# FY 1982 RDT&E DESCRIPTIVE SUMMARY

Program Element: #35158F
DoD Mission Area: Strategic Communications, #133

Title: Satellite Data System
Budget Activity: Strategic Programs, #3

(U) RESOURCES (PROJECT LISTING)($ in thousands):

| Project Number | Title | FY 1980 Actual | FY 1981 Estimate | FY 1982 Estimate | FY 1983 Estimate | Additional to Completion | Total Estimated Costs |
|---|---|---|---|---|---|---|---|
| N/A | TOTAL FOR PROGRAM ELEMENT | 36,400 | 43,200 | 29,100 | 15,600 | Continuing | Not Applicable |

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Satellite Data System is a multi-payload, communications satellite which provides reliable communications. The Satellite Data System provides a portion of the coverage required by the Air Force Satellite Communications System for essential command and control communications to our nuclear capable forces. It also provides a high speed link between Air Force Satellite Control Facility remote tracking stations for command and control.

(U) BASIS FOR FY 1982 RDT&E REQUEST: This request includes funds for continuing the multi-year design and development efforts to improve the anti-jam capabilities of the Air Force Satellite Communications System payload. Also included is the multi-year development necessary to produce a Space Shuttle optimized satellite. The Critical Design Review for these efforts occurs in this fiscal year. Sustaining engineering support, required on a continuing basis, is also included. These estimates are based on contractor proposals and past experience for the sustaining engineering support.

(U) COMPARISON WITH FY 1981 DESCRIPTIVE SUMMARY:

| | FY 1980 | FY 1981 Estimate | FY 1982 Estimate | FY 1983 Estimate | Additional to Completion | Total Estimated Costs |
|---|---|---|---|---|---|---|
| RDT&E | 36,300 | 45,300 | 27,900 | | Continuing | Not Applicable |
| Procurement (MISSILE) | 100,200 | 92,700 | 39,400 | | Continuing | Not Applicable |

(U) OTHER APPROPRIATION FUNDS:

| | | | | | | |
|---|---|---|---|---|---|---|
| Procurement (MISSILE) | 100,200 | 95,500 | 43,200 | 161,900 | Continuing | Not Applicable |
| (Quantity) | (1) | (1) | | (1) | | |
| Operation and Maintenance | 8,500 | 10,300 | 11,300 | 11,500 | Continuing | Not Applicable |

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(U) DETAILED BACKGROUND AND DESCRIPTION: The Satellite Data System provides critical, real-time command, control, and communications for Strategic Air Command Single Integrated Operational Plan and other nuclear capable forces. It is an integral part of the Air Force Satellite Communications System which also includes the Ultra High Frequency communications capability on the geosynchronous Fleet Satellite Communications satellites, piggy-back transponders on selected host satellites, and airborne/ground radio terminals. As such, the Satellite Data System complements the Fleet Satellite Communications coverage by providing the polar coverage which the other satellites cannot provide.
Additionally, the Satellite Data System supports the Air Force Satellite Control Facility requirement for reliable, two-way high data rate communications with its remote tracking stations.

The direct benefits of the Satellite Data System are reliable and secure direct communications which will result in greatly improved command and control of our nuclear capable forces, elimination of the dependence on some of the vulnerable Air Force Satellite Control Facility communications.

(U) RELATED ACTIVITIES: The space segment of the Fleet Satellite Communications System was developed, procured, and launched under the Navy's Program Element, 33109N. The Air Force ground Ultra High Frequency radio terminals needed for operation with the Fleet Satellite Communications and Satellite Data System satellites are funded within the Air Force Satellite Communications System Program Element, 33601F. Terminals installed in aircraft were funded in the specific weapons system/aircraft Program Element. The Air Force Satellite Control Facility network is funded under Program Element, 35110F. Space Shuttle flights for the Satellite Data System satellites are provided by the Space Launch Support Program, Program Element, 35171F.

(U) WORK PERFORMED BY: Air Force Systems Command's Space Division, Los Angeles, CA, is responsible for the Satellite Data System. The prime contractor is Hughes Aircraft Company, El Segundo, CA. General Systems Engineering and Integration is performed by the Aerospace Corporation, El Segundo, CA.

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(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

(U) 1. FY 1980 and Prior Accomplishments: The technology phase of the program was completed in FY 1971. This was followed by a contract definition phase in FY 1972 which established the system configuration. The system acquisition contractor was selected by competitive source selection and a system development contract was awarded in June 1972. The system Critical Design Review was successfully completed in March 1974 with all critical specifications being met or exceeded. The structural model satellite testing was finished in May 1975. A qualification model satellite was built and tested to fully qualify the satellite prior to production. All payloads were fully checked out on-orbit. Full operational capability was declared for all payloads after successful on-orbit checkout.

Primary activities in FY 1980 included the continuation of design and development activities associated with improving the anti-jam capabilities of the Air Force Satellite Communications System payload on the sixth and subsequent satellites, the continuation of the multi-year development of a Space Shuttle optimized design on the sixth and subsequent satellites, reliability improvement efforts, and sustaining engineering support.

(U) 2. FY 1981 Program: Efforts for this year include sustaining engineering support, continuing design and development activities to improve the anti-jam capabilities of the Air Force Satellite Communications System payload on the sixth Satellite Data System satellite, and continuing the multi-year development necessary to transition the sixth and subsequent satellites to the Space Shuttle. FY 1981 is the peak year for these development efforts, culminating in a Critical Design Review and qualification testing. Also included are continuing efforts to improve satellite payload reliabilities.

(U) 3. FY 1982 Planned Program: Planned efforts include the continuation of the development efforts related to the Space Shuttle optimization and the completion of the development of the Air Force Satellite Communications payload anti-jam improvements. Sustaining engineering support and payload reliability improvements will also be continued. The difference in the current and previous year estimates is price escalation based on an increased inflation factor.

(U) 4. FY 1983 Planned Program: The FY 1983 plan is to continue sustaining engineering support and payload reliability improvements and to complete the development efforts related to Space Shuttle optimization.

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(U) 5. Program to Completion: This is a continuing program. As an integral part of the Air Force Satellite Communications System, the program will continue to provide critical communications coverage and be totally compatible with the system's aircraft and ground radio terminals. Sustaining engineering support will be required to maintain design compatibility and to incorporate improvements for survivability and reliability. Replenishment satellites will be procured to provide the required operational availability.

(U) 6. Milestones:

| | Date |
|---|---|
| Program Start | October 1971 |
| System Preliminary Design Review | March 1973 |
| System Critical Design Review | March 1974 |
| Launch First Satellite (F-1) | |
| Launch Second Satellite (F-2) | |
| Full Operational Capability | |
| AFSATCOM System IOC | May 1979 |
| Critical Design Review for Shuttle Optimized (Seventh) Satellite | June 1981 |

* Date presented in Fiscal Year 1981 Descriptive Summaries

(U) EXPLANATION OF MILESTONE CHANGES:

Budget Activity: Strategic Programs, #3

Program Element: #35158F, Satellite Data System

1. (U) Development Test and Evaluation: The development contractor for the Satellite Data System was Hughes Aircraft Company, El Segundo, California. The first satellite was launched Initial Operational Capability was established in The first satellite (F-1) was funded entirely within the development program. The second satellite (F-2) was the first vehicle funded under the production program. The development hardware included engineering models of the communication subsystems, a structural model spacecraft (X-1) and a qualification model spacecraft (Y-1). Development tests of the communications subsystems engineering models were completed in November 1973. Structural testing was satisfactorily completed on the X-1 engineering model spacecraft in May 1975. Systems level qualification was completed in October 1975 with all critical performance specifications met or exceeded. System level qualification was designed to demonstrate design integrity and performance to specification via a series of tests including shock, acoustic, modal survey, thermal, electromagnetic interference, solar-thermal vacuum, and integrated system test. The F-1 spacecraft was acceptance tested during the The Y-1 spacecraft was a fully configured spacecraft which has been refurbished and designated as flight vehicle (F-4).

2. (U) Operational Test and Evaluation: A portion of the Satellite Data System is to be part of the Air Force Satellite Communications space segment. Classical separate Initial Operational Test and Evaluation was not conducted on the space segments since all operational objectives and requirements were fully integrated into the Development Test and Evaluation effort and were not broken out separately. Compatibility, operational characteristics, and orbit performance of payloads supporting the Air Force Satellite Communications program are scheduled to be demonstrated during the follow-on test and evaluation which is managed by the Air Force Test and Evaluation Center. Results to date are contained in Development Test and Evaluation reports (see paragraph 1 above).

3. (U) Systems Characteristics:

| Characteristics | Objectives | Demonstrated |
|---|---|---|
| Data Rate in words per minute | | |
| Message Bit Error Rate per ten thousand bits | | |
| Anti-Jam Protection (decibel watt) | | |