FY 1982 RDT&E DESCRIPTIVE SUMMARY

Program Element: #12431F

Title: Defense Support Program
Budget Activity: Strategic Programs, #3

(S) 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
	TOTAL FOR PROGRAM ELEMENT	31,000	87,570	146,300	TBD	Continuing	Not Applicable

(S) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Defense Support Program is the key element of the Worldwide Military Command and Control System

The system consists of satellites two large processing stations, one simplified processing station, and a ground communications network.

(S) BASIS FOR FY 1982 RDT&E REQUEST: Funds are included for the design and development of satellite 14 and beyond with survivability upgrades. The design and development will be completed in FY 1983. Production of satellites 14 - 17 will start in FY 1982 for those components which are not new and do not require major redesign. Continuation of modifications for compatibility with Shuttle/Titan III(34)D/Inertial Upper Stage is included. Two satellites scheduled for a FY 1981 delivery will be Titan III(34)D/Inertial Upper Stage compatible and two satellites scheduled for a FY 1982 delivery will be Shuttle/Inertial Upper Stage compatible. Mobile Ground Terminal (MGT) and the associated user interface design will be completed in FY 1982. Funds are also included for General Systems Engineering/Integration. Cost data were derived by the Air Force Systems Command's Program Office, using a combination of contractor estimates and past experience.

(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	31,000	72,900	135,300	153,100	Continuing	Not Applicable
Procurement (Missile)	103,862	51,931	192,280	173,200	Continuing	Not Applicable
Procurement (Other)	26,574	90,132	10,733	75,100	Continuing	Not Applicable

(U) OTHER APPROPRIATION FUNDS:

Procurement (Missile) (Quantity)	103,862 (1 retrofit)	52,008	230,254 (Start 4)	200,260 (Continue 4)	Continuing	Not Applicable
Procurement (Other)(Includes initial spares) (Quantity)	26,574	70,305 (2 MGTs)	101,806 (3 MGTs)	9,357	Continuing	Not Applicable
Operations and Maintenance	33,505	50,835	53,434	63,118	Continuing	Not Applicable

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(S) DETAILED BACKGROUND AND DESCRIPTION: The Defense Support Program (DSP) was developed
DSP satellites contain infrared sensors.
The system is operational
to the National Command Authorities (NCA) and other designated users.

The system's current deployment consists of

Two dedicated ground stations, one overseas and one within the Continental United States (CONUS)
The Simplified Processing Station provides a backup capability to the current ground stations to enhance mission data survivability
It is currently deployed in the CONUS, but can be moved overseas in about a two week period. The Joint Chiefs of Staff have designated the Aerospace Defense Command, Strategic Air Command, National Military Command System, Atlantic Command, Pacific Command, European Command,
as users of DSP data. Evolutionary satellite improvements are intended to prolong the useful life of each satellite, make the satellite more survivable
increase the viewing area of each satellite, and increase the accuracy of data provided
for the NCA decision-making process. Modifications under development will ensure that the DSP payloads are compatible with Shuttle/Titan III(34)D/Inertial Upper Stage (IUS) capabilities. The Mobile Ground Terminals will provide DSP data survivability by developing a truck mounted data processing and communication capability
Future satellites scheduled for delivery starting in FY 1985 will include significant data survivability improvements.

(S) RELATED ACTIVITIES:

Defense Satellite Communications System (P.E. 33110F) provides primary communications routing for DSP overseas data and will help provide Mobile Ground Terminal communications. Space Boosters (P.E. 35119F) provides launch support. Space Vehicle Subsystems Advanced Development (P.E. 63401F) is developing technology for improved satellite stabilization techniques. The National Emergency Airborne Command Post (P.E. 32015F) and Post-Attack Command and Control System (P.E. 11312F) are potential users of DSP data. DSP is the key element of the Worldwide Military Command and Control Systems (WWMCCS)
After transition to the Space Shuttle, Space Launch Support Program (P.E. 35171F) will provide IUSs and Space Shuttle flights for DSP missions. DSP Communications (P.E. 12447F) provides operations and maintenance for the DSP Ground Communication Network.

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(U) WORK PERFORMED BY: Commander in Chief, Aerospace Defense Command, maintains operational control of Defense Support Program (DSP) for the Joint Chiefs of Staff. Strategic Air Command and the Air Force Communications Command are the system operators and maintainers of the DSP ground stations. Air Force Systems Command's Space Division, Los Angeles, CA, has overall development and procurement management responsibility and program management of the satellites. The Air Force Logistics Command provides engineering and logistics support. Air Force Weapons Laboratory, Kirtland Air Force Base, NM, will provide facility support. The Air Force Test and Evaluation Center, Kirtland Air Force Base, NM, participates in test and evaluation of selected system segments. TRW, Redondo Beach, CA, is the prime contractor for the spacecraft and satellite integration. Aerojet Electro Systems Company, Azusa, CA, is the prime contractor for the infrared sensor and the computer replacement. The Martin-Marietta Aerospace Company, Denver, CO, builds the Titan III boosters. The Department of Energy (Sandia Corporation) IBM, Thousand Oaks, CA, is the prime contractor for all software efforts as well as the prime contractor on the Simplified Processing Station and Mobile Ground Terminals. Technology Development Corporation of Santa Clara, CA, is the prime contractor for the Ground Communications Network. The Aerospace Corporation, Inglewood, CA, furnishes general systems engineering/integration for the DSP System Program Office.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Significant accomplishments to date include procurement of 13 satellites and 12 Titan IIIC boosters, construction of two data processing facilities, and provision of user displays, software, communications and a training facility (also used for software development and mission data analysis), completion of Research and Development (R&D) for modifications to satellites 10-12 to improve survivability and to provide data survivability, completion of R&D for an improved focal plane for satellite 13 and completion of development of hardware and software for the Simplified Processing Station. Development, initiated in FY 1976, continues on an improved sensor to provide increased viewing area

In June 1976, a software package was delivered which enables the Development of modifications for satellite retrofit to improve survivability was initiated. R&D support for DSP augmentation was completed. Ground station modifications for compatibility with a satellite anti-jam command capability were completed. Satellite Tracking Set Training Equipment was delivered.

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Funding ensuring Titan III(34)D/Shuttle/Inertial Upper Stage (IUS) compatibility continues. In December 1978 the Simplified Processing Station (SPS) was shipped for Initial Operational Test and Evaluation. The testing was completed in June 1979. A satellite calibration experiment was performed An upgrade to the Ground Communications Network started in August 1979 to provide data to an Airborne Command Post. In June 1980 a contract was awarded to replace the computers in the Defense Support Program (DSP) ground stations and the training and development facilities. This replacement is necessary to provide processing capability for new satellites and to avoid obsolescence.

2. (S) FY 1981 Planned Program:

In February 1980 the Deputy Secretary of Defense chose the option that increased the survivability of the current DSP.
These survivability upgrades include the following: (1) Mobile Ground Terminal will provide survivability to the ground processing of satellite data
(2) a satellite-to-satellite crosslink
(3) a Mission Data Message rebroadcast capability

Design of the Mobile Ground Terminals and the associated user interfaces will start in FY 1981. The basic computers and software will be the same as those used in the Simplified Processing Station. The design funds will be used primarily for the repackaging of the components, the new antenna subsystem, and to ensure that the mobility requirements are met. A total of six Mobile Ground Terminals are required to ensure survivability of DSP data with today's threat.

Two MGTs are planned for procurement in FY 1981. Also the design and development of the survivability upgrades, which will be incorporated on satellite 14 and beyond, will start in FY 1981.

Expenditures include the continuation of the DSP satellite compatibility development with the Shuttle/Titan III(34)D/IUS. This development is necessary to ensure that the DSP satellites are compatible with the IUS interfaces and support the program transition to a Shuttle launch capability. The development efforts will be applied to insure that the system design will incorporate launch and recovery loads, safety requirements, interface compatibility and contamination protection. The current plan for DSP satellite launches is as follows: one more Titan IIIC launch, two Titan III(34)D/IUS launches, and all subsequent launches on Shuttle/IUS. Orbital operations data analysis, survivability and satellite improvement efforts will continue.

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3. (U) FY 1982 Planned Program: A major part of the FY 1982 funds will be applied to the design and development of the satellite 14 and beyond survivability upgrades. The components for satellite 14 fall in one of the following three categories: (1) those that are the same as on previous satellites; (2) those that require various levels of redesign due to obsolescence, shuttle compatibility, etc.; and (3) those that require design and development (primarily the survivability upgrades). In order to meet the projected need date and to make the survivability upgrades available as soon as possible, the production program is planned to start in FY 1982 before the components in category (3) above have completed design and development. This approach is considered low risk because the category (1) and (2) components form the basic satellite. The FY 1982 planned production program includes a block buy of satellites 14-17 starting in FY 1982 with incremental funding through FY 1986. This programming approach will save over $130 million for the four satellite procurement over the business as usual method which would require the full funding procurement of one satellite each in FY 1982, FY 1983, FY 1984, and FY 1986. The development of the payload/Titan III(34)D/Shuttle/Inertial Upper Stage compatibility will continue. The Mobile Ground Terminal and associated user interface design will be completed. Three production Mobile Ground Terminals are planned for procurement. General system engineering/integration will be continued. Orbital operations data analysis, survivability, computer software improvements, and satellite improvement efforts will continue. The changes from the FY 1981 submission reflect: more accurate cost data for the survivability upgrades for RDT&E and procurement (missile); and the Mobile Ground Terminal and computer replacement reschedule in procurement (other).

4. (U) FY 1983 Planned Program: The satellite survivability upgrade design and development will be completed. The development of the payload/Titan III(34)D/Shuttle/Inertial Upper Stage compatibility will continue. General system engineering/integration will continue, as well as orbital operations data analysis, survivability, computer software improvements and satellite improvement efforts.

5. (U) Program to Completion: This is a continuing program. RDT&E funding will support continuing satellite/system development in support of Department of Defense requirements. Primary emphasis will be directed toward eliminating or minimizing operational employment deficiencies, the use of the Space Shuttle and/or Titan III(34)D/IUS in lieu of the Titan IIIC, the development of a survivable DSP system through Mobile Ground Terminals and satellite upgrades, and the adequacy of the ground station data processing capability.

6. (U) Milestones:

		Date
A.		
B.		
C.		
D.	Delivery of Satellite #5	Mar 1973
E.		
F.	Delivery of Satellite #6	Jul 1973
G.	Delivery of Dual Satellite Software	Feb 1974

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H.	Delivery of Satellite #8	May 1974
I.	Delivery of Satellite #7	Oct 1974
J.	Delivery of Satellite #9	Mar 1975
K.		
L.		
M.		
N.	Delivery of Simplified Processing Station (SPS)	Dec 1978
O.		
P.		
Q.	Deliver Simplified Processing Station Link Status Capability	1Q CY 1981
R.	Retrofit of Titan III(34)D/Inertial Upper Stage (IUS) Compatible Satellite Complete	4Q CY 1981
S.	Retrofit of Shuttle/IUS Compatible Satellite Complete	3Q CY 1982
T.	Completion of Ground Communications Network Upgrade	1Q CY 1983
U.	Completion of Computer Replacement	2Q CY 1983
V.		
W.	Satellite #14 Delivery	4Q CY 1985
X.	Satellite Launches	As required

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Test and Evaluation Data

1. (U) Development Test and Evaluation: The Defense Support Program has been designed, developed, tested and deployed as an operational system in the early 1970's. The system is a classified space program consisting of ground control and readout stations that receive data from satellites, process the data,
to the National Command Authorities and military commanders for decision-making purposes. Development, Test and Evaluation/Initial Operational Test and Evaluation on the prototype Simplified Processing Station was completed in 1978. Over the next several years three major system upgrades will require Development Test, and Evaluation. They are the Sensor Evolutionary Development and Advanced Atmospheric Burst Locator upgrades, the Mobile Ground Terminals, and the Satellite 14 and beyond survivability upgrades.

These upgrades have three different elements: the satellite, the software modifications and the ground station upgrade which involves replacing the computers. The sensor portion of the satellite is being produced by Aerojet ElectroSystems Corporation and the spacecraft is being produced and integrated by TRW, Incorporated. Development, Test and Evaluation will be performed at the Aerojet ElectroSystems Corporation and TRW facilities prior to government acceptance, which is scheduled for fiscal year 1982. The satellites will then be stored until there is a launch requirement. The computers are being replaced at all Defense Support Program locations by Aerojet ElectroSystems Corporation. This replacement is scheduled to be completed by fiscal year 1983. Development, Test and Evaluation will be accomplished on this replacement in conjunction with acceptance testing. The system software is being modified to accommodate the Sensor Evolutionary Development satellites by International Business Machines Corporation. Development, Test and Evaluation will be accomplished prior to turnover to Strategic Air Command (scheduled for fiscal year 1982) who will integrate the software into the operational system. This initial software installation will process data from the current satellite configuration. When the first Sensor Evolutionary Development satellite is launched, Air Force Systems Command will accomplish a system level Development, Test and Evaluation to insure that all elements of the system work together, including the satellite, the ground station hardware and the software. The purpose of the Mobile Ground Terminals is to provide survivability to the Defense Support Program ground processing and communication elements through mobility. They will use the same computer hardware and software as the Simplified Processing Station. The prime contractor will be International Business Machines Corporation. Development, Test and Evaluation will be accomplished on the antenna which is new and at the Mobile Ground Terminal system level to ensure that the Mobile Ground Terminal can meet its mobility and communication goals. Satellite 14 and beyond will include several survivability upgrades directed by a Defense System Acquisition Review Council.

Development of these satellites will start in late fiscal year 1981 and the first will be delivered in late fiscal year 1985. The ground station and software modifications have not been defined. The Development, Test and Evaluation program for these upgrades will be very similar to the Sensor Evolutionary Development Development, Test and Evaluation program.

2. (U) Operational Test and Evaluation: Combined Development, Test and Evaluation and Initial Operational Test and Evaluation was performed on the Defense Support Program prototype Simplified Processing Station from 26 August 1978 to 6 November 1978 at Vandenberg Air Force Base, California. This combined test was then followed by dedicated Initial Operational Test and Evaluation Space Division was responsible for Development, Test and Evaluation while the Air Force Test and Evaluation Center, assisted by personnel from the Aerospace Defense Command (operating command for Defense Support Program), managed and conducted Initial Operational Test and Evaluation. Initial Operational Test and Evaluation was conducted using simulated and "real world" missile launch events with prototype Simplified Processing Station hardware and software. The objectives were to evaluate the system's performance and to estimate the reliability, availability and maintainability of an operationally deployed system. The Initial Operational Test and Evaluation report, October 1979, identified three major deficiencies which would prevent the Simplified Processing Station from being operationally useful. These were:

and excessive computer-generated message error rate - mission messages were periodically rejected at the data distribution center because of parity error. As a result, mission messages were lost.

Phase I follow-on operational test and evaluation of the Simplified Processing Station was conducted by Air Force Test and Evaluation Center from 7 January 1980 through 5 February 1980. The purpose of the Phase I follow-on operational test and evaluation was to confirm correction of the deficiencies identified during Initial Operational Test and Evaluation

Strategic Air Command will conduct a 30-day Phase II follow-on operational test and evaluation in January 1981 to confirm the effectiveness of this procedure and to support the declaration of an initial operational capability. Operational Test and Evaluation for the Sensor Evolutionary Development satellites and Advanced Atmospheric Burst Locator, Mobile Ground Terminals and satellite 14 and beyond is currently being defined.