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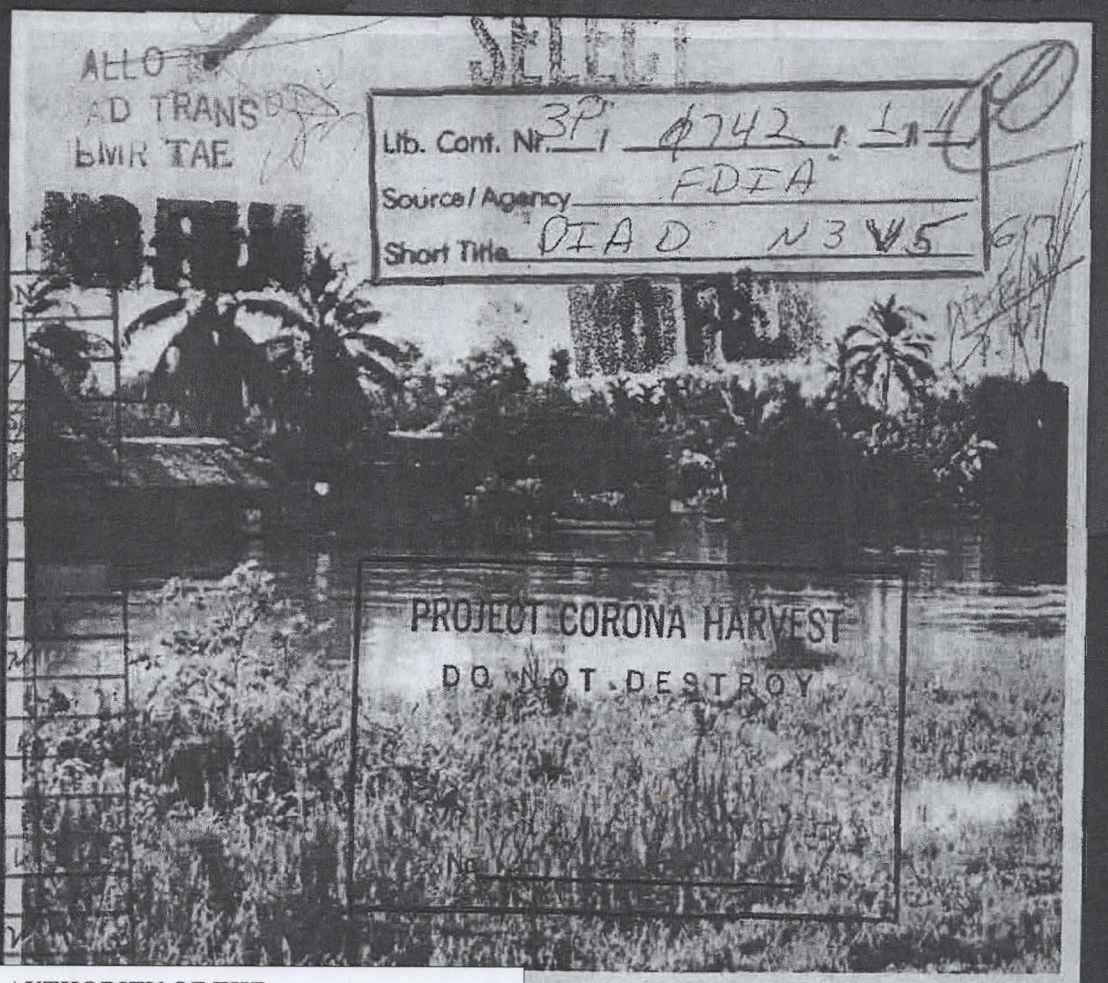

DEFENSE INTELLIGENCE AGENCY

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THE COVER

MEKONG River Delta scene: The area generally is described as flat and green—toxic with reptiles, leeches, and Viet Cong, and so wet that men moving across it must "wade in oatmeal" about nine months of the year. Within the fertile area, which produces about half of the country's rice, fish, and other foodstuffs, an estimated 6 million inhabitants make their homes in hamlets and on waterborne sampans.

The factors present major obstacles to large-scale military operations. From the standpoint of modern arms, the conditions seem to be the work of a malevolent genius. There is the sheer baffling problem of a solid place to stand. As a result, the helicopter, which can sit down nearly anywhere, is being used extensively—while gunboats patrol the myriad waterways. But there is little or no footing for tanks and heavy armor. For further description of the terrain conditions see, "Lower Mekong Delta: Vital Triangle," beginning on page 24. ~~[C]~~

FOREWORD

MISSION: The mission of the monthly *Defense Intelligence Digest* is to provide all components of the Department of Defense and other United States agencies with timely intelligence of wide professional interest on significant developments and trends in the military capabilities and vulnerabilities of foreign nations. Emphasis is placed primarily on nations and forces within the Communist World.

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Joseph F. Carroll

JOSEPH F. CARROLL
Lt General, USAF
Director

SUMMARY OF SOVIET SPACE EFFORTS IN 1966

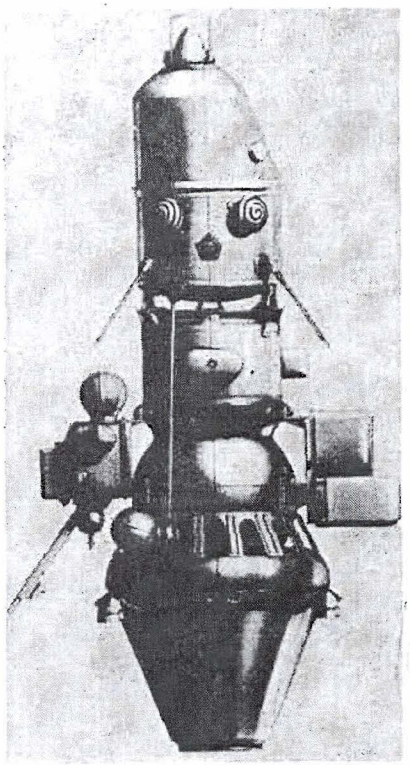
THE year 1966 was relatively lackluster for Soviet space efforts. Most activity centered on the photoreconnaissance program, and was concentrated during the first quarter of the year.

But 1966 was not without success. High points of the year's program were the two successful lunar shots, the Cosmos 110 bio-satellite, the Cosmos 122 meteorological satellite, and the apparent testing of a new recoverable spacecraft with Cosmos 133.

Reconnaissance program

By the end of 1966, 21 reconnaissance vehicles had been launched successfully—four more than in 1965. First use of the Plesetsk launch site for space launches facilitated higher orbital inclinations—73 degrees versus 65 degrees from Tyuratam—and thus provided better surveillance over the United States, Canada, NATO installations in Greenland, and the Scandinavian countries. Six satellites were launched from Plesetsk, and two were placed in the 65-degree orbital inclination.

The Soviet reconnaissance program is in an advanced operational stage. Of the 21 payloads orbited almost half contained high-resolution cameras. For these missions, a 52-degree orbital inclination—usually associated with optimum photo coverage of the United States—was used on two launchings; two other vehicles were placed in the new 73-degree inclination, and the remaining two used the standard 65-degree inclination. For medium-resolution missions, the 73-degree inclination was used on one launch, 52 degrees on two launchings, and the remainder used the 65-degree inclination.



SOVIETS photograph of Luna 10. [U]

Lunar successes

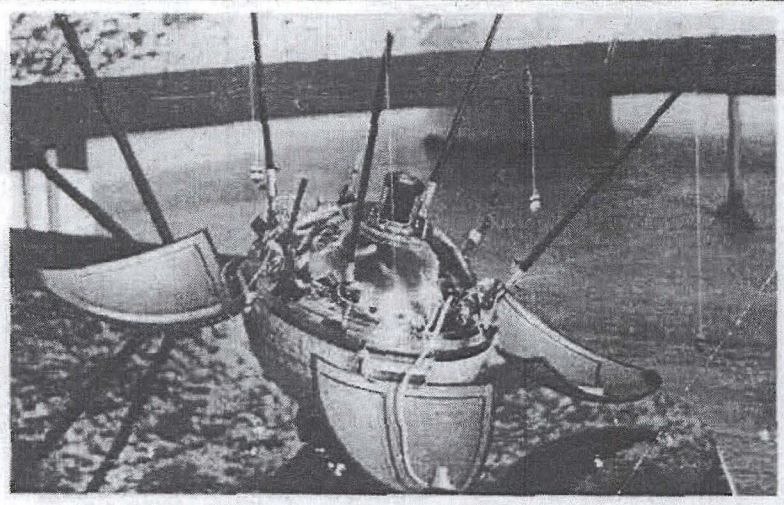
After a long series of failures, the Soviet lunar program improved in 1966. Most spectacular were the two successful semisoft landings on the moon. The first was the relatively unsophisticated Luna 9. In addition to the equipment for transmitting photos of the moon's surface back to earth, Luna 9 carried instrumentation to collect scientific data on the lunar environment. Total weight of the Luna 9 vehicle that was injected into a transfer trajectory toward the moon was 735 pounds, half of which consisted of fuel.

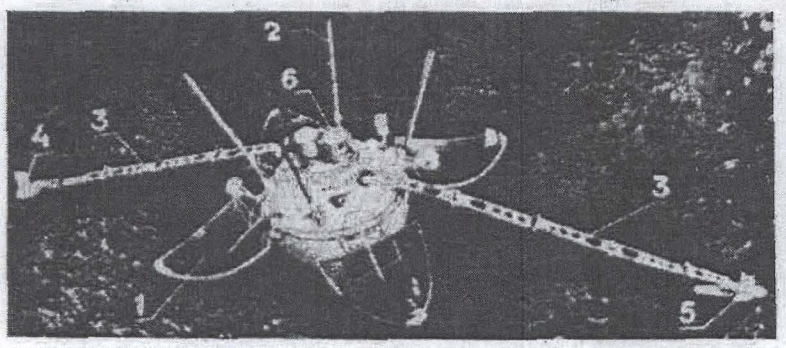
The next lunar probe, launched on 1 March, was a failure. The probe did not transfer into a lunar trajectory and the Soviets designated it Cosmos III in an apparent attempt to mask the failure.

Luna 10, launched on 3 April, was the first successful lunar orbiter. There was no indication that Luna 10 had a photographic or mapping mission; its announced purpose was to study radiation, particle fluxes, and the near-lunar magnetic field.

Luna 11 went into lunar orbit on 28 August and appeared to duplicate the mission of Luna 10. It had photographic capabilities, but this portion of the mission probably was a failure.

Success was finally achieved by Luna 12, which went into a selenocentric orbit on 25 October and photographed a series of possible landing sites for manned lunar expeditions. Luna 12 also is collecting data on radiation conditions and micrometeo-





MOSCOW display of Luna 9 payload (above); Soviet drawing and description of Luna 13 (below): 1. Blade antennas, 2. whip antennas, 3. instrument deployer, 4. mechanical soil gage, 5. radiation density gage, and 6. TV camera.

rite density in near-lunar space and is detecting radio-frequency electromagnetic radiations from deep space, which are inaccessible while in earth orbit.

Soviet press comments suggest that Luna 13, launched on 21 December, made a controlled landing on the moon on 24 December and that its mission is similar to that of Luna 9. Luna 13's small size (a two-foot sphere weighing about 220 pounds) and available electrical power will limit the complexity of experiments that it is to perform beyond the photographic mission.

Direct applications

Soviet attempts to reduce the US lead in satellites having immediate applications are indicated by the launching of two large (approximately 2,000-pound) communications satellites, and the launching of two meteorological satellites.

Molniya 1/3, launched in April 1966, probably ceased transmitting prior to the October launch of Molniya 1/4. Thus, an operational multiple-satellite system has not yet been achieved. The communications satellite provides approximately 10 hours of relay time.

The Soviets claim that these satellites have a higher radiated power and a greater simultaneous communications capacity than comparable US satellites in orbit. They have begun to exploit the propaganda potential of these experimental vehicles through color television exchanges with France. Moreover, the Soviets can be expected to attempt to compete with Western Comsat arrangements.

Both Molniya 1/3 and Molniya 1/4 had sufficient weight and volume capacity to carry payloads other than radio relay equipment. Molniya 1/3, for example, carried an experimental TV camera system, and high-altitude photos taken by Molniya 1/4 appeared in the Soviet press. TASS stated that the pictures were used for earth-shape determination and for meteorological purposes.

Long-delayed development of an operational Soviet meteorological satellite achieved success in 1966 with Cosmos 122, which was their fifth attempt. The Soviets announced that Cosmos 122 was equipped with an infrared camera system to study the dark (night) side of the earth, and TV cameras to photograph clouds over the day side of the earth. They also stated that the satellite is capable of measuring heat that is radiated and reflected by the earth.

The Soviets are now transmitting cloud pictures to the United States under the 1962 agreement, but the photographs normally are too old to be useful in weather predictions. The Soviets also are committed to launching a series of medium-orbit meteorological satellites, and they have agreed that a more useful polar-orbiting weather satellite would be forthcoming.

Scientific satellites

While the majority of the Cosmos-series satellites launched in 1966 had intelligence-collection missions, the remainder carried out a variety of scientific assignments including data collection for meteorological, radiation, solar plasma, and biological studies.

Cosmos 110 probably was the most spectacular. It carried out advanced biological investigations on the effects of weightlessness, radiation, and acceleration on two dogs and lower order biological specimens in a 22-day space flight. After recovery, Soviet scientists released considerable information on the deleterious, although reversible, effects of the flight on the dogs, and cautiously concluded that a prolonged stay by living creatures in a weightless state is possible. Clearly, the flight was undertaken to provide data applicable to long-duration manned space flights.

Lull in manned flight

The most obvious gap in the Soviet 1966 space effort has been in the manned space program. The USSR

has not put a man into space since the Voskhod-2 flight of 18 March 1965. But Cosmos 113 apears to be directly connected with future manned missions. It was tested on 28 November 1966.

There are indications that the Soviets have encountered problems in their plans for rendezvous experiments. Limitations in their command and control system and their reluctance to allow cosmonauts to make important decisions while in orbit may have contributed to the delay.

In addition, their tracking system is limited by the geography of the USSR. When rendezvous experiments eventually are flown, more extensive tracking facilities would be most desirable. During the recent space treaty negotiations the Soviets were not successful in their bid to gain access to Western tracking facilities.

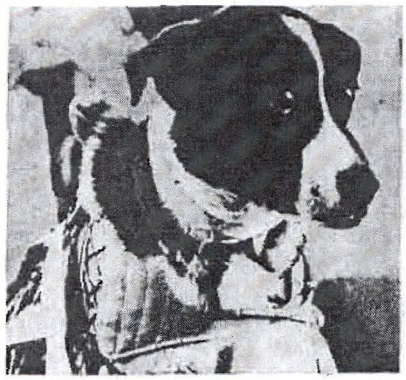
Inflight rendezvous of Voskhod spacecraft is considered unlikely as these spacecraft almost certainly do not possess the capability to dock nor, very possibly, to effect a meaningful rendezvous.

Possibly the first Soviet experiments in this field will involve rendezvous of some form of manned spacecraft with a large Proton-type satellite orbited by the SL-9 booster. The recently launched Cosmos 133 may be this type of vehicle. Similarly, the new restartable propulsion unit and attitude control system in Cosmos 125 may be designed for catch-up and rendezvous operations.

Prospects for 1967

The flight of Cosmos 133, apparently a new spacecraft designed for recovery, permitted an actual test of new major subsystems. There are virtually no data concerning the launch vehicle employed in this mission, but it is believed to have been the SL-4 or a modified launch vehicle of the SS-6 family.

This mission represents part of the flight test development cycle leading to advanced manned and military reconnaissance space systems. The spacecraft was not the ultimate configuration of any operationally mission-oriented space system. Early success in this series of tests, including an unmanned circumlunar flight and the "man-rating" of the SL-9 with a third stage, could result in a manned circumlunar flight before the end of 1967.



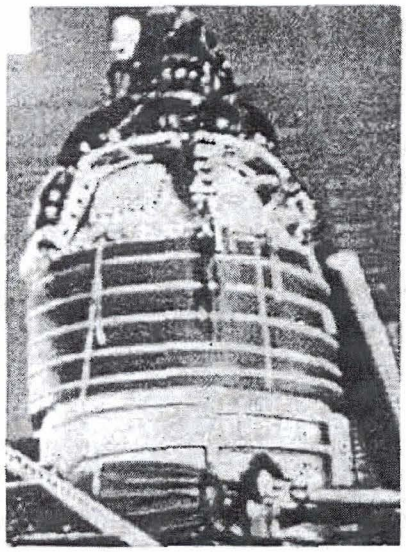
COSMOS 110, which was in orbit for 22 days, carried two dogs, Breezy and Blacky. [U]

Reconnaissance to continue

The launching of Cosmos photo-reconnaissance satellites is expected to continue in 1967 at about the 1966 pace. Advantages of using the Plesetsk launch facilities have been demonstrated, and an increasing number of these satellites probably will be launched there.

Development of communications

Continuing development of Soviet space communication systems perhaps utilizing two Molniya I-type satellites to provide complete coverage of the USSR and Western Europe is foreseen for 1967. Moreover, further efforts are anticipated in the development of high powered communications satellites capable of transmitting directly to receivers.



ISVESTIA says this is a Molniya satellite. [U]

Interplanetary exploration

In keeping with their expressed interest in eventual manned exploration of Mars and Venus, the Soviets are expected to continue to launch unmanned probes to those planets whenever suitable minimum-energy launch "windows" are open. A Mars window opened in early January and remained open through 8 February 1967; also a Venus launch window will be open during portions of May and June 1967. Further, the Soviet Union may attempt a "space spectacular" this year to commemorate the 50th anniversary of the Bolshevik Revolution. This event might be the flight of a multimanned space station in near-earth orbit, or possibly a manned circumlunar flight. If not, a year-long series of less dramatic launchings of scientific and military satellites could be planned.

The Soviet Five-Year Plan, covering the period from January 1966 to December 1970, provides for an intensified space program. Unless constrained by economic considerations or technology problems, this will include lunar and interplanetary probes, the development of communications, weather, navigation, and geodetic satellites, and further manned space flights.

While the intensified effort anticipated in 1966 did not fully materialize, the Soviets probably will not allow the fiftieth anniversary of the Bolshevik Revolution to pass unnoticed and unheralded in the realm of Soviet space accomplishments. [END]

Portion identified as non-responsive to the appeal

NEW ROCKET ENGINE DESIGNER IDENTIFIED

A. M. Isayev has been identified as one of the leading Soviet designers of rocket engines. He apparently heads his own design bureau in Podlipki—which is the location of the Moskva Missile and Space Development Center (Kaliningrad 88) a headquarters for research, design, and development for ballistic missiles, space boosters, and space vehicles.

Previously, Isayev has been linked with such noted Soviet personalities as: S. P. Korolev, former chief designer at the Central Design Bureau for Intercontinental Rockets and Space at Kaliningrad 88; V. P. Glushko, a rocket expert whose design bureau is at the Moskva Missile and Space Propulsion Development Center in Khimki 456; and V. P. Chelomey, chief designer for Soviet aerodynamic missiles.

Isayev was involved in the early ICBM and Sputnik programs and has been praised for his contributions to liquid propellant engines. Recent information indicates that he may have designed the second stage of the Vostok vehicle used in the 1961 flight of Gargarin. Isayev probably has worked on other upper stage rocket engines, particularly those for unmanned space flights. [S]

Portion identified as non-responsive to the appeal