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PROJECT: SAN MARCO SATELLITE

SCHEDULED LAUNCH: No earlier than
December 11, 1964

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ITALIAN SAN MARCO SATELLITE LAUNCH SET FROM WALLOPS

The Italian Commission for Space Research and the National Aeronautics and Space Administration soon will place in orbit the first San Marco satellite designed and built by the Italians to conduct continuous measurements of Air Density.

The launch, scheduled from Wallops Island, Va., no earlier than Dec. 11, will be conducted by a NASA-trained Italian launch crew. A four-stage solid propellant Scout, designated San Marco Scout 1, will be the launch vehicle.

This will be the first time in the NASA international cooperative program that a satellite launch operation has been conducted by a team of foreign nationals. United States launch crews have placed in orbit two United Kingdom satellites and one Canadian satellite.

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The 254-pound San Marco satellite will be launched in an easterly direction from Wallops Island. Inclination to the equator will be 37.7 degrees. Its orbit is expected to have a perigee (low point) of approximately 135 statute miles (214 kilometers) and an apogee (high point) of about 420 statute miles (677 kilometers).

OBJECTIVES

Objectives of the mission are (1) to serve as a training exercise for the Italian launch crew in preparation for a sea platform operation; (2) to qualify the San Marco spacecraft for a later launch into an equatorial orbit from a sea platform in the Indian Ocean near the Equator; and (3) to provide measurements of air density and to investigate ionospheric characteristics related to interference with long-range radio transmissions.

Instrumentation in the 26-inch spherical spacecraft was tested in two suborbital flights from Wallops Island last year -- April 20 and Aug. 2. Launch vehicle used was the two-stage Shotput rocket.

This first attempt at continuous measurement of air drag forces on a spacecraft is made possible by a payload configuration consisting fundamentally of two concentric structures -- a heavy spherical structure contained in a much lighter spherical outer shell. The two spheres are linked by non-rigid connections.

When the orbiting light outer shell encounters the thin upper atmosphere, it is retarded by this drag to a slight degree. The heavy inner core, however, continues traveling unaffected except for the force transmitted by the flexible connections. The result is that the distances between the outer shell and the "floating" inner core change.

Equivalent position changes take place in three flexible arms that connect the core and the shell. The precise degree of movement, reflecting atmospheric drag -- hence, the air density -- is measured by strain gauges and transmitted to ground stations by radio.

A second experiment, with instruments attached to the inner core, will investigate certain characteristics in long-range radio transmissions.

The equatorial region also is the zone of greatest exposure to solar radiation which heats the atmosphere. This heating causes the atmosphere to expand and swell to its highest point in the equatorial region.

Both experiments will operate at maximum advantage when the San Marco satellite is launched into an equatorial orbit from the sea platform.

The project was conceived by Professor Luigi Broglio, Chairman of the Italian Commission for Space Research and Project General Director of the San Marco Project. The payload was developed by Professor Broglio and his group at the Aerospace Research Center in Rome.

TERMS OF AGREEMENT

The San Marco Project, involving the first satellite wholly designed and built in Western Europe, stems from an agreement signed by representatives of Italy and the United States Sept. 5, 1962. Basic objective of the cooperative venture in space is to perform high altitude measurements of atmospheric and ionospheric characteristics in the equatorial region.

Under terms of the agreement between the two countries NASA is providing the launch vehicles, use of its facilities, and training for Italian personnel for the initial phase of the program.

The Italian group is responsible for the design, fabrication, and testing of all payloads and experiments including construction of the satellite structure and telemetry, as well as for the orbital launchings. The Italian team also is establishing the equatorial range, including the mobile platforms, and such tracking and data acquisition facilities

as are peculiar to project San Marco and which are not available from NASA.

No exchange of funds between the two countries is involved. Scientific data resulting from the program will be made available to the world community of scientists.

The project is designed to culminate in the launching of a satellite into an equatorial orbit by the Italians. This launch, again using a NASA Scout launch vehicle, is to take place from a towable platform (similar to a Texas tower) located near the equator on the continental shelf off the east coast of Africa.

Tests of launch platform operations were conducted in March of this year at the equatorial site with sounding rockets of the Nike-Apache class.

Nearly 75 members of the Italian San Marco project team have been in training at intervals for the past two years at Wallops Station and other NASA facilities, and at the site of the prime contractor for Scout, Ling-Temco-Vought in Dallas, Tex.

RESPONSIBILITIES

The NASA Goddard Space Flight Center has assisted in testing of the payload and in training Italian personnel pending completion of test facilities in Italy and will assist in worldwide tracking and data acquisition. NASA's Langley Research Center is responsible for technical direction of the NASA portion of the program, including training by the Scout Project Office on the Scout launch vehicle. NASA's Wallops Station is responsible for the training of range support and operations personnel.

The San Marco Scout launch at Wallops Station will be conducted by the Italian launch crew, assisted by Ling-Temco-Vought personnel. Professor Broglio will direct the Italian space commission team effort during the forthcoming operation. Prof. Michele Sirinian is Launch Crew Director and Dr. G. Ravelli is Chief Spacecraft Engineer.

NASA Program Manager is R. D. Ginter of the Office of Space Science and Applications. The Langley Research Center Vehicle Project Manager is Roland D. English and Louis P. Tosti is Langley Field Operations Director. The Wallops Project Engineer for the launch is Tom W. Perry. Raymond H. Stanley of Wallops is Technical Advisor for Range Instrumentation Systems Design, Implementation and Training. Anthony Caporale is the Goddard Project Engineer.

SCOUT LAUNCH VEHICLE

Scout is a multi-stage launch vehicle using four solid propellant rocket motors capable of carrying payloads of varying sizes on orbital, space probe or reentry missions. Scout is 72 feet long and weighs 20 tons at liftoff.

Scout was developed by NASA's Langley Research Center, Hampton, Va. It is manufactured by Ling-Temco-Vought, Inc., Dallas.

The four motors are interlocked with transition sections which contain guidance, control, ignition, instrumentation systems, separation mechanisms, and spin motors. Guidance is provided by a strapped-down gyro system and control is achieved by a combination of aerodynamic surfaces, jet vanes and hydrogen peroxide jets.

Scout is capable of placing approximately 240 pounds into a 300-mile orbit or of carrying a 100-pound scientific probe some 7,000 miles away from Earth.

Scout stages include the following motors:

First Stage: Algol IIB - 105,000 pounds thrust, burning time 68 seconds.

Second Stage: Castor I - 62,000 pounds thrust, burning time 42 seconds.

Third Stage: Antares II (ABL X-259) - 22,000 pounds thrust, burning time 36 seconds.

Fourth Stage: Altair II (ABL X-258) - 5,800 pounds thrust, burning time 24 seconds.

BACKGROUND

The San Marco project is part of NASA's international program, which has among its objectives:

1. To provide the opportunity for scientists of other nations to participate in and contribute to man's understanding and use of his spatial environment;

2. To support the operating requirements of the NASA program;

3. To demonstrate the open character and peaceful purposes of the U.S. space program.

Arrangements for such flight projects as San Marco call for mutual agreement between NASA and the central civilian agency appointed to act on behalf of a given participating government to cooperate on a specific project which has scientific validity and is of mutual interest.

A program usually begins with receipt by NASA of a proposal from the foreign group. Upon preliminary agreement among the concerned scientists, a Memorandum of Understanding which defines what each party will do is negotiated between NASA and the designated foreign agency. In cases involving a sizable commitment of resources (such as San Marco), the Memorandum of Understanding is ratified through diplomatic channels by the participating goverments.

Scientific information obtained from the project is shared by both parties and the results are made available to the world scientific community.

To date, NASA has agreements to launch cooperative satellites with the United Kingdom, Canada, Italy, France and the European Space Research Organization (ESRO) composed of nine Western European nations.

In the cases of the Ariel I (launched April 1962) and Ariel II (March 1964) the United Kingdom's contribution was the design and preparation of the experiments placed on board the spacecraft. The United States provided the spacecraft and launch vehicle, and launched the satellite.

The Alouette (launched September 1962) project with Canada involved greater foreign participation, in that the Canadians not only prepared the experiments, but designed and engineered the spacecraft itself, while the United States provided the launch vehicle and launched the satellite. Similarly, the FR-1 and UK-E spacecraft will be conceived, designed and built by the French and British respectively, and launched by NASA from the Western Test Range.

The San Marco program provides still greater extension of foreign participation. The United States provides the Scout launch vehicle. But the Itallians, in addition to designing and engineering the spacecraft and its experiments, also are designing and assembling the launch complex, arranging

for the site, and, after receiving NASA training, an Italian crew will launch the satellites.

The planned Italian San Marco Range will be a complex facility, including two mobile sea-going platforms especially equipped with launchers, control and guidance equipment, radar and range safety devices, air conditioned working shelter and test rooms, command and tracking stations, etc.

One of the two platforms is used mainly as a launching pad and the other as the control and operations center. They are connected to each other by special submarine control and power cables.

The first of the two platforms, the "Santa Rita" was used in the March operations at the Equator.

ITALIAN GOVERNMENT'S TOP OFFICIALS CONCERNED WITH THE SAN MARCO PROGRAM:

Professor Giovanni Polvani, Chairman, National Research Council and Chairman, National Institute of Space Research.

Gen. Cesare De Porto, Chairman, Ad Hoc San Marco Working Group of the National Institute of Space Research.

Ambassador Egidio Ortona, Director General, Economic Affairs in the Ministry of Foreign Affairs.

Professor Luigi Broglio, Chairman, Italian Space Commission and San Marco Project General Director and Test Director.

Professor Carlo Buongiorono, Assistant Project General Director.

Dr. Giorgio Ravelli, San Marco Project Payload Manager.

Instrumentation Engineers:

Dr. Ugo Ponzi, Balance Experiments

Dr. Carlo Arduini, Therman Control System

Dr. G. Barresi, Payload Telemetry

Dr. G. Pellegrineschi, Payload RF System

Dr. V. Mazzaglio, Space Simulator Tests

Professor P. F. Checcacci, Ionospheric Experiments

G. Tarabra, Payload Structure

Data Acquisition and Evaluation:

Professor Paolo Santini, Orbit Analysis

Dr. Severino Giorgi, Data Reduction

Dr. Fabrizio Barbieri, Data Acquisition

Payload Experiments:

Professor Luigi Broglio, Balance Experiment

Professor Nello Carrara, Ionospheric Experiment

Vehicle and Launch Team:

Professor M. D. Sirinian, Assistant Test Director

Dr. G. Spampinato, Test Conductor

Dr. G. F. Manarini, Electronics Supervisor

Range Control:

Dr. R. Solimena, Range Instrumentation

Dr. A. Berlese, Range Safety Officer

NASA Liaison:

Dr. Franco Fiorio

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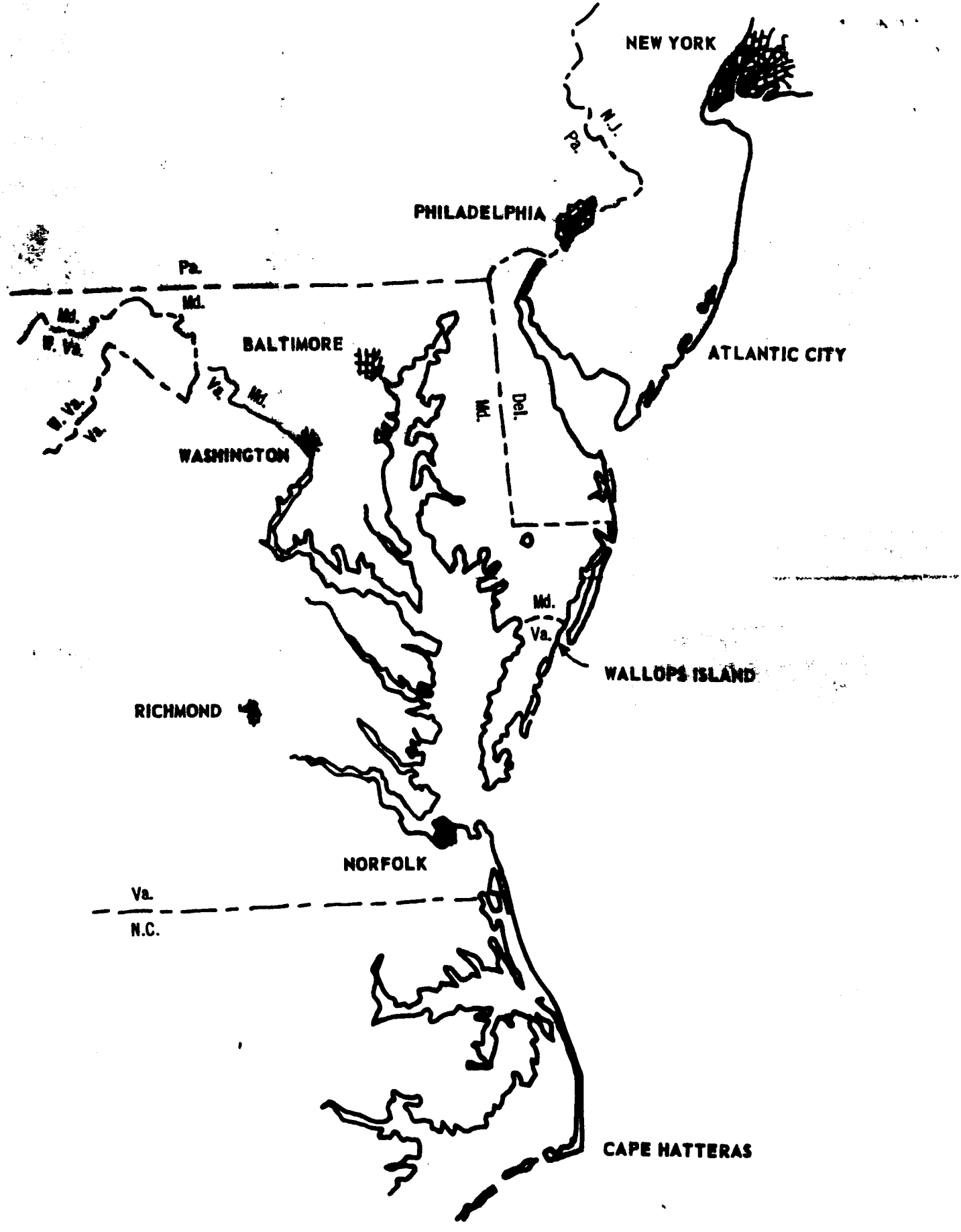
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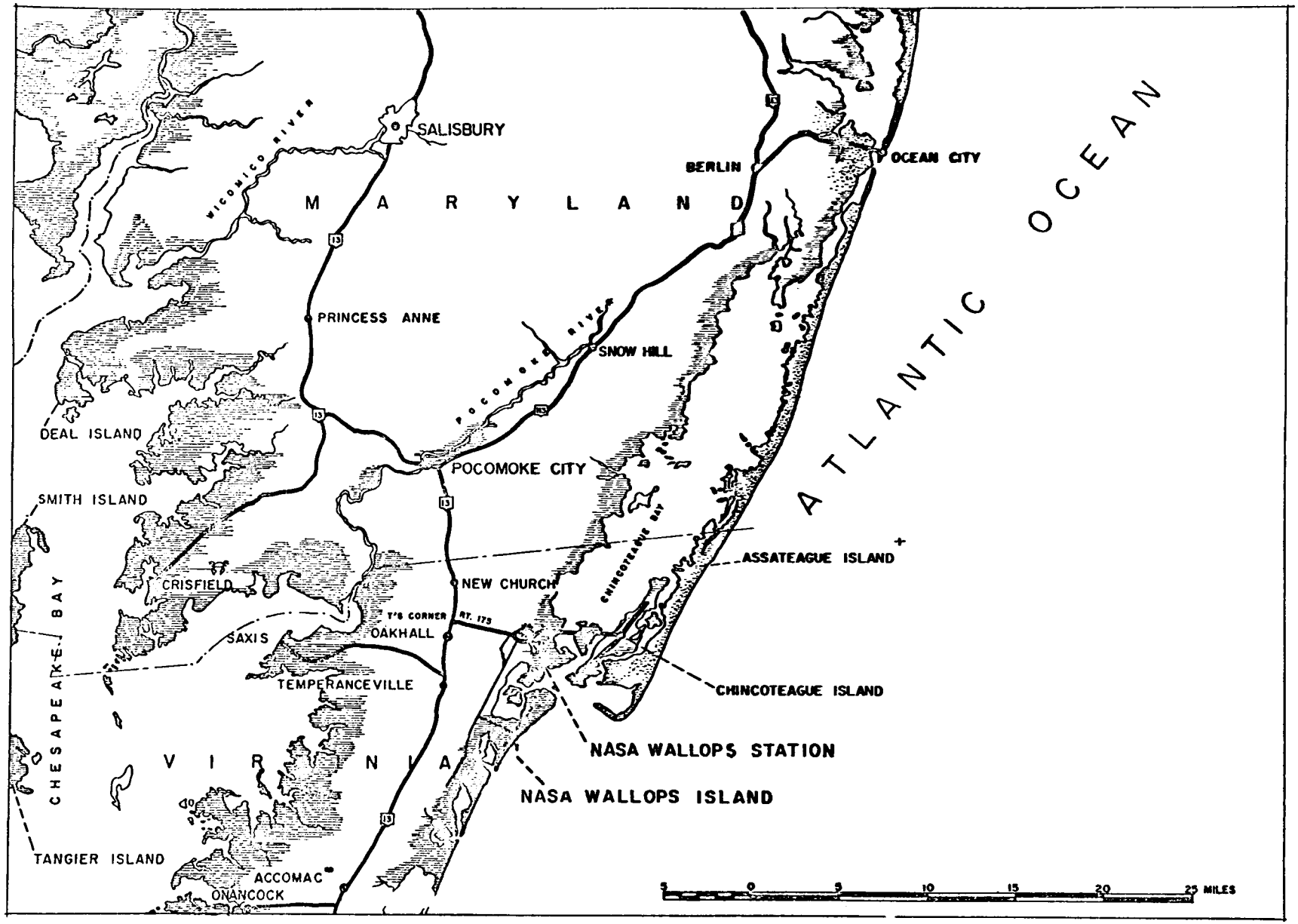
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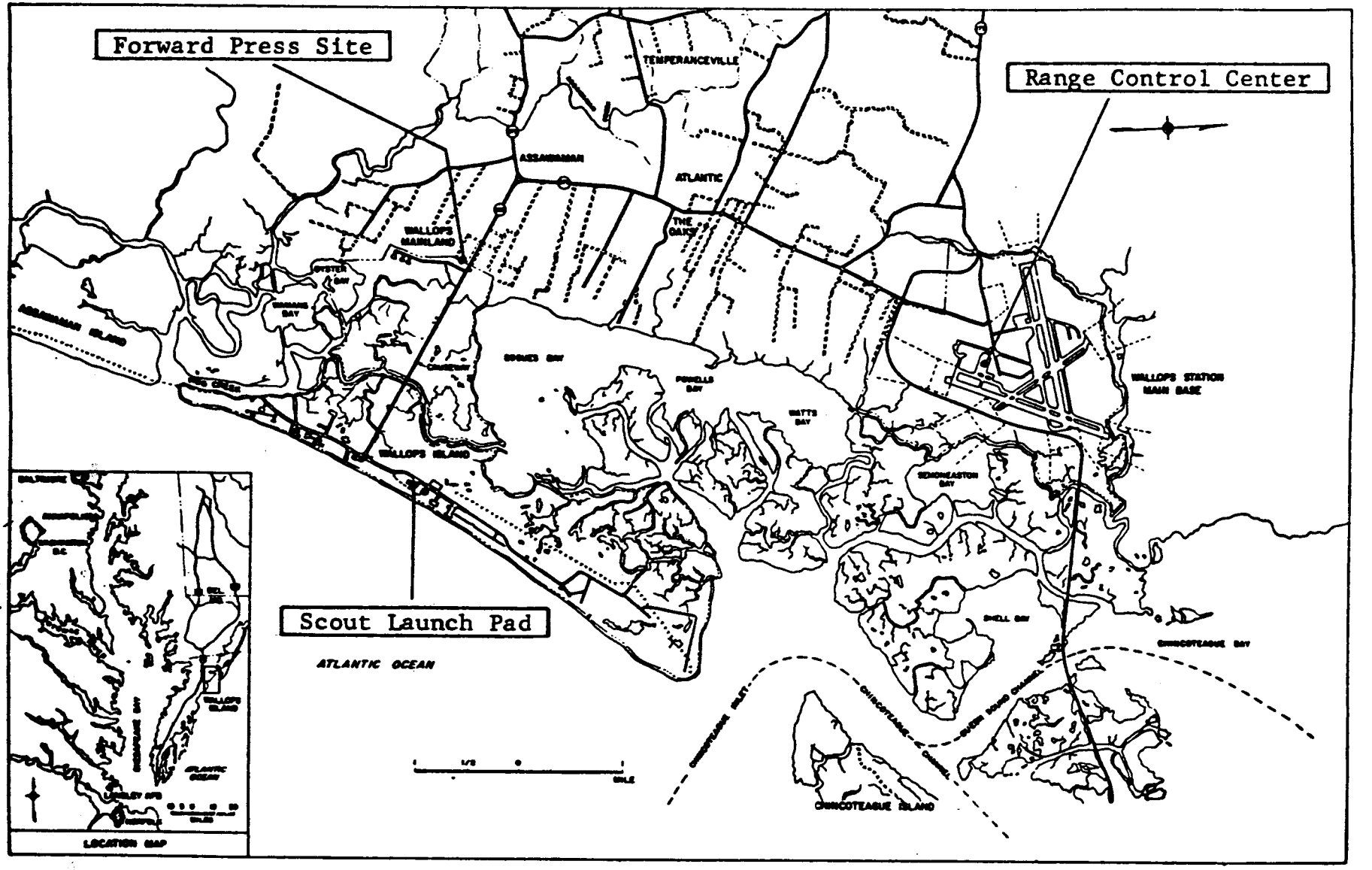

Wallops Station,
Overall Site Map