NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

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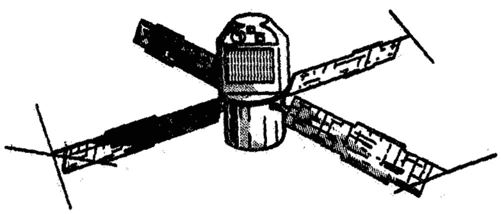

PROJECT: SAS-A
(To be launched no earlier than Dec. 12)

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NEWS

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (202) 962-4155
WASHINGTON, D.C. 20546 TELS: (202) 963-6925

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ITALY TO LAUNCH U.S. SATELLIT

The first American satellite to be launched by another country will be placed in Earth orbit by a team of Italian space engineers operating from a mobile launch platform located in the Indian Ocean. The launch will take place off the coast of Kenya in East Africa no earlier than December 12.

The spacecraft is the Small Astronomy Satellite-A (SAS-A), 42 in the National Aeronautics and Space Administration's Explorer series. It is the first satellite equipped with sensitive experiments to detect high-energy X-ray sources in space, and is also known as the X-ray Explorer,

Successful operation of the astronomy satellite will allow scientists to take the next giant step in astronomy -- the cataloging of powerful X-ray sources both within and outside our galaxy, the Milky Way. During the first day of operation of its scientific instruments, the satellite is expected to collect more data than has been obtained with sounding rockets in the eight years since the science of X-ray astronomy was born.

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When correlated with radio and optical astronomy findings, this information will give astronomers a new dimension for understanding the mysteries of the high-energy phenomena of our galaxy and those which govern the principal physical processes of the universe.

The X-ray Explorer will be launched no earlier than 10 a.m. East African time (2 a.m. EST).

A four-stage, solid-propellant Scout launch vehicle will boost the 315-pound (142.8 kilogram) Explorer satellite into a circular orbit along the equator, some 342 statute miles (550 kilometers) high. The spacecraft will circle the globe once about every hour and a half and has a design lifetime of six months.

Orbiting above the Earth's atmosphere, opaque to X-rays and most other energy from space, the X-ray Explorer will scan the sky systematically for X-ray sources in the energy range of 2,000 to 20,000 electron volts. (Visible star light covers a range of about two electron volts.) In addition to pinpointing their location, the satellite will radio data on the intensity, spectral distribution (frequency) and time variation of the detected X-ray sources.

The satellite also will map a diffuse X-ray background that covers the entire sky almost uniformly. Information on the distribution and energy spectrum of this X-ray background should prove invaluable in determining its origin.

The long-observing time of the satellite, compared to a few minutes for the typical sounding rocket experiment, will permit the observation of X-ray sources from about 30 times fainter than those observed thus far. With this increased sensitivity, astronomers speculate that the number of observed X-ray sources will increase from about 40 to several hundred.

The X-ray Explorer will offer astronomers the unique opportunity to coordinate X-ray research with other areas of astronomy. Once X-ray sources have been identified with known visible objects, simultaneous observation of selected stars can be made in the visible, ultraviolet, infrared, radio and X-ray regions of the energy spectrum.

Once new exploding stars are discovered and their locations pinpointed, the X-ray Explorer can be maneuvered to view them. Any X-ray detected in these exploding stars will give valuable clues about the temperatures and details of the nuclear processes which are occuring.

Response time after report of such events may be as short as five hours or as long as 24 hours, depending upon the amount of maneuvering required.

NASA controllers will maneuver the X-ray Explorer from the ground by energizing an electromagnet contained in the spacecraft's attitude control system. Electrical energy surging through this device causes the electromagnet to act as a compass needle, attempting to align itself with the north-south lines of the Earth's magnetic field. Thus, the spacecraft can be pointed to any direction in the sky.

A contract for the launch of the X-ray Explorer, signed by the U.S. and Italy, implements a Memorandum of Understanding signed by the two countries in February 1969, calling for use of Italy's San Marco launch platform off the east coast of Africa for launch of U.S. satellites.

Under the terms of the contract, signed by NASA and the Universita degli Studi di Roma (University of Rome), NASA will provide the launch rocket and the satellite. The University's Centro Ricerche Aerospaziali (Aerospace Research Center) will be reimbursed for assembly, checkout of the launch vehicle and launch of the satellite.

The Italian launch team, trained by NASA at its Wallops Station, Va., range successfully launched the San Marco-I satellite from Wallops in 1964 and the San Marco-II satellite from the San Marco platform in 1967.

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Use of Italy's San Marco platform enables NASA to place the X-ray Explorer into an equatorial orbit with the smaller Scout rocket rather than the larger launch vehicles required for achieving the same orbit from Cape Kennedy.

An equatorial orbit was selected for this satellite to bypass the South Atlantic area where the Earth's radiation belts dip close to the surface. This radiation could degrade the spacecraft's electronic systems and the X-ray experiment.

The X-ray Explorer is the first of three spacecraft approved for flight under the Small Astronomy Satellite program conducted by NASA's Office of Space Science and Applications. This program has a basic objective of surveying the celestial sphere in search of sources of X-rays and gamma rays both within and outside of our galaxy.

Later SAS spacecraft may be approved to study other regions of the electromagnetic spectrum -- ultraviolet and infrared.

The SAS spacecraft are unique in that the scientific instruments for each mission are contained in a separately fabricated section which is fitted to a common bus section. Power, attitude control, communications, data storage and other instrumentation necessary to support the mission are contained in the bus section.

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Management of the SAS program is directed by the Goddard Space Flight Center, Greenbelt, Md. The X-ray experiment was designed and developed by the American Science and Engineering Co., Inc., at Cambridge, Mass., which is also the principal experimenter for this mission. Fabrication of the spacecraft and integration of the experiment with it was accomplished at the Johns Hopkins University's Applied Physics Laboratory in Howard County, Md., under contract to Goddard.

The Scout Launch Vehicle is managed for NASA by its Langley Research Center, Hampton, Va. It was developed by Ling-Temco-Vought, Aerospace Corp., Dallas.

(END OF GENERAL RELEASE; BACKGROUND INFORMATION FOLLOWS)

SAS-A MISSION OBJECTIVES

The primary objective of the Small Astronomy Satellite-A (X-ray Explorer) is to develop a catalog of celestial X-ray sources by systematic scanning of the celestial sphere in the energy range of 2,000 to 20,000 electron volts.

Operating above the Earth's energy obscuring atmosphere, the satellite will search for X-ray sources both within and outside our galaxy, the Milky Way.

Measurements made on known and new X-ray sources detected will include their position, strength, spectral composition and time variation from minutes to months. Expected accuracy for the location of the stronger X-ray sources is one arc-minute and about 15 arc-minutes for the weaker sources.

HIGH ENERGY ASTRONOMY

The window of visible light through which man has always looked into space shows only a small part of the events occuring outside the atmosphere of our planet. Even the visual images we see from Earth are distorted and clouded by turbulence and scattering of light in the atmosphere.

A new world of phenomena came into view when a second window was opened to the universe with the discovery about 38 years ago that radio signals from space could be detected on Earth.

As man learned how to surmount the atmospheric veil with space vehicles such as balloons, sounding rockets and satellites, the universe began coming into view on all frequencies of the energy spectrum.

High energy astronomy is concerned with the most energetic forms of radiation -- X-rays, gamma rays, and cosmic particles. The observable energy range extends from soft X-rays, about 250 electron volts, to the highest energy cosmic rays, almost 100 million billion electron volts. In contrast, all of the visible light covers a range of about two electron volts.

A Geiger counter rocketed into space aboard a sounding rocket in 1962 by American Science and Engineering astronomers surprised the world by revealing the existence of several X-ray sources within our Milky Way galaxy. This first major surprising astronomical observation with a space vehicle above the Earth's atmosphere proved to be the birth of X-ray astronomy.

Since that beginning, just eight years ago, X-ray astronomy research with sounding rockets and balloons has revealed the existence of X-ray stars and X-ray galaxies, so called because their X-ray energy far exceeds their visible or radio energy.

To date, some 40 discrete sources of X-rays have been discovered against a diffuse X-ray background that covers the entire sky almost uniformly. Nearly all of these sources are believed to lie in our galaxy and are characterized by an average X-ray power about 1,000 times greater than the total energy output of our Sun.

The strongest known X-ray source, SCO X-1 located in the constellation Scorpius, was hardly noticed by optical or radio astronomers. It appeared to them as an ordinary faint star. Yet, this star radiates 100 times more power in X-rays as it does in visible light. The true nature of this star is still a mystery and there is no acceptable theory as to why it should emit so much more X-ray than visible energy.

One X-ray source is thought to originate in the distant radio galaxy Virgo A (M87). The X-ray power of this source is about 70 times its radio power.

Most X-ray sources have yet to be identified with visible or radio counterparts, even though there is strong evidence that they are associated with supernova (exploded stars) and pulsars. Weaker evidence links X-rays with radio galaxies and quasars.

In one case, pulsed X-rays have been observed coming from the Crab nebula (a star remnant believed to have exploded nine centuries ago) at the rate of about 30 pulses-per-second. Each pulse contains as much energy as could be produced by collecting the entire electrical output of our present terrestrial civilization for 10 million years.

These findings represent a major beginning step toward the goal of understanding the high energy phenomena in our galaxy and those which govern the principal physical processes of the universe.

Scientists think that the time is now ripe for detailed studies of the X-ray phenomena already discovered and for much more thorough surveys of the sky to determine the numbers and types of objects emitting high energy X-rays. Also correlations between X-ray, visible, ultraviolet, infrared and radio astronomy observations must be done to further the understanding of the nature of the X-ray sources.

The advent of the X-ray Explorer, first in the Small Astronomy Satellite series, now makes it possible for man to take a giant step in astronomy. Its systematic detection of X-ray sources some 30 times weaker than the weakest known source is expected to reveal a heaven full of X-ray stars. In this respect, the satellite has been compared to the development of the first large optical telescope which disclosed billions of visible stars in the heavens not seen by the naked eye.

Quick reation correlation of X-ray sources with optical and radio sources will provide astronomers new insight about the physical structure and energy balance of the objects in the universe as well as the major energy transfers occuring in the universe.

Since X-rays are very penetrating, they may provide a means of studying regions near the center of our galaxy that are not accessible in other ways.

X-ray astronomy offers scientists new opportunity to study some of the most dynamic aspects of stellar objects. Many astrophysicists believe we may be observing the climax of the stellar evolution process.

Whereas optical astronomy tells the scientist about a star's thermal processes -- the events that just boil along -- high energy astronomy (including X-rays) reveals the non-thermal events. These are the truly disruptive processes which represent major changes in the way energy is distributed.

THE SPACECRAFT AND ITS OPERATIONS

The SAS spacecraft is unique in that it utilizes a common control section to carry and support custom experiments on separate missions. This design is intended to minimize costs for follow-on programs.

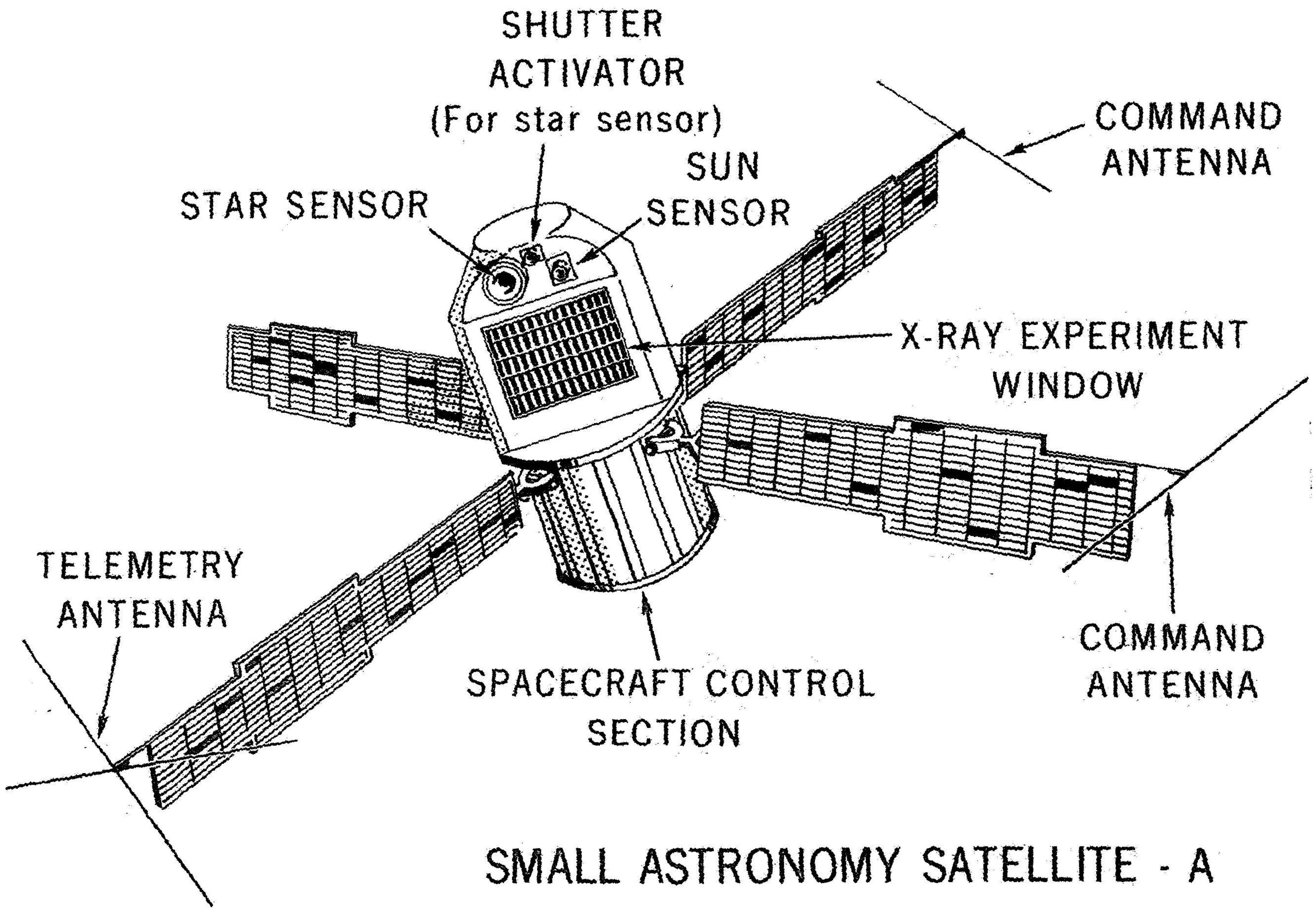
The control section consists of an aluminum shell which houses all the systems necessary for attitude control, data storage, power storage and regulation, and communications. The 140-pound (63.6 Kg) experiment is supported on the upper end of the 175-pound (79.5 kilograms) control section.

The lightweight cylindrical shell of the control section measures about two feet (61 centimeters) in diameter by two feet long. Four solar paddles, hinged to the outer rim of this shell, provide an average of 27 watts of raw power to the spacecraft and experiment day and night.

Folded against the spacecraft during launch, these paddles extend perpendicular to the control section in orbit where they measure about 13 feet (3.9 meters) tip to tip. Two command antennas and a single telemetry antenna are mounted to the ends of three of the solar paddles.

In orbit, the spacecraft rotates at the rate of five revolutions per hour causing the experiment window to sweep across teh sky in search of X-ray sources. Stabilization of the spacecraft at this slow rotation is provided by an internal wheel that spins like a gyroscope. An electromagnet system helps control the spin rate and a nutation damper provides further stabilization.

The most unique feature of the spacecraft is its attitude control system which also contains an electromagnet. When energized, this device acts like a compass needle and attempts to align the spacecraft with the Earth's magnetic field. Thus, the spacecraft can be pointed to any direction in the sky upon ground command.



SMALL ASTRONOMY SATELLITE - A

THE X-RAY EXPERIMENT

The X-ray astronomy instrument is an advanced version of an experiment previously flown on sounding rockets and is also designed for use on manned spacecraft. It was designed and built by American Science and Engineering, Inc., Cambridge, Mass.

This 140-pound (63.6 kilogram) experiment package is divided into two essentially identical halves, each independent of the other. Beyond the redundancy provided by the two similar halves, each experiment side contains redundant elements.

Each experiment half basically consists of an X-ray detector, a mechanical collimator which defines the viewing direction of the detector, and the necessary processing electronics.

For high resolution, the collimator on one side of the experiment will provide a narrow one-by-ten degree field of view. For high sensitivity, the other side's collimator will provide a wide ten-by-ten degree field of view. Both sides of the experiment scan the same path in the celestial sphere.

The location of detected X-ray sources with respect to the celestial sphere is then determined with the aid of star and Sun sensors aligned with the experiment collimators.

SCOUT LAUNCH VEHICLE

Scout is NASA's only solid propellant launch vehicle with orbital capacity. The first development Scout was launched July 1, 1960. The SAS-A mission is expected to be the 72nd Scout launch. Since the Scout was recertified in 1963, the launch vehicle has attained a 94 per cent success record.

Scout B is a four-stage solid propellant rocket system. Scout No. S-175 and the spacecraft will be set on an initial launch azimuth of 90° to obtain a 342 statute mile (550 kilometer) circular orbit with 2.9° inclination and 95.6 minutes to complete one revolution.

The four Scout motors -- Algol II, Castor II, Antares II, and Altair III -- are interlocked with transition sections that contain guidance, control, ignition, and instrumentation systems, separation mechanics and the spin motors needed to stabilize the fourth stage. Control is achieved by aerodynamic surfaces, jet vanes and hydrogen peroxide jets.

The launch vehicle is approximately 73 feet (22.25 meters) long and weighs about 40,000 pounds (17,144 kilograms) at liftoff.

The Scout program is managed by NASA's Langley Research Center, Hampton, Va. The launch vehicle is built by LTV Aerospace Corp., Dallas. The San Marco launch complex is owned and operated by the Italian government and this Scout will be launched by an Italian launch crew.

LAUNCH PLATFORM

The San Marco launch platform, which looks much like an off-shore oil drilling installation, is owned and operated by the Italian government. It is stationed in Formosa Bay three miles (4.8 Kilometers) off the coast of Kenya about 2 1/2 degrees south of the Equator. A smaller platform, the Santa Rita, located 500 yards (457 meters) from San Marco, contains the control and operations center, range equipment and test rooms. The two platforms are connected by submarine control and power cables.

NASA will reimburse the University of Rome's Aerospace Research Center for launch costs.

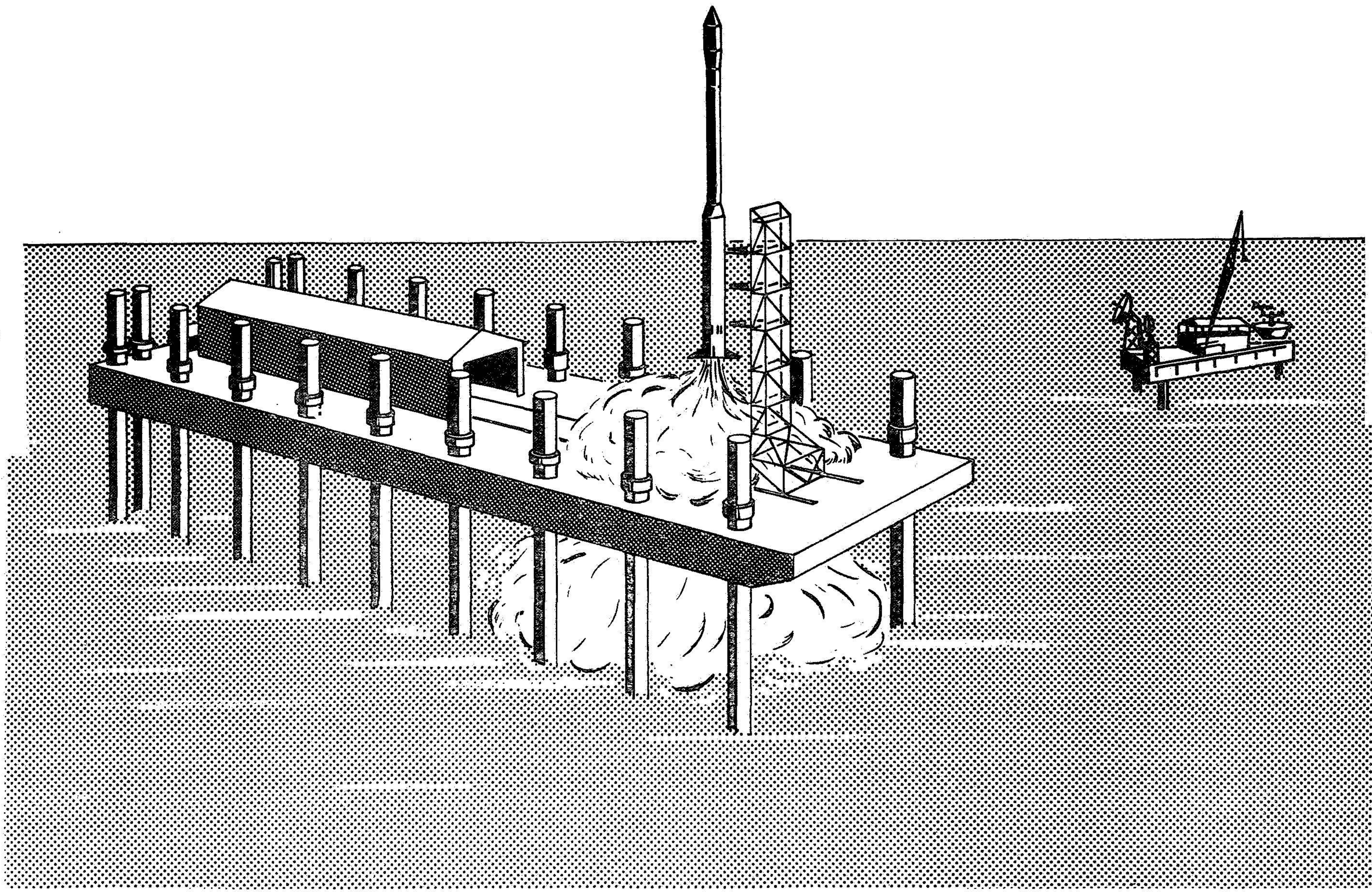
The platform was first used for the successful launch on April 26, 1967 of the Italian scientific satellite San Marco II in a cooperative international project in which NASA provided the Scout launch vehicle.

The San Marco rocket platform has 20 steel legs firmly embedded in the sandy seabed at latitude 2° - 56' - 40" South, longitude 40° - 12' - 47" East -- ideal for equatorial space launchings. The 120-foot (36.5 meter) shed which houses the Scout vehicle prior to launch is air conditioned for environmental control. A large pit on the launch platform, open to the sea, will absorb the rocket exhaust of the Scout first-stage motor.

The Santa Rita platform, a modified oil drilling platform built by the Italian firm Nuovo Pignone, contains the nerve center of the project, the control room, and houses the tracking and instrumentation required to launch and track the Scout.

There are 23 cables linking the San Marco launch complex with its sister platform. Some idea of the complexity of the operation can be gained from the fact that there are more than 3,000 connections of various kinds linking the two platforms. Independent generators at the two locations produce electricity at two voltages to meet the requirements of the scientific equipment and the housing and other facilities.

SAN MARCO LAUNCH PLATFORM



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OPERATIONS CONTROL, TRACKING AND DATA ACQUISITION

The focal point for control of the SAS-A launch is the base camp of the San Marco launch site on Formosa Bay, Kenya. Located on the coast within sight of the offshore launch platform, this camp is linked by voice and teletype communications to the SAS Control Center at the Goddard Space Flight Center over the worldwide NASA Communications System -- NASCOM.

All commands for the SAS-A, once it is in orbit, originate at the Goddard control center.

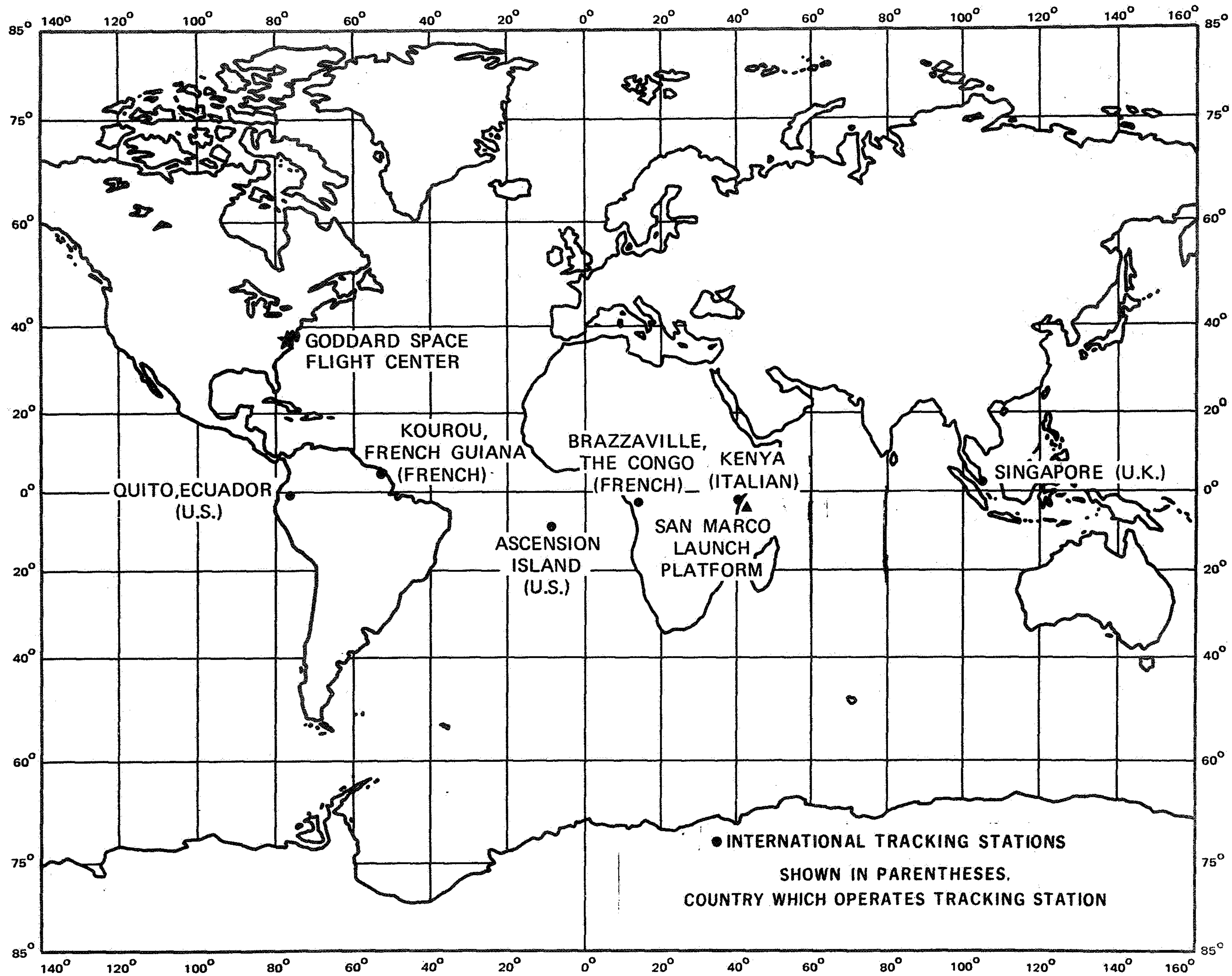
The primary ground station for generating commands to the spacecraft as well as tracking and acquiring data from it is the Quito, Ecuador, station of NASA's worldwide Space Tracking and Data Acquisition Network (STADAN).

As the spacecraft orbits the globe over the equator about once every 96 minutes, it continuously radios spacecraft and experiment data back to the Earth. Simultaneously, an onboard recorder tapes this same data for later playback at 30 times recorded speed to the Quito station once per orbit.

Three to five of these taped transmissions will be transmitted daily to Goddard over the NASCOM for assessing the condition of the spacecraft and its X-ray experiment. Three of these will be sent from Goddard over a data link to the American Science and Engineering, Inc., in Cambridge, Mass., for experiment analysis.

In case of severe ionospheric storms over South America, several other foreign stations around the globe can command the spacecraft's tape recorder and take data from it. These include France's Centre National d'Etudes Spatiales (CNES) station in Brazzaville, Congo Republic; and the Mobile Italian Telemetry Station at the base camp of the San Marco launch site.

In addition to serving as a tracking beacon, the continuous telemetry signal from the spacecraft allows ground stations around the globe to collect vital data from the spacecraft should its recorder fail. These stations include: STADAN's Quito, Ecuador station; CNES' Kourou, French Guiana and Brazzaville stations; NASA's Ascension Island station; Italy's Kenya station; and the British station in Singapore.



NASA G-71- 1126

LAUNCH AND ORBIT SEQUENCE OF EVENTS

The sequence of events from liftoff until the spacecraft is fully operational is as follows:

Launch Sequence

Event	Time (seconds)
Liftoff	0.00
First stage burnout	76.35
Second stage ignition	79.08
Second stage burnout	118.86
Third stage ignition	133.64
Third stage burnout	169.45
Spin-up	545.77
Third stage separation	547.27
Fourth stage ignition	552.12
Fourth stage burnout & orbital injection	587.15
Spacecraft separation	867.12

First Orbit

All of the ground stations included in the international tracking and data acquisition support will track or collect data from the X-ray Explorer during the first orbit. The spacecraft should pass over the Quito, Ecuador, station about one hour after liftoff. As the prime ground station, it will confirm that the spacecraft has separated from the fourth stage and generally check the condition of the spacecraft by collecting data from the onboard tape recorder. Commands from this station also will energize a momentum wheel and a nutation damper system in the spacecraft for stabilization purposes.

Second Orbit

During the second Quito pass, some two hours after launch, this station will collect taped data and generally check the spacecraft's condition. The Sun shades for the spacecraft's star sensor will be deployed and the low voltage portion of the X-ray equipment will be turned on and off for a check.

Third Orbit

Three hours after liftoff, Quito will energize the spacecraft's magnetic de-spin device to slow the spin rate from five rpm to 1/12 rpm.

Subsequent Orbits

It may be several days before the spacecraft is fully stabilized and rotating at the desired rate. At this point, the spacecraft will be oriented with the magnetic attitude control system so that the X-ray experiment can scan the Milky Way to collect the first scientific data. The experiment will then be turned on. From this point on, data will be collected continuously, recorded onboard the spacecraft and radioed once-per-orbit to Quito unless a contingency situation dictates otherwise.

THE PROJECT, EXPERIMENT AND LAUNCH TEAM

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(Program Direction)

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Dr. Nancy Roman	Program Scientist
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Joseph B. Mahon	Director, Launch Vehicles and Propulsion Programs
Robert W. Manville	Program Manager, Small Vehicles and International Projects
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James C. Bavely	Chief of Network Operations, OTDA

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(Project Management)

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Daniel G. Mazur	Director of Technology
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Donald Wrublik	Project Operations and Experiment Manager
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Thomas Ryan	Tracking and Data Systems Manager

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L. R. Foster	Head, Scout Operations
C. W. Winters	Head, Launch Operations
D. M. Smith, Jr.	Mechanical Systems
W. L. Sullivan	Fluid Systems
R. P. Parks	Electrical Systems
L. R. Tant	Scout Payload Coordinator

University of Rome, Aerospace Research Center

(Launch Support)

Professor Luigi Broglio	Director, Centro Ricerche Aerospaziali
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American Science & Engineering Co., Inc., Cambridge, Mass.

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Dr. Edwin Kellogg	Co-experimenter
Dr. Herbert Gursky	Co-experimenter
Gerald Austin	Program Manager
Harvey Tananbaum	Co-experimenter

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Johns Hopkins University, Applied Physics Laboratory

(Spacecraft Fabrication & Integration)

Henry Riblet	Project Engineer
Joseph Nagrant	Payload Engineer
Frederick F. Mobley	Project Scientist

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NOTE TO EDITORS:

The following background information of the National Aeronautics and Space Administration's Small Astronomy Satellite (SAS) launch, now scheduled for Dec. 12 from the San Marco Equatorial launch platform in the Indian Ocean, is offered as a supplement to the SAS Press Kit issued earlier.

SAN MARCO EQUATORIAL RANGE

The San Marco Range was proposed by Centro Ricerche Aerospaziali (CRA) in 1961, based on the desirability of:

1. Establishing a seaborne mobile orbital launch facility independent of the mainland;

2. Providing an efficient and economic system capable of accomplishing direct equatorial orbit.

These requirements were met by selecting two sea platforms (similar to those employed for oil research in deep water) as launching pad and instrumentation location.

This solution is also advantageous for the delivery of large, heavy hardware, such as rocket motors. These items can be directly transhipped from cargo ship to launching pad.

The other advantage of the San Marco Range as a launching site for the Scout vehicle, is the possibility of injecting directly into equatorial orbit relatively large payloads with a reliable and economic rocket such as the Scout vehicle. It is possible to obtain equatorial orbits from launch ranges located in other latitudes, but this requires a "dogleg" maneuver which necessitates a larger and more expensive rocket.

The availability of the San Marco Range is important because of the variety of scientific experiments which require an equatorial orbit, particularly those related to the study of the Earth's atmosphere gravitation, magnetic field, and radiation belts.

The CRA, in selecting a launch site for the San Marco Range in international waters, chose the region of Formosa Bay in the Indian Ocean about three miles off the coast of Kenya, Africa, with the range proper extending eastward from that point.

In 1962, the general design was completed and a formal proposal was made to NASA for development of a joint cooperative project to launch the San Marco II satellite with experiments of mutual scientific interest into equatorial orbit utilizing a Scout vehicle. In the same year a Memorandum of Understanding was signed between the former Italian Space Commission and NASA under the terms of which CRA would design and build the Range equipped with a Scout launch complex and launching crew. CRA would prepare the scientific satellite. NASA agreed to provide the Scout launch vehicle, the training services for the Italian launch crew and the tracking network into which the CRA Mobile Italian Telemetry Station (MITS) would be integrated.

CRA utilized, for the construction of the facility, two existing offshore platforms. A launch control center was developed on the platform, Santa Rita, obtained from the Italian National Oil Company (ENI). A launch platform was developed on the sea-going pier, San Marco. The CRA was also responsible for the fabrication of all Ground Support Equipment and its integration into the complex.

Modifications of the platforms and installation work were accomplished in La Spezia, Italy, by CRA personnel during 1965. The platforms were towed to the Port of Mombasa, Kenya, Africa, where equipment installation continued from June to November 1966.

The platforms were towed some 90 miles north to Formosa Bay where from December 1966 to February 1967 the Range was integrated, checked-out and validated.

The first satellite was successfully placed in orbit from this site on April 26, 1967, establishing the San Marco Equatorial Mobile Range as an operating range.

Geographical coordinates of the San Marco platform are $40^{o}12'45''$ longitude East and $2^{o}56'18''$ South latitude.

The main components of the Range are the San Marco platform and the Santa Rita platform. A base camp located on the coast, near the village of Ngomeni, is utilized for transfer of Range personnel and items.

Dimensions of the San Marco platform are: length 300 ft., depth 90ft. It has 20 steel legs embedded in the sandy seabed. On the platform is the Standard Scout Launch Complex which includes the launcher and the 120-foot shed which houses the Scout vehicle prior to launch in an air conditioned environment. The other main items are the preparation shed and the clean room to house the spacecraft before it is mated with the vehicle. Facilities include the hydrogen peroxide room terminal building, compressed air system, storage and crew accommodations.

A large pit on the launch platform, open to the sea absorbs the rocket exhaust of the Scout first-stage motor.

The Santa Rita platform, contains the nerve center of the Range, the vehicle control room (blockhouse) and houses tracking and instrumentation equipment, radar and telemetry stations.

On board Santa Rita there are also the accommodations for the launch and range crew, the main cafeteria and other general services.

The main communication system which connects the San Marco Range with the East African telecommunications Station in Mombasa and with the rest of the world originates on the Santa Rita platform. Many voice channels and teletype channels are available.

There are 23 submarine cables linking the San Marco Launch complex with its sister platform. Some idea of the complexity of the operation can be gained from the fact that there are more than 3,000 connections of various kinds linking the two platforms.

Independent generators at the two locations produce electricity at two voltages to meet the requirements of the scientific equipment and the housing and other facilities.

At the present time the San Marco Range has the capability of placing scientific satellites into equatorial orbits of the following characteristics with a standard Scout rocket, (Scout C):

Low orbit (500km.)	320 lbs.
High eliptic orbit (400 km. perigee 27,000 km. apogee)	100 lbs.

During 1971, it is expected that use of a new Scout first stage (Algol III) will boost the capabilities of the range to the following values:

Low orbit	450 lbs.
High eccentric	150 lbs.

The San Marco Range also has the capability of launching sounding rockets utilizing a sounding rocket Omnitype launcher.

The overall operation is made possible through the cooperation of such Kenya technical and scientific organizations as EAPT (East Africa Post and Telecommunications), EARH (East Africa Railroad and Harbours), East Africa Meteorologic Service and others.

This cooperative effort is provided for in an agreement between the CRA and the University of Nairobi, and by a memorandum between the Kenyan Government and the Italian Government.

Under this agreement the Kenyan Government leased a piece of land, near the village of Ngomeni, to provide an area for the San Marco Range Base Camp and the Mobile Italian Telemetry Station.

The San Marco Range is owned and operated by the Universita degli Studi di Roma (University of Rome), through its Centro Ricerche Aerospaziali. The Centro Ricerche Aerospaziali is responsible for management, operation and maintenance of the range.

The CRA is a specialized space science and technology laboratory consisting of:

1. Electronic laboratories for the design and construction of satellites, such as San Marco I, San Marco II, San Marco C and ELDO STV.

2. A space environment laboratory for the ground testing of satellites and simulation of the space environment.

3. A guidance and propulsion laboratory where problems connected with rockets and vehicle ground support equipment are studied.

4. An aerospace flight laboratory consisting of hypersonic, supersonic, arc tunnel and wind tunnel, for the experimental study of aerospace problems.

5. A computing, tracking and communications laboratory consisting of a high speed computer facility and MITS station.

6. The San Marco Range.

MITS STATION

The CRA Mobile Italian Telemetry Station (MITS) located at the San Marco Range Base Camp, is participating in the SAS-A launch operation.

The MITS Station consists of three air conditioned vans, a high gain auto track antenna mounted on a truck and two 100 kw. mobile power generators. The main van contains the station operating on 136 Mhz compatible with the standard STADAN system. The other two vans contain the satellite command station, the computing facility for quick orbital parameter determination and other auxiliary equipment.

The station is also equipped with an interferometric system of the Minitrack type, for tracking purposes.

CENTRO RICERCHE AEROSPAZIALI, UNIVERSITA DEGLI STUDI DI ROMA

CRA Headquarters, Rome

Prof. Luigi Broglio, Director CRA
Prof. Carlo Buongiorno, Programs Office Manager
Prof. Ugo Ponzi, Programs Office
Dr. Gennaro Orsi, Range Activity Coordinator

San Marco Range

Prof. Michele Sirinian, Range Supervisor and Launch Crew Director
Dr. Giuseppe Spampinato, Test Conductor
Dr. Gianfranco Manarini, Vehicle Engineer Supervisor
Dr. Giuseppe Li Gotti, Range Safety Officer
Dr. Vincenzo Ambrogini, Guidance Engineer
Mr. Salvatore Paracchini, Meteorology Service
Mr. Alfio Maggiore, Instrumentation Engineer
Mr. Aldo Marasca, Electric Power Engineer
Mr. Raffaele Virno Lamberti, Electric and Pyrotechnic Engineer
Mr. Filippo Brunelleschi, Range Coordinator
Mr. Adriano Fantoni, Quality Control Engineer
Mr. Giuseppe Pinzari, Platforms Mechanical Services Engineer
Mr. Enrico Remiddi, TV Supervisor

Communication Systems

Dr. Lamberto Celletti, Chief Engineer
Mr. Enrico Civitella, Internal Communications System

Marine Operations

Com. Wolfango Mandini, Consultant

Logistics and Ground Operations

Mr. Salvatore Romano

Administration

Dr. Tommaso Giacomelli

MITS Station

Prof. Giorgio Ravelli, Chief,Electric Laboratory and Tracking Laboratory
Mr. Antonio Quintilli, Station Head

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