be because of the contract's tightness rather than its looseness.

Fixed price development with production options

In our opinion experience has shown that the use of fixed-price development contracts with binding production options, total package procurement, is generally inadvisable in a major weapon system procurement because of the risk that contractually imposed inflexibility will bring about contract failure if major development problems arise or if the contract is too tightly priced. The current philosophy within DOD is that development contracts should be on a cost-type basis as opposed to a fixed-price basis because of the increased flexibility provided by the cost type. Additionally, recent pronouncements by top officials of DOD indicate that development and production of future weapon systems may be contracted for separately rather than purchased by so-called total package or modified total package contracts; in fact, the most recent major weapon system to go into engineering development, the B-1 bomber, contains no production options.

The structuring of the S-3A contract took place before DOD established the policies described above. With the exception of the clause providing that production options are to be slipped until certain development milestones have been passed or for 6 months, whichever is earlier, the S-3A contract generally reflects the procurement policies and practices which were in effect throughout most of the 1960's.

In our opinion, if the development risk has been determined to be sufficiently low and pricing is realistic, no impediment exists to the use of a fixed-price development contract or for that matter to the inclusion of development work with binding production options in a single contract.

The Navy chose to use a fixed-price development contract with binding production options for the S-3A because, in the Navy's engineering judgment, the development risk involved was sufficiently low to ensure development within contractually required targets and/or ceilings. Our visits to Lockheed, to major subcontractors, and to the Naval

Development Test Center, Warminster, Pennsylvania, disclosed no major development problems. We cannot conclude, therefore, that the determination to use a fixed-price development contract with binding production options in the S-3A program was not a proper exercise of the discretion vested in the Navy contracting officials.

Conservative pricing

However, as indicated earlier, several interrelated factors including, but not limited to, the use of a fixed-price development contract with binding production options could, under certain circumstances, combine to result in contract failure. A review of the records of negotiations indicates that the prices accepted by Lockheed in the S-3A competition may actually have been so conservative as to lead to the possibility that, under adverse conditions, the contract ceilings could be breached.

This view is supported by the fact that the Navy's independent cost estimate for S-3A research and development (lot I, which at that time consisted of eight research and development aircraft) was some $45 million, or 11 percent, higher than the cost initially proposed by Lockheed. Further, Lockheed's price for this work was some $30 million lower than its competitor's although, according to negotiation records, the Lockheed proposal, technically speaking, called for a more sophisticated weapon system than its competitor. Finally, the Navy's cost estimate for lots II through V was some $60 million, or 6.5 percent, higher than Lockheed's cost estimate. The Headquarters, Naval Material Command, approval of the Request for Authority to Contract for the S-3A program stated, with respect to the conservative nature of the Lockheed proposal, that, in view of the admitted probability that Lockheed would exceed target and possibly even reach ceiling on lots I and II, "it would be prudent, in this case, to budget on some other basis than target price" (the usual budget base). Also, the Request for Authority to Contract stated that Lockheed's assumption of a 70:30 cost-sharing ratio in the development portion of the contract (whereby Lockheed pays 30 percent of all costs over target up to ceiling), coupled with its conservative lot I estimate and its agreement to be bound by variable option quantity production ceiling indicated, "a willingness to

assume considerably more cost risk than is ordinarily associated with fixed-price incentive contracts."

Although the Navy made no attempt during negotiations to obtain more favorable prices from Lockheed, it did require the contractor to accept certain provisions in the contract which had not been mentioned in the request for proposals. Although these provisions increased the contractor's financial risks under the contract, they were accepted by the contractor at no increase in price. The new provisions included the Variable Quantity Option provision and the Pricing of Changes clause.

Additionally, Lockheed had predicated its proposal on the inclusion in the contract of a clause providing for adjustments to each of the production lot option prices for abnormal economic inflation. The Government, however, would agree to adjustments for abnormal economic inflation only with respect to the last two option lots, thus the prices of lots I through IV were left unprotected from abnormal inflation. Since negotiation of the contract, inflation has increased at a rate significantly in excess of that anticipated by either party. Although both the Navy and Lockheed have expressed confidence that ceilings through lot IV will not be exceeded in spite of the abnormal inflation experience, the absorption of the unanticipated inflation within the unescalated ceilings obviously reduces the cost flexibility originally contemplated by the choice of a 130-percent ceiling.

Finally, in April 1969, after negotiations had been completed but before the contract was awarded, the Director of Defense Research and Engineering was briefed on the results of negotiations. At this meeting the Director stated his belief that the Navy should require that the contract include provisions for delay of production options until such time as major development milestones had been met. The Deputy Secretary of Defense subsequently agreed with this recommendation. The Navy then reopened negotiations and included the Project Milestones clause in the contract. Lockheed accepted inclusion of this clause at no increase

in price, although contractor financial risk was increased. It was agreed to include, in addition to the Project Milestone clause, a 6-months extension of the schedule for the research and development portion of the contract in order to render milestone accomplishments, particularly the avionics portion of the contract, less risky. This schedule stretch-out somewhat balances the increased financial risk represented by the milestone requirement.

CONTRACT DESCRIPTION

The S-3A prime contract continues the practice followed in recent major weapon system acquisitions of obtaining binding production commitments at the same time development is contracted for. This practice was designed to obtain competition in the pricing of both the development and production portions of the required effort. This feature is the most important element of the so-called total package procurement concept.

The S-3A program was the next aircraft program in DOD to go into full-scale development following the F-14 program. Due to this proximity and to the fact that the F-14 is a Navy program, the F-14 contract served as the chief example for the Navy in structuring the S-3A contract. In most respects the two contracts are very much alike. Important differences are noted in following sections of this report.

The S-3A contract with Lockheed is a fixed-price incentive contract. The initial phase of the contract (lots I and II) provides for design, development, and testing, and the furnishing of weapon system data and eight S-3A research and development aircraft at a target cost of $371.2 million, a target profit of $44.6 million or 12 percent of target cost, and a ceiling price of $482.6 million, or 130 percent of target cost. These target and ceiling prices reflect the movement of certain work from lot II to lot III and contract changes through November 29, 1970. Under the fixed-price incentive formula, the contractor is to receive 30 percent of the amount by which his costs underrun target costs and pay 30 percent of the amount by which his costs exceed the target cost. The Government receives or pays 70 percent of the amount of costs under or over target cost, as applicable. In a fixed-price incentive contract, the margin between target and ceiling prices and the cost-sharing ratio are the two most important individual factors in the contract in allocating risks between the contractor and the Government.

The pricing features of the research and development portion of the S-3A contract are similar to those of the F-14 contract, except that the latter contract provides for a target profit of 10 percent and a price ceiling of 125 percent.

Unlike the F-14 contract, the S-3A contract provides for cost incentives only; that is, no provision is made for profit incentives based on demonstrated weapon system performance. The contract, however, does have a negative incentive against the late delivery of the four aircraft scheduled for the Navy's Board of Inspection and Survey tests (the first four aircraft in lot III). The contract provides that specified liquidated damages will be assessed against the contractor for each day each of the four aircraft is delivered late up to a maximum of $3 million for all aircraft.

The S-3A contract includes options for production aircraft in addition to the research and development efforts under lots I and II. These options are discussed in considerable detail under a separate heading.

Progress payments will be made at the rate of 80 percent of the contractor's total costs incurred under the contract; however, the aggregate amount of progress payments may not exceed 71.5 percent of the total contract price.

Research and development, in contrast to production, involves the delivery of relatively little hardware which could be billed to the Government as deliveries are made. Therefore, the S-3A contract provides that partial payments will be made for research and development effort (excluding lot II effort) on the basis of satisfactory accomplishment of specified events.

KEY CONTRACT CLAUSES

This section of the report is devoted to evaluation of the clauses and provisions of the S-3A contract, which appear, in our judgment, to be most noteworthy. Most of these clauses are considered particularly important because they seek (as do the ceiling price margin and the cost-sharing ratio which were mentioned previously) to allocate the financial risks of unexpected events in performance of the contract between the contractor and the Government.

One clause, the Project Milestone clause, was selected because of the importance attached to it by top officials in DOD. The S-3A marks the first use of this clause in a defense weapon contract.

The Restraint of Competition clause is discussed since it represents an attempt to avoid some of the past problems in subsequent purchases of spare parts and assemblies directly from actual manufacturers rather than through the prime contractor. This clause is relatively new and has been used previously in only two or three defense contracts.

Clause granting options to purchase additional quantities

In addition to lots I and II, which cover research and development and the furnishing of eight developmental airplanes, the contract contains four options for production lots of aircraft. (See schedule below.) The option for the first production lot must be exercised by April 1, 1972, if the milestones have been successfully demonstrated. (See p. 23.)

Schedule of Production Lot Options

Lots	Range of quantities		Ceiling prices for median quantities		Option date
	Minimum	Maximum	Quantity	Ceiling price	
III	7	26	17[a]	$ 265,648,566	4-1-72
IV	23	92	52[a]	379,221,527	2-1-73
V	30	92	60	381,503,819	11-1-73
VI	30	92	62	383,243,983	10-1-74
	90	302	191	$1,409,617,895	

[a]Current plans indicate that four aircraft will be shifted from lot III to lot IV.

Lots I and II are to be considered together for final pricing with the ceiling prices added together for this purpose. The price of each production lot option (lots III through VI) will be negotiated separately on a fixed-price or fixed-price incentive basis at the choice of the Government.

The ceiling prices for the production lot options are contingent upon authorization of long-lead-time funding in accordance with a schedule set out in the contract. Long-lead-time funding is required to enable the contractor to begin production of components which take exceptionally long periods of time to produce. Failure to provide full and timely long-lead-time funding entitles the contractor to an adjustment in ceiling prices and delivery terms, as may be appropriate.

The contract provides that prices for the production lot options may not exceed the ceiling prices. However, the ceiling prices may be equitably adjusted as a result of change orders and contract modifications or as permitted under various contractual clauses or provisions, such as the funding-delay adjustment mentioned above. Perhaps the best example of such a clause is the one providing for adjustments for abnormal economic escalation. (See p. 30.)

Variable quantity option provision

The number of aircraft in each production option lot can be varied about 50 percent, either plus or minus. For example, on lot III the Government has the right to order from seven to 26 aircraft. This is known as the variable quantity option provision. Ceiling prices have been established in the contract for the varying quantities of aircraft which may be ordered under each option lot. The unit price of each aircraft in the lot will increase or decrease depending on the quantity ordered; that is, smaller quantities will mean higher unit prices and greater quantities will mean lower ones. The prescribed delivery schedule is also subject to adjustment in accordance with guidance set forth in the contract.

The variable quantity option provision allows the Government a considerable degree of flexibility under the contract. For example, if progress in development is not as good as desired, the Government could order fewer than the median quantities under the option lots. The same alternative would be useful if funding constraints are imposed by the Secretary of Defense or by the Congress. Extracontractual considerations, however, may reduce the apparent flexibility provided by this provision. In our review of the F-14 aircraft program for the Subcommittee, we found indications that, if the minimum lot quantities permitted under that contract were ordered, the contractor might find it necessary to seek extracontractual financial relief from the Government.

In connection with the S-3A program, Lockheed officials have informed us that two of its major subcontractors will not accept a variable quantity option provision similar to the one contained in the prime contract; the parties

are still negotiating this matter, however. Specifically, these subcontractors will not accept a subcontract which allows orders for less than the median quantities of the options as set out in the prime contract. This situation conceivably could result in substantial losses to the prime contractor if the Government chose to exercise the production option lots in the minimum or near minimum quantities.

Acceptance of design deficiencies

The contract contains specific provisions concerning production aircraft in the event that the Government chooses not to require correction of a design deficiency following Navy acceptance tests (Board of Inspection and Survey trials) but, instead, desires to continue procuring the aircraft. The applicable specifications for all aircraft to be delivered in the future will be changed to reflect the performance attained during the tests. The price of all aircraft on order, both delivered and undelivered, will be adjusted in accordance with the Inspection and the Defects clauses to reflect the design deficiency. The ceiling price of aircraft on option but not yet ordered will not be adjusted, the rationale apparently being that the design deficiency will be a factor in negotiating the firm price or firm target prices for the option lots when the options are exercised.

On the other hand, if the Government chooses not to require correction of a deficiency in delivered aircraft but to require its correction in all others, the specifications will remain unchanged. The nonrecurring cost of correcting the deficiency in all lots will be charged to lot I, and a downward equitable adjustment will be made in the price of those aircraft in which the correction is not required.

The provisions discussed here concerning the treatment of design deficiencies are of interest primarily because they frankly suggest the possibility that the Government may choose to accept an S-3A system with less performance capability than that specified in the contract. The same provisions were used in the F-14 contract. The Navy advised us that use of such provisions in that contract was considered realistic since the Government generally had accepted less performance capability in major weapon systems than initially specified.

Project milestones

The S-3A program is the first major weapon system program to provide, by contract, strong Government remedies for the contractor's failure to meet specified development milestones (also variously called risk assessment milestones, project milestones, progress milestones, etc.). This feature requires that, until the contractor demonstrates that development of the system has passed specified technical milestones, the Government may delay the actions it must take, such as allotment of funds and the exercising of options for additional aircraft. No ordering date can be extended more than 6 months, however, without loss of that option as well as future options. The development milestone provision represents an attempt to avoid the adverse situations associated with entering production before significant problems of development are solved.

The development milestone feature subsequently has been included, in one form or another, in the following defense contracts for major weapon systems: Airborne Warning and Control System (AWACS), the F-15, the B-1, the AN/TPQ-27 ground-directed bombing system, and the AN/TPN-19 landing control system.

Top officials of DOD have indicated that milestones will be included in all future major weapon system development contracts in which substantial degrees of development risk are present. A special study group established by the Deputy Assistant Secretary of Defense (Procurement) recently completed a review of development milestones as related to defense contracting. The group's recommendations for Armed Services Procurement Regulation (ASPR) coverage of milestones was communicated to the ASPR Committee. The proposed coverage is confined mainly to broad, policy-type discussion and provides flexibility to Government procurement officials in devising milestones for particular contracts.

We believe that the milestone provision, in appropriate cases, should be a useful device in helping the Government avoid committing large sums of money to production before major development problems are solved. The success of this new feature, in those cases where it has been used, can

only be determined by experience. Sufficient time has not yet elapsed to permit such a determination.

Top officials of DOD have recently announced changes in procedures for acquiring major weapon systems which, in our opinion, will greatly reduce the need for development milestone provisions in contracts. The important changes in this regard involve acquisition of a weapon system under separate development and production contracts and using a cost-type rather than a fixed-price-type contract for development where significant development risk is present. The most recent major aircraft weapon system to go into engineering development, the B-1 bomber, reflected these changes.

The best application of the milestone concept in contracts appears to be where both development and production are covered under one contractual effort (i.e., total package procurements). In contracts of this type, exercise of production options can be made dependent upon meeting the milestone development events. Development milestones are established by the B-1 contract; however, the contractor's failure to meet these milestones results only in a lessened award fee.

The use of a milestone provision in a contract for development only, seems even less useful if the contract is on a cost-type basis. This is because the Government bears essentially all financial risks under a cost-type contract, thus no strong penalties can be put into such a contract to motivate the contractor to meet the designated milestones.

Milestones in the S-3A contract

Five development milestones are provided for in the S-3A contract. The first two milestones, 1 and 2, are required to be demonstrated on or before March 15, 1972, as a prerequisite to ordering production lot III by April 1, 1972. The critical antisubmarine warfare avionics data processing, control, and displays must be successfully integrated in the laboratory for milestone 1. This means that critical avionic subsystems must be able to interconnect and to "talk to one another." It means also that, with a given laboratory signal input, the proper computer

actions must take place, data must properly interchange between the various pieces of avionic equipment, and the proper information must be displayed on the televisionlike screens. Although this is an important demonstration, it does not guarantee that these critical avionic units will perform in the same manner outside the carefully controlled laboratory environment. Milestone 2 is a 30-minute first flight of the S-3A (the airframe and engines without avionics) to demonstrate the aircraft's ability to fly.

The significance of these milestones is that the most risky elements of the avionic system will have been configured and integrated to the point where they successfully meet mission requirements at least in the laboratory and that the engine and airframe have progressed to a point where all preflight requirements have been met and safe operation of the airframe and engine together are possible.

The second two milestones, 3 and 4, are required to be demonstrated on or before January 15, 1973, as a prerequisite to ordering production lot IV by February 1, 1973. Milestone 3 is an evaluation of the flying qualities and performance and a demonstration that the airframe and engine will fly within the design flight envelope; i.e., speed, altitude, loiter capability, fuel consumption, maneuverability, etc. Milestone 4 is an assessment of the avionics performance during the flight test program which utilizes a P-3 aircraft as a flying laboratory. It should be noted that these milestone events separately assess the flying qualities of the S-3A as an air vehicle and the performance of its avionics in the detection of submarines and in withstanding a typical flight environment.

The fifth and final milestone is the delivery of S-3A aircraft configured for the Board of Inspection and Survey. This delivery is scheduled on or before October 15, 1973, as the prerequisite to the Navy's exercise of the option for 60 additional S-3A aircraft in lot V by November 1, 1973. It should be noted that this delivery is only the start of a series of Navy tests and evaluations culminating in the formal acceptance of the S-3A. This apparent concurrency risk should be tempered by the fact that, prior to October 15, 1973, the Navy is planning to conduct a series of five preliminary evaluations to monitor and verify the

progress of Lockheed's flight test program on the original eight developmental S-3A aircraft.

The purpose of these Navy preliminary evaluations is to provide assurance that the first four production aircraft are indeed ready for Board of Inspection and Survey trials. In recent years, the Navy has been modifying its development approach to place additional emphasis on the preliminary evaluations. The Board of Inspection and Survey testing, which in itself requires the existence of production aircraft, is not a high-risk element in the complete evaluation sequence.

Ordering-Date Extension

In addition to the Project Milestone clause the S-3A contract contains another new clause which is somewhat similar in that it permits the Government to delay exercising production options. This clause, called the Ordering-Date Extension clause, states that the Government may unilaterally extend the ordering date for an optional lot of aircraft for a reason other than one which would entitle it to such an extension under the Project Milestone clause. The maximum amount of time a date may be extended under this clause is 4 months. Little, if any, financial risk accrues to the contractor due to this clause since the Government must continue to fund the contractor's progress during the option slip. Contract prices or other terms of the contract are not affected as a result of extending an ordering date under this clause.

A DOD official acquainted with this clause told us that it was included in the S-3A contract as protection against delay in the passage of a DOD appropriation bill. The clause would serve to allow 4 additional months for funds to become available to permit exercise of an option. A similar clause is included in the Air Force AWACS contract. That clause, however, allows a slip of 14, rather than 4, months and applies only to the first production option lot.

Defects

The Defects clause contained in the S-3A contract is essentially the same as the clause used by the Navy in the F-14 contract and is designed to extend contractor liability for defects in workmanship or material or for failure to meet specifications beyond the time of Government acceptance. Because the exercise of production options is not tied to the completion of Navy Board of Inspection and Survey trials, the likelihood exists that production aircraft will be accepted before these trials are completed. Since these trials can be expected to pinpoint defects requiring correction, the Defects clause extends the Government's right to correction for either 1 year from the date the last aircraft is accepted for Navy Board trials or 2 years from the date the first such aircraft is accepted, whichever is earlier. Alternatively, the clause provides for downward equitable

adjustment in contract price should the Government elect to accept defective or nonconforming supplies without correction, during the warranty period.

The clause disclaims any implied warranties of merchantability or fitness for a particular purpose and, in a departure from the standard ASPR Inspection clause, limits the Government's right to correction of latent defects (those not evident upon proper inspection), with regard to all but the first six research and development aircraft, to the same periods stated above for patent, or obvious, defects.

Finally, the Defects clause states that the contractor's liability, "for the destruction of or damage to an aircraft resulting from an accident proximately caused by a breach of the warranty," shall be limited to $100,000 for each occurrence. In return, the contractor warrants that no charge for insurance is included in the contract price for such damage.

Although costs incurred for correction of defects are allowable for purposes of determining final contract price, no adjustments for correction of defects are permitted by the clause in target cost, target fee, or ceiling price nor is any adjustment permitted for defect correction after a final contract price is established.

The purpose of the Defects clause is to provide the Government with time beyond acceptance to discover and require the correction of defects and, at the same time, to provide assurance to the contractor that his liability will not extend beyond that explicitly set out in the contract.

The limitation of potential contractor liability under warranty is an important consideration from the Government's viewpoint because it is designed to eliminate the inclusion of contingency amounts, either hidden or identified as such, in contractor proposals, particularly in areas where there is little likelihood that the Government would or could enforce contractual rights to correction or replacement.

For example, in its request to the ASPR Committee for a blanket deviation from the ASPR requirement of unlimited

liability for latent defects, the Navy pointed out that, although contractors could justifiably be expected to include "substantial price increases" to cover unlimited latent defect liability, little likelihood existed that the Government would derive any benefit from such extended liability because of the probability that most latent defects would be discovered before the expiration of the warranty period and therefore be correctable and because of the difficulty of establishing that a defect discovered after the warranty period is, in fact, latent.

Contractors have stated that in the past it has not been the practice of the Government to require contractor liability for proximate damages and that as a result contractors have generally not insured against such liability nor have they included contingency amounts in their contract prices to cover such potential loss. However, the question of whether the Government should enforce proximate damage liability has been raised recently and has been brought to a head by a pending lawsuit in which it is contended that a Government prime contractor and a subcontractor are jointly liable for the value of an aircraft lost as a result of the malfunction of an inexpensive component part.

The consensus of both Government and industry opinion seems to be that contractors--particularly relatively small subcontractors--should not be exposed to the potentially catastrophic financial loss which the loss of an aircraft or other proximate damage would impose on them and that such potential loss cannot be economically insured against. They feel that the Government should, therefore, be a self-insurer in this area. While the subject was being considered by the ASPR Committee, no regulation had been issued and the $100,000 limitation in the S-3A Defects clause appears to be a fair resolution of the problem.

Although the warranty rights reserved to the Government by the Defects clause confer a potentially valuable benefit upon the Government, some question exists as to the extent to which the exercise of such rights is feasible. The problems of identifying and correcting defects after field deployment could well result in the failure to correct defects for which correction would be required by the clause. One of the most significant of these problems is the one of

proving that an apparent defect in an item which has been in the hands of the Government for some time is an actual defect; that is, proving that the defect is the fault of the contractor rather than the Government.

We understand that the Defects clause was used in the S-3A contract at the insistence of the contractor. Presumably, the contractor prefers the treatment accorded latent defects and proximate damages by the Defects clause since, in other respects, the Defects clause seems more favorable to the Government than the Inspection clause. This is significant since it would indicate the contractor believed more financial risk attached to latent defects and proximate damages than it did to the possibility of losses due to the additional time provided by the Defects clause for the discovery and correction of patent defects (the warranty provision).

Economic Escalation

The Economic Escalation clause provides, in effect, that, if future economic inflation varies significantly from that estimated for the purpose of pricing the contract, the contract ceiling price will be adjusted upward or downward, accordingly. This clause, however, is only applicable to the last two lots provided for by the contract--lots V and VI. The options for these lots are to be exercised in calendar years 1973 and 1974, respectively.

The escalation clause provides protection to the contractor for only so-called abnormal inflation. Protection against ordinary or anticipated inflation is provided for in the prices negotiated for each contract lot. In preparing its price proposal, Lockheed included a factor for inflation based on a price rate increase of 4 percent per year for material and 3 and 3.5 percent per year for labor (depending on the type labor).

In essence, the escalation clause provides for adjustments to the ceiling price of lot V if actual price levels at March 31, 1973, vary more than specified amounts from the levels predicted for this date. The option for lot V is to be exercised by November 1, 1973, some 7 months later. The ceiling price for lot VI is similarly adjusted for actual price levels at March 31, 1974. The option for this lot must be exercised by October 1, 1974, or 6 months later. The significance of these dates is discussed in a subsequent paragraph. The predicted levels are based on rates slightly higher than those used by the contractor in preparing his proposal. Price levels will be determined by reference to certain Bureau of Labor Statistics indexes.

As calculated by Lockheed using the indexes specified in the escalation clause, inflation has been increasing at an annual rate of 6.22 percent for material and 6.35 percent for labor. These rates contrast sharply with the 4-percent rate for material and the 3- and 3.5-percent rates for labor which were used in establishing the option ceiling prices. The Lockheed calculation was based on experience for the 3-year period ending September 1970 for material and for the 3-year period ending July 1970 for labor.

As noted above, the escalation clause is applicable only to the last two production lots. Based on median quantities, the ceiling prices of 69 production aircraft, or more than one third of the total production aircraft under option, are thus unprotected from abnormal inflation as are the prices for the two research and development lots. If rates of economic inflation continue at present levels, the lack of abnormal inflation protection until lot V could place a heavy economic burden on the prime contractor.

The contractor originally proposed inflation coverage on all lots, including lot I, applicable retroactively to actual costs. When the Government stated that this arrangement would not be accepted, Lockheed revised its proposal by raising its proposed profit rate in lot I from 10 percent to 12 percent (but with no increase in ceiling price). One of the Government negotiators of the S-3A contract advised us that the Government felt the 130-percent ceiling prices, together with the other pricing provisions in the contract, provided sufficient protection to the contractor in connection with work up to lot V. He explained that, in early 1969 when the contract was negotiated, no one anticipated that inflation would reach and stay at the level it has. He further stated, in retrospect, that abnormal inflation coverage of the early lots should have been allowed.

The abnormal inflation coverage for lots V and VI is incomplete. As noted on the previous page, these lots are required to be ordered 7 and 6 months, respectively, subsequent to the dates on which any economic escalation adjustment to their prices will be determined. Production effort relative to each lot (except for relatively minor long-lead-time effort) occurs over an approximate 2-year period following option exercise. This means, assuming the options are exercised at the latest dates possible, that work in connection with lots V and VI will not be completed until approximately 2½ years after their prices have been adjusted for abnormal inflation and that no further adjustment will be made for any abnormal inflation occurring during these periods. Furthermore, the escalation clause does not allow slipping the dates which determine the escalation price adjustments in the event the option ordering dates are slipped under the Project Milestone or Ordering-Date

Extension clauses. This incomplete coverage of abnormal economic escalation on lots V and VI could also place a heavy economic burden on the prime contractor.

Pricing of Changes

The Pricing of Changes clause was devised to discourage vast numbers of contractor-initiated engineering change proposals and to provide stronger Government controls over technical changes deemed desirable or necessary. On many prior major weapon system programs, large numbers of technical changes were made. The resulting contract changes were usually authorized by the Government before they were priced or, in many cases, even before formal estimates of their costs were rec ived. It was felt in many Government quarters that contract changes were being used by major weapon system contractors to "get well" under contracts (eventually make a profit) which they had "bought into"; i.e. had accepted at unreasonably low prices.

In the 16 months between the signing of the S-3A contract and November 29, 1970, only 18 contract modifications affecting price were made. These changes in total decreased the combined target price of lots I and II by some $8 million. (Work valued at another $8 million was transferred from lot II to lot III.) This is considered a very small number of changes in comparison with prior aircraft contracts which did not contain such a clause. The S-3A contracting officer attributes the relatively small number of changes to the Pricing of Changes clause and to the tightness of the S-3A program budget.

This clause seeks to control engineering change proposals in four major respects. First, it provides that changes valued at $35,000 or less be made at no change in contract price and that changes valued between $35,000 and 1 percent of the original cost of the production lots affected by the change be negotiated at a lesser profit rate than would normally be expected. This feature was apparently designed to discourage an excessive number of small contractor-initiated engineering change proposals and also to reduce the administrative costs of processing such small changes.

The second controlling feature of the clause stipulates that the price negotiated for each change shall not exceed the target price or ceiling originally proposed by the contractor for the change. In the case of changes

which would result in reduced rather than increased costs, the clause states that the price reduction negotiated for the change shall not be less than the price reduction proposed by the contractor.

The third controlling feature of the clause provides that the binding price ceiling or minimum price reduction accompany the engineering change proposal when it is submitted to the Government. The fourth feature is not explicitly included in the clause. We were told by a Navy attorney, however, that it is implicitly included. This feature provides that the prices of proposed changes identify the impact of the change not only on the authorized portions of the contract but on the options as well. The last three features discussed are designed to ensure that the Government will have available realistic, timely, and complete cost estimates when it makes its decision as to whether a contractor-proposed change should be adopted.

The scope of the Pricing of Changes clause is narrowed by the fact that certain types of engineering change proposals are excluded from coverage. One of the most significant exclusions has to do with proposals submitted by the contractor in connection with the value engineering program established by the contract. Value engineering programs are established to encourage elimination of "nice to have" but unessential technical features. The clause does not apply to certain other types of engineering change proposals. Among these exclusions are proposals resulting from requirements for improvements in the S-3A aircraft which would overcome deficiencies in Government-furnished equipment and proposals which would change the basic mission of the S-3A system.

Lockheed officials indicated to us that this clause, together with the current economic climate, makes it hazardous for the contractor to propose changes. These officials stated that the provisions requiring binding price proposals at the time a change was proposed had already resulted in some losses to the company. They indicated that their course in regard to future change proposals would be (1) to not bother with smaller changes, (2) to make no change proposals at all unless they were relatively sure

the change would "sell" (a change proposal costs from $3,000 to $4,000 to prepare), and (3) to include a contingency factor of from 5 to 50 percent as a separate line item in all proposals in order to overcome the potential loss represented by the binding ceiling estimate.

Government control over contract changes is further strengthened by the requirement that all engineering change proposals and all requests for deviations from or waivers of specifications must be prepared in accordance with MIL-STD-480 (Military Standard, Configuration Control-Engineering Changes, Deviations and Waivers) dated October 30, 1968. We were advised that this military standard provides tighter Government control over contract changes than did the Navy document which it replaced.

It seems likely that an undesirable side effect of the Pricing of Changes clause, and perhaps of MIL-STD-480 also, will be to discourage the contractor from proposing improvements in the S-3A weapon system which the Navy would want and would approve if proposed. Another possibility is that the binding ceiling price provision may cause the contractor to propose inflated ceiling prices for changes, which could result in Navy disapproval.

Installment Funding

This clause is designed to limit the Government's financial obligation to the contractor at any given time to predetermined amounts. Another purpose is to impose cost discipline on the contractor. The clause is limited to the research and development portion of the contract (lot I) since research and development is incrementally funded, whereas production if fully funded.

This clause establishes a funding schedule by which the Government is required to obligate money to the contract for lot I. The schedule, as amended, shows the dates by which each of 18 funding installments will be made and the amounts of each. The total of these installments is the target price of lot I. The contractor may request that the Government provide funds at a more rapid rate than required by the schedule, but the Government is not obligated to satisfy such a request. Change orders affecting contract price similarly affect the funding schedule.

This clause has the effect of limiting payments to the contractor in connection with lot I effort by limiting obligations in accordance with the schedule. Further, and most importantly, the clause specifically provides that, in the event of contract termination, the Government's termination liability to the contractor for lot I be limited to the total funds then obligated as provided in the schedule. As noted previously, the installment funding schedule is based on target price. This would indicate that, although the contract is on a fixed-price incentive basis and thus has a ceiling price higher than the target price, the contractor's reimbursement, in the event of termination, would be limited to target price. It seems unlikely, however, that the contractor would allow his funding protection, as provided by the Installment Funding clause, to lag significantly behind experienced costs before he would request the Navy to increase the amounts set forth in that clause. This stimulus to the contractor is beneficial to the Government in that it encourages the contractor to bring cost growth situations to the Government's attention at an early date.

The clause states that, if the Government fails to obligate an installment by the date specified, such action

shall have the effect of the contracting officer's ordering the contractor to stop all work under the contract pursuant to the Stop-Work-Order clause. Stop-work orders can result in additional costs to the Government and to adjustments in the delivery schedule, as can other provisions of the contract.

A similar clause is contained in the F-14 contract. A closely related clause known as the Limitation of Government Obligations clause has been used in recent Air Force contracts, including the F-15 and the AWACS contracts. The chief difference between the clauses used by the two services is that the Air Force clause requires that the contractor request adjustments in the specified funding several months (generally 17) in advance of the period in which the additional funding is required. Because of this feature the Air Force clause seems even more restrictive on the contractor than the Navy clause.

Performance responsibility--
prime and associate contractor relationships

Under the terms of its prime contract, Lockheed is charged with responsibility for total system performance. The significance of a contractual provision placing performance responsibility on the prime contractor is governed by the amount of Government-furnished aeronautical equipment called for by the contract. The provision in the S-3A contract is of some significance because Government-furnished aeronautical equipment accounts for approximately 19 percent of the total program price. Engines and accessories, electronics and communications, armament and support are all furnished by the Government.

The prime contractor's responsibility for total system performance, however, is contingent on the Government's furnishing it with subsystems which are "suitable for intended use," which the contract states

> "shall be deemed to require that the Government-Furnished Aeronautical Equipment conform to the specifications and acceptance tests therefor cited in said detail specification."

We were advised by an attorney in the Office of the General Counsel, Naval Air Systems Command, that the language contained in the S-3A contract was designed to overcome a jet engine integration problem encountered in the F-111 aircraft, in which a dispute arose as to whether the Government or the prime contractor was responsible for an engine problem which developed during flight testing. The intent of the language, in the eyes of its authors, is to clearly impose liability for later failure of Government-furnished aeronautical equipment on the prime contractor once the equipment has passed prescribed acceptance tests and has been accepted by the Government. Thus in the case of a jet engine, if acceptance testing is prescribed by the Government-furnished aeronautical equipment contract specifications to take place on the ground, failure to meet the requirements of the prime system specification for in-flight performance after delivery of the tested equipment to the prime contractor would be the prime contractor's responsibility.

However, the position taken by the Navy's contract negotiator in discussions with us, which position is also subscribed to by the contractor, is that, if it can be shown that a subsystem--though meeting the specification and tests required by the subsystem contract--does not permit the system prime contractor to meet the prime system specification, then the prime contractor will be relieved of performance responsibility until the defect in design or workmanship is corrected and the Government will bear the cost of correction.

The Government has traditionally had problems in furnishing suitable equipment to contractors. Should a problem occur in Government-furnished aeronautical equipment after delivery to Lockheed and should the stricter interpretation of prime contractor responsibility be advanced by the Government, a dispute almost certainly will arise as to whether the Government or Lockheed must bear the cost of correction.

The approach taken by the Air Force in recent major system contracts accords with the strict interpretation placed on the Navy provision in that the Air Force places complete responsibility for the integrated performance of Government-furnished equipment on the prime contractor once the Government-furnished equipment has been formally accepted by the prime contractor. Protection is provided the prime contractor, however, in that he is not required to accept Government-furnished equipment until he has agreed in writing as to the design and/or performance characteristics of the Government-furnished equipment; the inspection and acceptance test procedures specified; and the conformance of the Government-furnished equipment to such design, performance, and test requirements. No similar "sign off" protection is contained in the S-3A performance responsibility provision.

To escape as many potential problems connected with this requirement as possible--particularly integration problems--the S-3A contract provides that Lockheed enter into written agreements with major Government-furnished aeronautical equipment suppliers (termed "associate contractors"), which are designed to encourage and/or require exchange of data and coordination between the prime and

associate contractors with respect to integration of Government-furnished aeronautical equipment with the prime weapon system; proposed specification changes, deviations, or waivers; and failure of Government-furnished aeronautical equipment to comply with specifications. Costs associated with the agreements between prime and associate contractors are allowable costs under the respective contracts.

These agreements are implemented by the establishment of formal boards composed of representatives from the prime and associate contractors (but not from the Government), which monitor problems as they arise so that those problems can be resolved expeditiously. The requirement for a formal agreement was first used in the F-14 contract, although we were advised at the time our F-14 report was prepared that contractors have typically set up informal arrangements to accomplish the same purposes.

Stop-Work Order

The Stop-Work-Order clause of the S-3A differs from the norm in that, while the ASPR-specified clause precludes termination for default following a stop-work order, the S-3A clause confers on the Government the right to terminate the contract for either default or convenience at the expiration of a stipulated period. The ASPR stop-work-order clause states that the Government may stop work for up to 90 days, while reimbursing standby costs. At the end of that time, the Government must either cancel the stop-work order or terminate the contract for convenience. The S-3A clause, on the other hand, sets a 30-day limit on the stop-work order itself but provides an additional 60 days if termination is to be effected so that the Government may determine whether such termination should be for convenience or default.

In its request to the ASPR Committee for a deviation from the prohibition against default termination following a work stoppage, the Navy stated that, upon determination that a program of the magnitude of S-3A should be canceled, additional time as allowed by the 60-day provision is appropriate for completion of the "formidable task" of assessing the feasibility of default as opposed to convenience termination in order to save the extra expense which would be incurred if work were allowed to continue pending such assessment. Representatives of Lockheed, however, expressed the apprehension that the 60-day provision could provide an incentive to the Government to strain to convert what would otherwise be a convenience termination to one for default by searching out technical but not necessarily important deviations from contractual requirements.

Records show that the 60-day feature of the Stop-Work-Order clause was designed to come into play only in a situation where termination is deemed necessary and that the 60 days provided by the provision was to be used for an analysis, in good faith, of whether the termination should be for convenience or default.

Restraint of Competition

The so-called Restraint of Competition clause requires that all data, including limited rights data (that which a

contractor furnishes to the Government or a subcontractor for explicitly limited purposes) furnished by the contractor to vendors or subcontractors for use with regard to the S-3A contract, be furnished to the subcontractors and kept up to date without payment. This clause is included in order that the Government may purchase directly from the subcontractors and vendors additional supplies and/or services to be used in connection with the S-3A without paying fees or royalties to the prime contractor.

Although this clause does not permit the general dissemination of limited rights data, it does require the contractor to give up rights in the affected data for purposes of present or future buys of spare or replacement parts related to the S-3A airplane. The clause has application to the present contract as well as to any follow-on contracts. This represents a departure from usual practice and requires the contractor to relinquish a right without any compensation.

The purpose of the clause is to grant the Government the right to make later purchases of spare or replacement parts for the S-3A from subcontractors or vendors where there is no contribution, other than the data, by the prime contractor. Also, the clause helps overcome the problem, at least with respect to subcontractor-furnished parts, of the wholesale marking by prime contractors of component part data as "proprietary" thereby placing on the Government the burden of challenging any markings considered to be inappropriate through a rather cumbersome ASPR-required process if sole-source repurchase from the prime contractor is to be avoided.

The Restraint of Competition clause is in the contract because it was demanded by the Government, and the Government's strong bargaining position resulted in its acceptance by Lockheed. A possible side effect of using the Restraint of Competition clause in prime contracts could be to encourage the prime contractors to perform work in-house which otherwise would have been economically subcontracted. This incentive would be due to the prime contractor's desire to retain its data rights. Such an effect could work to the disadvantage of the Government in some cases and could have implications for the small business community.

CHAPTER 3

MANAGEMENT CONTROLS

PROJECT MANAGEMENT ORGANIZATION

As in other major weapons system acquisitions, management of the S-3A aircraft program is vested in a project manager. In accordance with usual Navy practices, the S-3A project is "horizontally" rather than "vertically" structured. Accordingly, the S-3A Project Manager draws most of his support from other, organizationally independent, elements within the Naval Air Systems Command rather than from a large staff which reports directly to him.

Lockheed's S-3A project office has complete authority to direct and control its functional organizations.

PERFORMANCE MEASUREMENT

DOD Instruction 7000.2 provides for the application of uniform DOD criteria to contractor management systems under major weapons contracts. The instruction requires the use of cost/schedule control systems criteria by the contractor's internal management to provide an adequate basis for responsible decisionmaking by both contractor management and DOD components.

The contractor management systems must provide data which (1) indicate work progress, (2) properly relate cost, schedule, and technical performance, (3) are valid, timely, and auditable, and (4) supply DOD managers with a practicable level of summarization. Subcontracts, excluding those that are firm fixed price, are selected for application of these criteria by mutual agreement between prime contractors and the contracting DOD component, according to the criticality of the subcontract to the program.

Addendum 6 to the S-3A prime contract embodies the requirement of Instruction 7000.2. Lockheed developed its planning and control system to comply with Instruction 7000.2. A demonstration review was held in March 1970 at Lockheed, and the Navy's validation team stated that the system met the criteria; however, the Office of Naval

Material questioned whether the Navy should continue to require Instruction 7000.2 or accept the system being utilized by Lockheed on its commercial L-1011 system. We were informed that the Office of Naval Material accepted Lockheed's planning and control system on October 20, 1970, but wanted the requirements reduced. The Navy has not yet formally approved (validated) the Lockheed system as being in accordance with the requirements of Instruction 7000.2.

Addendum 6 was originally expected to be applied to the two major subcontractors, Univac and Vought; but the requirement concerning Vought was removed before Addendum 6 could be applied, and a modification to Addendum 6 to reflect that deletion had resulted in a decrease in the contract of approximately $1.5 million. A modification of the requirement is now being considered which would eliminate Univac.

Lockheed initially asserted that strict compliance with Addendum 6 represents added work amounting to approximately $4 million at the target cost level for the S-3A development program. Lockheed has not been able to substantiate this estimate. Lockheed feels that its planning and control system does employ timely approaches for measuring the impact of such significant program influences as inflation, technical problems, and subcontractor pricing; however, the system does not ensure that decisions regarding resolution of problems will recognize the impacts on cost, schedule, and technical performance in other parts of the management system. Such information is available but the system does not ensure its use. The planning and control system provides the potential to furnish a wide variety of additional reports which the Government might consider beneficial.

The S-3A project manager stated that, in his opinion, DOD Instruction 7000.2 was a good idea, philosophically, but that he was against the strict interpretation being attempted by the Air Force. He believed that, as presently constituted, Addendum 6 produced more data than was needed and that a proposed modification would delete some of the requirements. The data contained in the formal reports generated by Instruction 7000.2 are, on the average, 45 days old and, therefore, the reports are not as dependable as the

other management tools applied. GAO intends to perform a separate review concerning Instruction 7000.2.[1]

OTHER MANAGEMENT TOOLS

The S-3A project manager informed us that, in addition to using formal reports generated by Lockheed's planning and control system, he applies day-to-day management tools to ensure effective control of the project. Among these tools are (1) the weekly action and "re-action" reports which point out specific problem areas and their resolution, (2) monthly meetings with Lockheed project management, (3) direct-line-telephone and data-transmission hookup with the Lockheed project office, and (4) "hot line" reports indicating significant problem areas. The project office has not yet received any hot-line reports. It is the project manager's opinion that, if the first indication of a significant problem must be reported via hot line, management is not doing its job.

DEVELOPMENT CONCEPT PAPER

The Development Concept Paper is considered by the project manager to be his "contract" with the Office of the Secretary of Defense to develop and produce a total S-3A weapon system within definable cost, schedule, and performance parameters. Other sections of the Development Concept Paper evaluate enemy threat, need for the weapon system, development risks, program management, etc. The Development Concept Paper was signed by the Secretary of Defense in November 1967 when the system was approved for contract definition.

As directed by the Secretary of Defense, the Development Concept Paper is being revised to include an updated justification for the system. This justification apparently

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[1]The report will include data developed at several contractors' plants to evaluate the potential of 7000.2 for disclosing early problems and their ultimate impact on cost, schedule, and performance to industry and DOD management.

will include a discussion of the P-3C and the proper mix of the two aircraft for antisubmarine warfare. The original submission date for this revision was September 1, 1970; however, the submission date is now unknown The Development Concept Paper is required to be revised before April 1972 when the Defense Systems Acquisition Review Council meets to consider whether or not the S-3A should be released for production.

THRESHOLDS

One section of the Development Concept Paper sets forth program thresholds for cost, schedule, and performance. As long as the program stays within these thresholds, program management is left to the procuring service. Crossing a threshold may initiate a review of the program at the Office of the Secretary of Defense level.

Thresholds are set by the Office of Defense Research and Engineering to indicate when a program might be out of control; that is, considerable degradation from performance guarantees, extreme schedule slippage, and substantial cost overruns.

In light of the previous discussion of known optimism in contract pricing and the fact that Lockheed is performing at 112 percent of target cost, the development cost threshold may be crossed as the program advances into the critical avionics integration phase.

As is the practice of DOD, the cost threshold for the production aircraft is quoted at the total program amount. The S-3A production cost threshold was set at ceiling price rather than between target and ceiling as was the threshold of the AWACS program.

Assuming that the production options are exercised, the total production cost will not be known until substantial aircraft deliveries have been made. The selected acquisition report prepared by the project manager will, of course, reflect estimates to complete, at various points throughout the program cycle, and could presumably reveal an estimated overceiling situation; however, estimates in past programs have tended to be optimistic. If the total

production threshold is broken, it may occur late in the program, and any review will, by its nature, be made near the completion of the program.

Thus, as a management tool, a total program cost threshold is largely ineffective during most of the production cycle. It would seem reasonable instead to break out the production threshold into a yearly, or similar, period consistent with economic production runs to provide a management gauge of production costs as the program proceeds.

The schedule thresholds are set at 6 months beyond the contractual milestone dates. The performance thresholds involve four overall characteristics of the aircraft related to weight, approach speed (carrier landing), range, and endurance. If these guarantees are exceeded by 10 percent for the first two or reduced by 15 percent for the last two, a review at the Secretary of Defense level is made. Two other performance thresholds apply to the avionics characteristics of signal recognition and search bearing accuracy.

If these performance thresholds are reached but not crossed, the Navy will have an S-3A whose performance is less than anticipated under the contract. The performance thresholds, however, do represent an increase over present antisubmarine warfare effectiveness. Officials at the Naval Air Development Center, Warminster, Pennsylvania, have stated that these thresholds were fair and offered reasonable management control at the Secretary of Defense level.

DEFENSE SYSTEMS ACQUISITION REVIEW COUNCIL

The vehicle for program review at the Secretary of Defense level is the Defense Systems Acquisition Review Council. Unless a program threshold has been crossed, as discussed previously, or some other special circumstance demands, the Council reviews a program three times during its life, that is (1) prior to entering contract definition, (2) prior to initiating engineering development, and (3) prior to a production decision.

The Council is scheduled to meet in February or March 1972 relative to a production decision on the S-3A. The contract calls for lot III to be exercised on or before April 1, 1972. If the contractually required development milestone provisions are met prior to this production decision, Lockheed (1) will have made a first flight of 30-minute duration without avionics and (2) will have substantially completed integration of the S-3A's complex avionics in a bench test under laboratory conditions. In addition, 6 to 8 months of airborne avionics testing utilizing a P-3 aircraft (test bed) will have occurred. The first full systems flight of the S-3A is scheduled to take place 3-1/2 months after the production option date.

The first four aircraft in lot III will be used for various research, development, testing, and Board of Inspection and Survey trials. However, because the Navy plans to recycle these aircraft for ultimate delivery to the fleet, these four aircraft are being considered as production aircraft and, thus, a production decision is demanded by the Defense Systems Acquisition Review Council.

One of the contractual milestones, avionics integration, will demonstrate only that the units will work together and respond to laboratory-generated inputs and will not demonstrate whether the system has the capability to fully perform its intended antisubmarine warfare mission. First flight, the other milestone is concerned only with the basic flying qualities of the airplane. It should be noted that the flying avionics test bed mentioned above will undergo a Navy preliminary assessment which is scheduled for completion only 2 months after the option date for lot III.

The results of the Navy preliminary assessment of the flying avionics test bed and the results of tracking experience against friendly submarines as well as the knowledge gained from the initial full-system flights of the S-3A would offer a better basis for a production decision by the Defense Systems Acquisition Review Council.

The project manager advised us that he and the prime contractor were of the opinion that to delay the production decision and consider additional test results would distract the prime contractor's attention from the laboratory avionics integration which they believed to be of primary importance.

In our report to the Subcommittee on the F-14 aircraft program dated August 17, 1970 (B-168664), we disclosed an analogous situation where it appeared that the Defense Systems Acquisition Review Council was being called upon to make a premature production decision. Subsequent to our report it was decided at the Secretary of Defense level that the F-14 program would be given only a preliminary, or interim, production decision and that a full production go-ahead would be given only after considerable experience and flight testing had been accomplished.

INDEPENDENT ASSESSMENT NEEDED BY THE DEFENSE SYSTEMS ACQUISITION REVIEW COUNCIL FOR PRODUCTION DECISION

When the Defense Systems Acquisition Review Council convenes to pass on the production phase of the S-3A program, the status of the program will be presented by the S-3A Project Office. We have noted in connection with other weapon system programs that these submissions tended to be very optimistic and indicated that potential problems could be readily overcome. No assessment independent of program management is given at this critical stage in the program.

Various study groups, as well as our office, have recommended in the past that DOD utilize independent operational testing and evaluation groups to monitor the progress of various weapon system programs thus neutralizing to some extent the climate of advocacy. The Blue Ribbon Defense Panel, in its July 1970 report, recommended that DOD establish independent operational testing and

evaluation groups reporting directly to the Deputy Secretary of Defense. These groups would represent both the developer and user but would remain organizationally independent of both. These groups could contribute significantly to decisionmaking at all levels and could participate in the production decisions which theretofore had been a forum for optimistic program advocacy.

Both the S-3A Project Manager and an official of the Directorate, Defense Research and Engineering, believed the idea of an independent assessment to be impracticable due to a lack of individuals or organizations that are technically qualified as well as unbiased. They believed that, at present, those organizations having a great deal of expertise generally had a biased point of view and that those that were unbiased generally lacked in-depth knowledge of the technical aspects of a given program. Furthermore, the S-3A Project Manager expressed his opinion that an assessment independent of his office would conflict with the concept of project manager responsibility.

We still believe that consideration should be given to establishing an independent means of determining the progress of development prior to entering production.

CHAPTER 4

EXTENT OF CONCURRENCY

To illustrate the level of planned concurrency between development and production in the S-3A, we have taken excerpts from the program master schedule and presented them in figure 2 on the following page of this report.

In terms of calendar months, the period of significant concurrency starts in May 1972, one month after the exercise of the production option for lot III, and ends in October 1973 with the delivery of four aircraft configured for the Navy's test and evaluations via its Board of Inspection and Survey trials. The ending date of October 1973, for purposes of concurrency measurement, is based on the Navy's contention that delivery of four Board of Inspection and Survey aircraft marks the completion of the development phase and that all significant development should be completed by that date. In terms of production aircraft, there will be, according to Lockheed's estimate, 10 S-3A production aircraft through the start of the final assembly process at the beginning of Board trials as shown below:

4 completed and delivered to the Navy for Board trials,

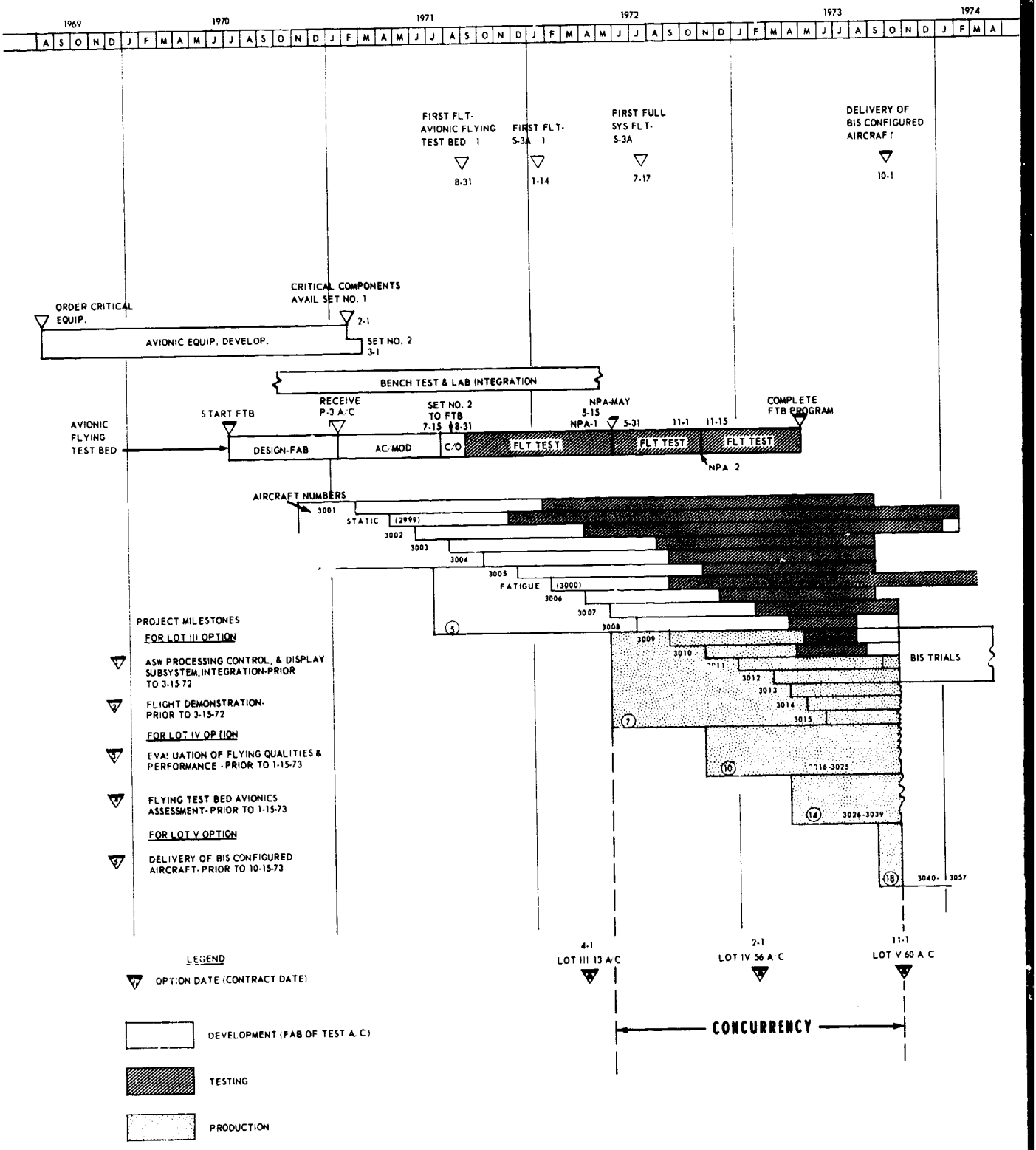
4 completed and in Lockheed's production flight test phase, and

2 in final assembly.

The significance of the start of final assembly is that experience has shown that there is a dramatic increase in the cost of applying changes beyond this point in comparison with any other point where changes might be incorporated.

In addition to the above 10 production aircraft, there are the eight development aircraft and two nonflying test (static and fatigue) airframes purchased under lots I and II of the S-3A program.

In terms of the total numbers of aircraft that are planned to be ordered by the time Board trials are started,



EXTENT OF CONCURRENCY

S-3A PROGRAM

Figure 2

the estimated number is 137, or about 68 percent of the total planned quantity of 199. The start of Board trials is scheduled for October 1, 1973, which is only 30 days prior to the order date of lot V. We have included lot V in the number of aircraft ordered prior to these trials because lot V is scheduled to be ordered when the four aircraft are delivered for the trials. The delivery of these four aircraft is the fifth and final contractual milestone. The following table presents the details of the planned program showing the numbers of aircraft that are planned to be ordered.

Date	Lot	Number of aircraft	Note	Purpose
Aug. 1, 1969	I	6	(a)	Development
Oct. 1, 1970	II	2		Development
Apr. 1, 1972	III	13	(b)	Production
Feb. 1, 1973	IV	56	(c)	Production
Nov. 1, 1973	V	60	(c)	Production
Total		137		
Oct. 1, 1974	VI	62	(c)	Production
Total		199		

[a]This does not include the two static and fatigue test airframes.

[b]The original baseline quantity was 17, plus or minus 50 percent; however, the more recent estimate is 13. (See p. 19.)

[c]These are baseline quantities and can be varied plus or minus about 50 percent by the terms of the contract. (See p. 19.)

AREAS OF PRIMARY TECHNICAL RISK

The S-3A program is somewhat unique, as compared with other contemporary weapon system development efforts, in

that the technical risks are primarily centered within one major technological area; namely, avionics. Actually, the risks are concentrated even further within certain limited areas of avionics. By comparison to the C-5A, F-111, F-14, and F-15, this situation is somewhat nontypical. In these other programs, consequential structural, materials, aerodynamic, tooling and manufacturing, and aircraft subsystem developments in engine and airframe were involved. In the S-3A program, these factors are not as risky since the Navy considers the engine and airframe to be low-risk items. This is particularly important because the lead time and cost impact for correcting avionic problems is generally less than that of major airframe components involving heavy tooling and manufacturing facilities.

Many of the avionic problems can be addressed on the ground or in avionic flying test beds, neither of which is subject to grounding or intermittent operations which can occur when new airframes and engines are also being tested. This means that problem solution can continue in the avionics area to a considerable degree irrespective of other problem areas, particularly if the program provides for both adequate laboratory and flying test bed tools.

With regard to the S-3A avionics, no special problems or difficulties are anticipated in some areas. For example, communication, navigation, and weapon/armament control equipment are considered to be within the current state of the art or to be repackaged or off-the-shelf items. The principal risks in the S-3A avionic system lie in six specific areas, as follows:

1. The acoustic data processor.

2. The central data processor.

3. The sonobuoy reference system.

4. Total avionic system integration and software.

5. Degree of success in the man/machine integration and automation design.

6. Impact of the rugged carrier environment on all sophisticated avionic equipment.

CHAPTER 5

POTENTIAL PROBLEMS TO BE MONITORED

As requested, potential problem areas are described below.

POSSIBILITY OF NEED FOR EXTRACONTRACTUAL RELIEF

We believe there is a possibility that the conservative pricing and tight structuring of the contract in combination with certain occurrences might force the contractor to seek extracontractual relief from the Government to continue work under the contract. (See pp. 8 to 15.) We believe also that the following potential events could precipitate the need for extracontractual relief and thus should be monitored by the Subcommittee:

1. An increase in the rate of economic inflation or even a continuance of the present rate for a prolonged period. (See p. 30.)

2. The occurrence of major development problems. (See p. 11.)

3. Ordering the minimum or near minimum quantities permitted under the production options. (See p. 20.) Our opinion on this point is bolstered by the fact that two of the prime contractor's major subcontractors have refused to accept clauses with a variable quantity option provision similar to the one contained in the prime contract. Specifically, these subcontractors will not allow orders for less than the median option lot quantities set out in the prime contract. This situation conceivably could result in substantial losses to the prime contractor should the Government choose to exercise the production option lots in the minimum or near minimum quantities.

UPCOMING PRODUCTION DECISION

A decision on whether the S-3A aircraft will go into production is scheduled to be made in February or March 1972. We believe that a decision by this date may be premature. Further, it appears that this decision, in accordance with customary procedures of DOD for making important decisions relative to major weapon systems, will be made in an atmosphere wherein the program advocates will be overly influential.

In our opinion, the risk of entering the production phase could be appreciably reduced if the production decision were delayed 3 or 4 months beyond the presently scheduled date for this decision. The contract would permit such a delay since it allows slipping the date for exercising the first production option for up to 4 months, at no increase in contract price.

If the production decision were delayed 4 months, additional technical data resulting from certain tests would become available to the decisionmakers. We noted that the first Navy preliminary assessment is scheduled for completion some 3 months after the production decision and that the first flight of the full S-3A system will come about 4 or 5 months after the production decision. The delay would also permit more information resulting from the ongoing avionics laboratory integration tests and the avionics flying test bed to become available.

The Navy's project manager and the prime contractor do not agree. They believe that to delay the production decision and consider additional test results would distract attention from the laboratory avionics integration (milestone 1) which they consider to be of primary importance.

In the past, major weapon system decisions have been made in an atmosphere dominated by advocates of the programs involved. We believe that an assessment independent of the program management should be made of the S-3A program prior to the production decision. The results of this assessment should be made available to the officials charged with making the decision. (See pp. 49 and 50.)

CONCURRENCY OF DEVELOPMENT AND PRODUCTION

There would be an appreciable degree of development and production concurrency in the S-3A program even if the production decision were delayed as we suggested in point 2 above. If development, testing, and evaluation show that the S-3A system will perform as intended and that significant changes are not required, this concurrency should result in the system's becoming operational quicker than it would have otherwise. On the other hand, if the tests and evaluations disclose that significant changes must be made to ensure an operationally effective weapon system, the problems of making the changes will be compounded. The changes must be made not only to the developmental units but to all production units which have been manufactured or which are in the process of manufacture. This could require substantial amounts of additional time and money. (See ch. 4.)

COST THRESHOLD FOR PRODUCTION AIRCRAFT

The Development Concept Paper sets forth program thresholds for cost, schedule, and performance. As long as the S-3A program stays within these thresholds, program management is left to the Navy. Crossing a threshold initiates a review of the program by the Office of the Secretary of Defense.

As is the practice of DOD, the S-3A cost threshold for production aircraft is set at the total program amount. Total program production cost will not be known until a substantial number of aircraft have been made. Reports prepared by the S-3A Project Manager will, of course, reflect estimates to complete and presumably could reveal an estimated cost exceeding the threshold; however, estimates in past programs have tended to be optimistic. Thus, as a management tool, a total program cost threshold may not be very effective during most of the production cycle. It would seem preferable to break down the planned program cost by production lot or by some other subdivision of the total production effort and have a separate cost threshold for each. (See p. 47.)

LESS THAN TOTAL SYSTEM PERFORMANCE RESPONSIBILITY

Despite the fact that there is a provision in the contract which purports to impose total performance responsibility for the integrated weapon system, including Government-furnished equipment, on the system prime contractor, there is some question as to whether its responsibility for system performance is, in fact, total. (See p. 38.) Under some circumstances it is the position of the Navy negotiator, and concurred in by the contractor, that the Government must bear the cost of modifying Government-furnished equipment so that it will be suitable for use in the S-3A system. Further, it is the Navy negotiator's position that the system prime contractor is relieved of the affected system performance requirements until the Government-furnished equipment is corrected.

On the other hand, we were advised by an attorney in the Office of the General Counsel, Naval Air Systems Command, that the provision does, in fact, place total responsibility on the contractor. We mention this area because the Government has traditionally had problems in furnishing suitable equipment to contractors and because the variance in interpretation of that contractual provision indicates that, should a problem with Government-furnished equipment arise and the performance responsibility provision be strictly interpreted, it will probably generate a dispute as to who is required to bear the cost of its resolution.

POSSIBLE SIDE EFFECTS FROM THE PRICING OF CHANGES CLAUSE

The Pricing of Changes clause was designed to ensure that the Government would have timely, complete, and realistic cost proposals for contractor-proposed engineering changes before they would be approved. (See p. 35.) There is a possibility that this clause may discourage the contractor from suggesting improvements in the S-3A weapon system which the Navy would want and would approve if suggested. Another possibility is that this clause may cause the contractor to propose inflated ceiling prices for changes which could result in Navy disapproval.

POSSIBLE SIDE EFFECTS FROM THE RESTRAINT OF COMPETITION CLAUSE

The Restraint of Competition clause requires the system prime contractor to give up many of its data rights relative to items it obtains from subcontractors using the prime contractor's design. (See p. 42.) This could have the effect of encouraging the prime contractor to perform work in-house which it otherwise would have subcontracted. Such an effect could work to the disadvantage of the Government in some cases and could have implications for the small business community. On the other hand, there is a possibility that the Restraint of Competition clause may not be effective in permitting the Government to reorder supply parts directly from the subcontractors. Information we have received indicates that, except for major items such as wings or engines, which are generally not repurchased, direct procurement of spare or replacement parts may not be feasible because of the possession by the prime contractor of information and expertise other than the data covered by the clause necessary for intelligent parts procurement.

CHAPTER 6

SCOPE OF ANALYSIS

In performing our analysis, we reviewed the S-3A contract N00019-69-C-0385 and other pertinent documentation and held discussions with key management personnel of the S-3A Systems Project Management Office and with contract negotiation, technical, and legal personnel of the Naval Air Systems Command. We also held discussions with personnel representing the prime contractor and selected subcontractors of major S-3A subsystems.

We discussed and researched key contractual clauses from such sources as the ASPR Committee. We attempted to gain an insight from other defense contractors on their prior experience with selected contractual clauses.

We probed technical aspects of the S-3A with representatives of the Office of the Director of Defense Research and Engineering and the U.S. Naval Air Development Center; however, our review did not include an in-depth analysis of development progress and technical risk.

Our fieldwork was performed during the period August through December 1970, and therefore this report generally reflects the status of the S-3A program about 1 year after contract award.

APPENDIX

United States Senate
COMMITTEE ON ARMED SERVICES
WASHINGTON, D.C. 20510

July 9, 1970

Honorable Elmer B. Staats
Comptroller General of the United States
General Accounting Office
441 G Street, N. W.
Washington, D. C.

Dear Mr. Staats:

This letter is to request your office to provide assistance to the Preparedness Investigating Subcommittee in performing an analysis and interpretation of the contractual features of the contracts entered into for the S-3A and AWACS aircraft programs.

The Preparedness Investigating Subcommittee has for some time been monitoring the status of the major weapon programs of the Department of Defense. In this regard, one segment of the Subcommittee's continued review has been to evaluate the contractual aspects of these programs. The Subcommittee is particularly interested in the progress being made in this area in the newer programs.

As you are aware, your office has been assisting the Subcommittee in performing these contractual analyses on the F-14 and F-15 aircraft programs and providing the Subcommittee with opinions and viewpoints regarding these contractual matters. I am very pleased with the results that we have seen to date in this work and believe this to be an important area in our review program.

We are again interested in your opinions on the merits of the management and contractual aspects of these programs and any potential problem areas that should be monitored. Your analyses should also include the areas of management controls, contractual structure and definiteness, cost and pricing provisions, and the extent of concurrency probable within the program structure.

Your continued early response will provide great assistance to the Subcommittee's efforts in this area.

Sincerely,

John C. Stennis

John C. Stennis
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