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U.S. NAVY SPACE SYSTEMS

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NAVY SATELLITE COMMUNICATIONS PROGRAMS

Defense Satellite Communications System (DSCS)

The first DSCS satellites were launched in 1966 to supplement HF and cable, long-haul point-to-point circuitry in the Defense Communications System. The Navy operates seven ground terminals in this system. JCS determines the use, location and application of satellites and ground terminals. The Defense Communication Agency (DCA) is the Project Manager. Navy participation has included the development and procurement of shipboard terminals. 14 of the original 26 Phase I satellites remain functional; these are scheduled to shut down automatically, 6 years ± 1/2 year from launch: i.e., 1972 and 1973.

Phase II commenced with the launch of two synchronous satellites with greatly increased capacity on 2 November 1971. The Pacific satellite failed soon after launch. The Atlantic satellite had a partial failure and is usable in a degraded condition. The next launch of 2 additional Phase II satellites is expected in the fall of 1973. JCS has stated a requirement for four satellites to provide world-wide (70°N - 70°S) coverage.

Navy participation in the DSCS II and follow-on systems plans use of two shipboard SHF prototype terminals (AN/SSC-6) to be installed in USS LITTLE ROCK and USS OKLAHOMA CITY in CY 1973. New development AN/WSC-2 terminals will begin delivery in 1977 for installation in large ships such as carriers, amphibious command ships and cruisers. Initial procurement is planned for 11 terminals; ultimate requirements are estimated at 40 terminals. This is subject to revision.

Tactical Satellite Communications (TACSATCOM) Program

This program was established in October 1965 by OSD as a tri-service UHF R&D Program to access the feasibility of UHF SATCOM for tactical applications. Navy participation included development of shipboard terminals. The space system consist of two synchronous satellites, LES 6 in the Atlantic and TACSAT-I in the Pacific. TACSAT I failed on December 1972; LES-6 is expected to provide service until fall of 1973. The Navy has used TACSAT-I and LES-6 most heavily for Atlantic and Pacific Fleet operations. The success of TACSATCOM formed the basis for the FLTSATCOM UHF system to be deployed in 1976.

UHF Gap Filler

Prior to the failure of TACSAT-I, the JCS validated the requirement for a continuous UHF satellite communications capability in the Atlantic and Pacific. In order to provide this capability between the expiration of the TACSATCOM satellites and the introduction of FLTSATCOM, Navy has requested proposals from five contractors to provide a UHF capability on a lease basis to commence in late CY 1974. Responses to the RFP are expected by 15 February with a target date for contract award of 1 March 1973. The service to be provided will be similar to that provided by the TACSATCOM satellites and will be used for R&D as well as operations.

Fleet Satellite Communications (FLTSATCOM) System

FLTSATCOM will provide for world-wide (70°N to 70°S) coverage with four geo-stationary UHF satellites. Six shore terminals will be operated by major Naval Communications Stations (NAVCOMMSTAS). The FLTSATCOM system will provide for jam-protected one way Fleet Broadcast to all ships as well as two way channels for record traffic, data and secure voice. High-data rate computer links will support Electronic Data Processing (EDP) systems. High priority Air Force communications requirements will be satisfied by separate two way channels. Each satellite will have 10 uplink and 10 downlink channels for Navy use, 12 channels for USAF and two wideband channels for special use. Fleet flagships and other major ships will have a four channel capability; smaller ships, submarines, and aircraft will have a single channel transceiver capability.

The Navy is the executive agent for the FLTSATCOM system development. The USAF is responsible for the space segment acquisition and launch. Contract award for the satellites was made in November 1975 to TRW systems, Inc.

First launch is scheduled for November 1975 with follow-on launches at 90-day intervals. Two ocean coverage is planned by April or May 1976; full operational capability of four operational satellites is planned by November 1976.

ENVIRONMENTAL SATELLITE SYSTEM

DSAP(S)

The Navy is not actively engaged in promoting a Navy sponsored meteorological or oceanographic satellite system. The Navy does, however, have a project underway to provide fleet carriers with the capability to read out the product from the DSAP satellite. This satellite, a polar orbiter at 450 nautical mile altitude, was developed by the Air Force and subsequently has become a DOD joint program. It provides very high resolution visual and IR data with a nominal resolution of 1/3 nautical mile. The Navy has equipped one ship (CONSTELLATION) with a developmental terminal to read out this data and has programming underway for twelve operational terminals. An 8 month deployment of this read out equipment to SEASIA on board USS CONSTELLATION demonstrated conclusively the enormous value of this data to tactical air operations.

NAVY NAVIGATION SATELLITE SYSTEMS

BACKGROUND

Based on observations of SPUTNIK, U. S. scientists in 1957 developed the concept of navigation by satellite, or more precisely position fixing, utilizing doppler or range-rate measurement techniques. By mid-1964, this concept had been developed into the Navy Navigation Satellite System which was placed into operation in support of fleet users. In 1967, the Navy had sufficient capability, confidence, and experience in the use of satellites for position fixing that Vice President Humphrey announced the availability of shipboard user equipment design data to our civilian community in order to permit peaceful use of this navigation system. Today there are as many commercial users (U.S. and foreign) as U. S. military users.

TRANSIT

As it is currently operating, this system, the only Navigational Satellite System in the free world, consists of 5 TRANSIT satellites in different polar planes at approximately 600 nautical miles altitude providing position fixing information to users on the average of one fix every 26 - 120 minutes depending upon where the user is latitude wise. The satellites weigh about 140 lbs, are gravity gradient stabilized and solar cell powered. The satellites are equipped with a memory in which it's own orbital data is held to be transmitted periodically to users. Every two minutes the signals from the satellites are modulated with an accurate time signal and with appropriate position information from the memory. Enough data is injected into the satellite at one time to last for 16 hours of consecutive 2-minute broadcasts. 150 and 400 MHz oscillator - regulated frequencies carry this data to the users.

The ground complex consists of four tracking stations located on U. S. soil - Pt. Mugu, California; Winter Harbor, Maine; Minneapolis, Minnesota; and Wahiawa, Hawaii.

The Navy is testing an advanced TRANSIT satellite designed to maintain its orbital parameters precisely and thereby eliminate the need to have the spacecraft transmit its latest ephemeris data. If successful, it would enable civil users with less expensive navigation satellite equipment to obtain higher accuracy position fixes without having to take account of orbital changes caused by solar radiation

pressure and atmospheric drag. Also being evaluated is the use of a ranging signal to reduce the time to obtain a position fix.

TIMATION

The Navy is also exploring a concept called TIMATION (for TIMe NavigATION) which is a ranging system using data from highly stable oscillators in a satellite and in the user's receiver to determine the slant range between them.