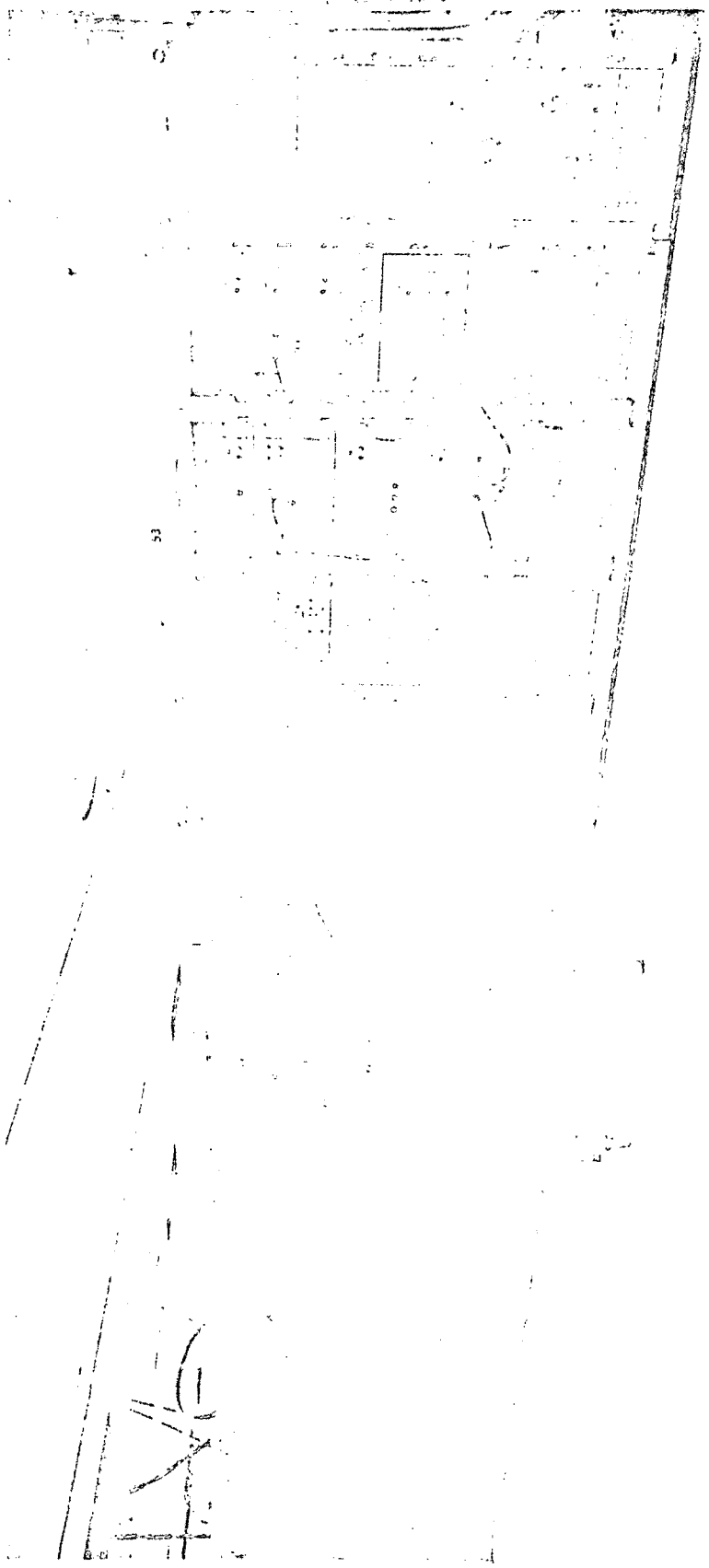
U. S. GENERAL ACCOUNTING OFFICE

STAFF STUDY

VERSATILE AVIONICS SHOP TEST (VAST) SYSTEM

DEPARTMENT OF THE NAVY

MARCH 1974



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ABBREVIATIONS

BIS	Board of Inspection and Survey
DOD	Department of Defense
OSD	Office of the Secretary of Defense
R&D	Research and Development
SAR	Selected Acquisition Report
SECNAV	Secretary of the Navy
VAST	Versatile Avionics Shop Test

SYSTEM DESCRIPTION AND STATUS

The Versatile Avionics Shop Test (VAST) system is an automated station for testing avionic components installed in the F-14A, E-2C, and S-3A aircraft. VAST will be installed on aircraft carriers and at shore sites to provide such support.

As of September 30, 1973, 43 of 62 VAST stations contracted for had been produced. Twenty-three were delivered to aircraft prime contractors, 14 to Navy Shore installations and 6 remained at the VAST contractor's plant (PRD Electronics) for use in developing software for self-test of the system.

The current Five Year Defense Plan authorized 74 stations, a reduction of nine from that reported at June 30, 1972. The Navy reported, however, that planned aircraft support requirements at June 30, 1973, will still necessitate the procurement of 83 stations. Further, the Navy now anticipates the procurement of six stations, in addition to the 83 already mentioned, to support Marine Corps F-14A program requirements.

COMING EVENTS

During calendar year 1974, the following major events are scheduled:

--Completion of shore-based technical and operational evaluation of VAST at the Patuxent Naval Air Test Center.

--First carrier VAST outfittings in preparation for deployments in 1974.

--First carrier deployments with VAST in support of F-14A and E-2C aircraft.

COST

At September 30, 1973, estimated program cost for VAST had increased from the $312 million development estimate in April 1968 for 207 VAST stations to the current estimate of $415.6 million for 74 stations.

Since June 30, 1972, there has been a net decrease of $19.8 million from $435.4 to $415.6 million. The decrease is primarily the result of (1) the OSD budget decision to reduce the fiscal year 1974 procurement by nine VAST stations budgeted at a cost of $21.9 million, (2) an increase of $1.2 million in fiscal year 1974 R&D funds for software development and hardware modifications; (3) an increase of $.7 million in anticipation of a support requirement for Marine Corps F-14A aircraft; and (4) an increase of $.2 million for other minor adjustments.

Cost Not Being Reported

The approved current estimate of $415.6 million for VAST does not include the following costs which we believe should be reported in the SAR on the basis that they are requirements which are included in Navy plans.

---$34.7 million for procurement of 6 additional VAST stations to support Marine Corps F-14A requirements and 9 to support Navy planned aircraft support requirements,

---replenishment spares costs deleted from the logistics support/additional procurement cost section of the Selected Acquisition Report (SAR) in accordance with OSD instructions. In this regard, Navy officials told us they did not know what the current

estimate for such costs are because they are no longer being reported by individual weapon systems.

--- VAST stations are procured by the Navy under contracts with PRD Electronics (Soyosset, New York). VAST test program sets (TPS's) which provide for the software interface between VAST hardware and the avionic unit to be tested are developed by the airframe contractor and funded by the aircraft project office. While the cost of these TPS's are reported in the VAST SAR, they are not included in the VAST current program estimate.

Accordingly, TPS costs are not addressed in this report other than to mention that as September 30, 1973, these costs amounted to $276.2 million for the F-14A, E-2C, and S-3A aircraft. This represents a $12.8 million increase over the estimate reported in the June 30, 1972, VAST SAR.

Allowance for Escalation

Allowance for escalation in the VAST program decreased $3.9 million during the year to $68.8 million as of June 30, 1973. This decrease is due to the reduction of nine stations in the approved program ($2 million) and adoption of lower escalation factors ($1.9 million), provided by OSD on April 1973.

FUNDING STATUS AND OUT-YEAR PLAN (As of Sept. 30, 1973)

	Appropriated	Reprogrammed	Total FY 1973 & Prior Years	FY 1974	FY 1975	Total
	($'s in millions)					
RDT&E	$ 8.0	$ (1.5)	$ 6.5	$ 1.2	$ 0	$ 7.7
Procurement	323.8	5.0	328.8	45.7	33.4	407.9
Total	$ 331.8	$ 3.5	$ 335.3	$ 46.9	$ 33.4	$415.6
Quantities	62	0	62	6	6	74

CONTRACT DATA

Five principal VAST hardware contracts have been awarded to PRD Electronics which account for 62 VAST stations. Four of these contracts have been awarded on a cost-plus-incentive-fee basis and have been definitized. The fifth contract was awarded as a letter contract on May 25, 1973. Definitization as a fixed-price incentive contract is anticipated in April 1974.

Definitization of the fifth contract has been delayed primarily due to differences between the Navy and PRD Electronics over cost allocations to direct labor hours. The limitation on Government liability on this contract is $28.8 million.

The status of the four definitized contracts as of June 30, 1973, is as follows:

($'s in Millions)

Contract No.	Target Cost	Target Fee	Target Price[1]	Contractor/Government Estimated Price At completion
N00019-68-C-0449	$59.3	$4.8	$64.1	$89.7/$92.2
N00019-69-C-0334	48.6	4.0	52.6	58.8/58.8
N00019-71-C-0225	45.6	3.7	49.3	83.3/118.7
N00019-72-C-0295	36.8	2.6	39.4	39.4/39.4

[1]Excludes $10.9 million of cost growth and $52.7 million in undefinitized changes.

PERFORMANCE

Between June 30, 1972, and September 30, 1973, current estimates of VAST's performance reported in the SAR had not changed.

Current test results evaluating VAST's use on F-14A and S-3A aircraft avionics are scheduled to be completed in March 1974. To date, the only testing that had been completed with VAST has been with A-7E aircraft avionics. Nonetheless, tests on A-7E avionics indicate overall VAST reliability is approaching current estimates of the system's performance.

Areas of Concern

Delays have been experienced in the development of the TPS's which are developed by the airframe contractor. This has resulted in (1) the need to manually test with VAST since no provisions have been made for back-up test equipment; and (2) the increased use of avionic spares. We believe that this could result in increased time for testing and impact on the availability of the aircraft VAST is intended to support. Accordingly, an effective logistics program is necessary to assure the required level of avionics spares support.

An OSD review conducted during fiscal year 1973, reported that based on past experience, there will be many changes in the avionics units to be tested by VAST during the life of VAST-supported aircraft. These changes will require that TPS updates be developed in order to reach the fleet concurrently. Further, the study said that unless an effective configuration management program is established to handle this process, full VAST support could not be provided.

Navy officials informed us that configuration management plans have been established for VAST. Since initial carrier deployments of VAST are scheduled during 1974 in support of the F-14A and E-2C aircraft, we believe that the Navy should monitor the effectiveness of these procedures to assure that the configuration management plans are effective.

A Center of Naval Analysis (CNA) study indicated that current planning for VAST shore-based stations may not be adequate to support the S-3A. In addition, the study indicated that even if excess VAST stations planned for support of other aircraft are reprogrammed to support the S-3A, there will still be a need for six additional VAST shore-based stations for full S-3A support. These stations would be in addition to those discussed on page 1. According to the Navy, however, current data indicates that the total number of VAST stations currently programmed meet anticipated needs. Project estimates will be defined, as experience builds up with VAST and new aircraft systems, with VAST station assignments adjusted to meet requirements.

SCHEDULE

All of the scheduled milestones for the VAST program listed in the June 30, 1973, SAR had been completed at the time of our review. These milestones show VAST progress through initial support of the F-14A, E-2C, an and S-3A aircraft during their Board of Inspection and Survey (BIS) trials, but do not list any progress indicators beyond this point. The final milestone--initial employment of VAST during BIS trials of the S-3A--occurred in October 1973.

Two milestones varied from our previous report covering the VAST program through June 30, 1972. They are (1) the availability of data packages which slipped by 3 months due to delay in completion of microfilming, and (2) start of BIS trials for the E-2C aircraft which was changed from June 1973 to May 1973. Microfilming was completed in December 1972.

RELATIONSHIP TO OTHER SYSTEMS

In addition to using VAST to support the F-14A, E-2C, and the S-3A aircraft, in November 1973 the Navy directed that project officers of newer weapon systems plan to use VAST wherever possible rather than developing and procuring new avionic test equipment.

SELECTED ACQUISITION REPORTING

Our review of several VAST SAR's disclosed that they are in compliance with OSD instructions. Several matters still exist however, which we commented on in our previous staff studies. These matters as they relate to the September 30, 1973 SAR, are discussed below:

--The explanations of changes in cost are not directed to the underlying causes.

--Performance characteristics established in the SAR do not provide the type of information to indicate or track the full performance capability of the VAST. The performance characteristics section does not include information such as percentage of availability of the VAST, physical characteristics (weight, height), number of operators, accuracy of VAST testing, or increased reliability resulting from VAST testing.

--The schedule milestones section presented in the SAR does not indicate the logical progression of the VAST system. This section does not include typical progress indicators such as initial operational capability, fleet delivery, approval for service use, etc.

--The current estimate for initial operational employment of VAST is based on the scheduled aircraft BIS dates. When a BIS date changed, this in turn appeared as a change in the VAST SAR. This type of information does not measure VAST progress.

In addition to the above, we noted that the June 30, 1973, SAR does not report what we believe to be the project office's best estimate of current VAST program costs. The original intent of SAR reporting, as stated in SECNAV Instruction 7700.5, dated February 26, 1972, was for the current estimate to be the project office's best estimate of program acquisition costs to acquire the SECNAV-approved program quantity. This

policy was revised by OSD on July 17, 1973, to reflect the latest price-out of the current approved Five Year Defense Plan. Accordingly, current estimates such as those included in the Program Objective Memorandum, which have been approved by the Secretary of the Navy, but not approved by OSD, are not reported in the SAR.

As discussed previously, the costs itemized on pages 2 and 3 should be reported in the SAR.

MATTERS FOR CONSIDERATION

The availability of VAST hardware and associated software (test program sets) are essential because their nonavailability could impact on the effective logistics support of three major aircraft programs. According to the Navy, the capability of VAST has been demonstrated and VAST is in use at three Naval Air Stations. While it is true that all of the required software has not completed development, the Navy stated that the gap can be filled by manual testing with VAST and the increased use of avionic spares.

The Congress may wish to inquire into the following:

--Navy plans to assure that the required level of spare avionic support is provided until the complete software package is made available.

--Navy plans to assure that the software in use is updated concurrently with installed aircraft avionic equipment.

AGENCY COMMENTS

A draft of this study was reviewed by DOD officials associated with the management of this program and their comments were considered and incorporated as appropriate. As far as we know, there are no residual differences in fact.