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NORTH AMERICAN AIR DEFENSE COMMAND

WIR

WEEKLY INTELLIGENCE REVIEW (U)

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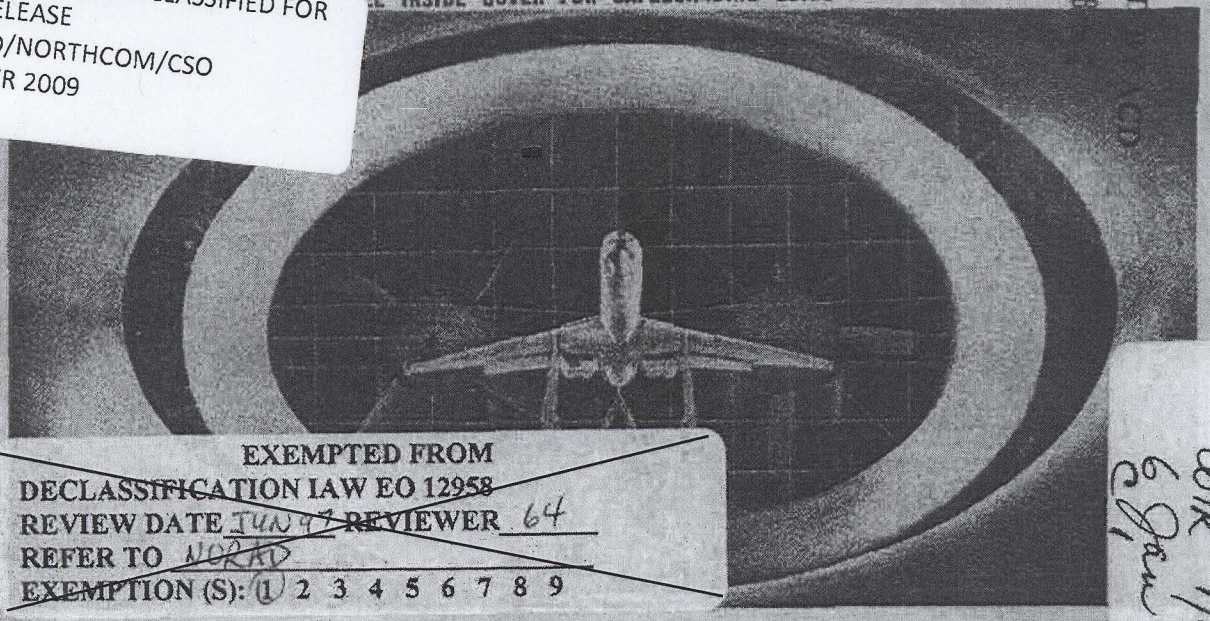

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NORAD Weekly Intelligence Review

Issue No. 1/67, 6 January 1967

The WIR in Brief

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Space

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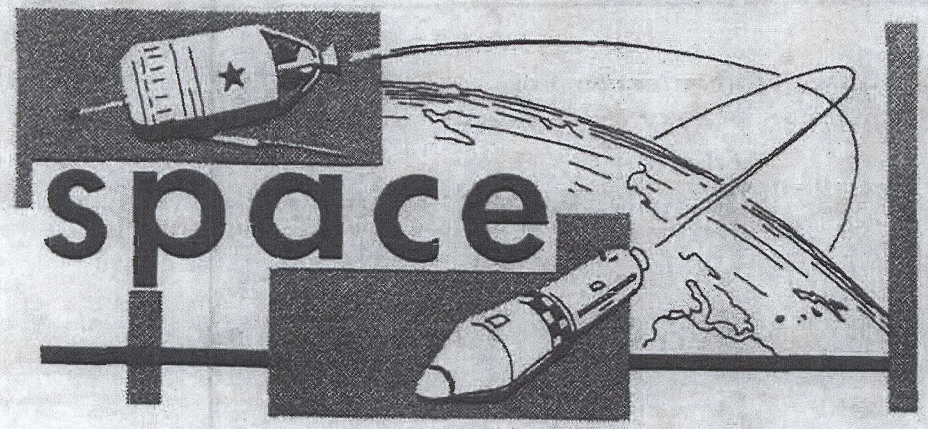
COVER: Soviet wind tunnel (from Pravda) (OFFICIAL USE ONLY)

NOTE: Pages 26, 28, 29, 32, 33, 36, 37, 40, and 41 of this issue are blank.



significant intelligence on space developments and trends

Mobile Stations Could Be Used with Molniya Communications-Relay Satellites

A Soviet delegate to the Radio-TV Conference held in Oslo in July said that the Molniya communications satellites were designed to operate with stations aboard ships and aircraft. The Soviet press has also claimed that the high transmitting power of the Molniyas (40 watts, vs 4 watts for the US's Early Bird) permits the use of smaller, such simpler ground stations (press photo on page 31). Again, the Soviets claim that, in TV transmissions, the Molniyas transmit sound and video on the same frequency, permitting the use of a narrower band, which saves power and reduces possible interference.

No mobile operation with the Moliniya has yet been noted, but a 2-way 60-channel link with surface ships could easily be established via the present Molniya satellite.

A link with aircraft would be more difficult. The smaller antennas (probably less than 6 feet) installed on an aircraft would reduce the number of channels which could be used.

The US Navy has developed a mobile station to use with the Initial Defense Communications Satellite Program, but it has a capacity of only 1 voice channel plus 6 teleprinter channels, using a 6-foot antenna. The US does not plan to have an individual satellite that can equal Molniya's mobile-communications capacity until about 1970.

(CIA; Izvestia)

~~(CONFIDENTIAL)~~

Ground Station for Communications Relay by Satellite to be Built in Cuba

The Soviet announcement of 27 September that a communications-satellite ground station will be built in Cuba is the first clear indication that the USSR hopes to establish a world-wide network with its Molniya system. TASS characterized the installation as a cooperative effort, to be built and

operated jointly by Soviet and Cuban personnel.

France, the only other country to participate in the Molniya system, is preparing to exchange regular color TV broadcasts with the USSR by late 1967, using the French-developed SECAM system.

Japan, which would represent the largest potential TV audience in Asia, has turned down overtures to participate directly in the Soviets' communications-relay system.

(DIA; CIA)

~~(CONFIDENTIAL)~~

2 More Scientific Research Satellites Launched from Kapustin Yar

The Soviets launched two Cosmos-series satellites from Kapustin Yar (KY) in December 1966:

	Cosmos 135	Cosmos 137
Date and time of launch	12 Dec/2044Z	21 Dec/1327Z
Orbital inclination	48.44 degrees	48.78 degrees
Period	93.615 minutes	104.35 minutes
Apogee	650 kilometers (350 n.m.)	1715.7 kilometers (922 n.m.)
Perigee	253 kilometers (137 n.m.)	221.9 kilometers (120 n.m.)

These two vehicles are probably scientific-research satellites, as announced by the Soviet news agency TASS. Their specific missions are not known. They are the 6th and 7th satellites launched from KY in 1966.

(NORAD)

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2 More Recce Satellites Launched and De-orbited

The Soviets launched and de-orbited 2 reconnaissance satellites in December 1966:

- Cosmos 134, whose mission included high-resolution photo-recce, was launched from Tyuratam at about 0816, 3 December, into an orbit with an inclination of about 65 degrees. It was de-orbited on Revolution 127, 11 December, probably impacting in the USSR at about 0549-0554Z.
- Cosmos 136, whose mission included medium-resolution photo-recce, was launched from the Plesetsk ICBM complex at about

1200Z, 19 December, into an orbit of about 65 degrees. It was de-orbited on Revolution 125, probably impacting in the USSR at about 0603Z, 27 December 1966.

These two launches in December are consistent with the launch rate of two-per-month which has prevailed throughout most of 1966. (NORAD)

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Luna 13 Repeated Luna 9 Mission, Also Probed Moon's Surface Mechanically

Luna 13, which the Soviets launched from Tyuratam at about 1017Z, 21 December (within 7 minutes of the optimum time for such an event), repeated the soft landing and photographic mission of Luna 9 (launched 31 January) and also probed the lunar surface with an explosive mechanical device. The probe landed in the Sea of Storms, about 250 miles from where Luna 9 landed, according to the Soviets.

Luna 13's photography of the Moon's surface showed topography much the same as that revealed by Luna 9's. Mechanical probing, according to the Soviets, indicated that the "soil" of the lunar surface is, physically, much like the average soil of the Earth, that is, firm enough to support heavy objects. (Photos on pages 34 & 35.)

The propulsion system of Luna 13 was the same as that used by all Soviet Lunar probes since Luna 4: it was launched by the SS-6 ICBM, injected into Earth parking orbit by the heavy Venik third stage, and ejected into lunar trajectory by a fourth stage. (NORAD)

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51^0 Orbit Better For Photorecce of US than 65^0 or 72^0

An FTD study of the Soviet satellite potential for photoreconnaissance of a selected area (60-130° W. & 20-50° N.) which includes the US indicates that 51^0 orbits are better than 65^0 or 72^0 orbits for Soviet photorecce satellites, because such orbits provide:

- More than twice as much time over target during which sunlight is adequate for photorecce. (See Table I, page 38.)
- More opportunities (more orbits) during which some photorecce can be accomplished. (See Table II, page 38.)

In addition, the 51° orbit permits photography of many individual targets on both ascending and descending passes, thereby providing photo interpreters with additional aspects for sizing and analysis.

The study was based on a computer comparison of the orbits of Cosmoses 67, 69, and 121, which had orbital inclinations, respectively, of 51°, 65°, and 72°, and which were relatively similar with respect to orbital lifetime, time of launch, time of year, and type of payload.

Most of the Soviet military recce vehicles launched to date have had orbital inclinations of about 65°, but those with an inclination of 51° or 52° are becoming increasingly common. All those launched from Plesetsk have had inclinations of about 72°.

(FTD)

(~~SECRET~~ NO FOREIGN DISSEMINATION -- Releasable to NATO, Aus & NZ)

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The 1966 Space Year in Retrospect; Prospects for 1967

A statistical comparison of Soviet space activities might suggest that in 1966 little progress was made over 1965. For instance, the number of known launches increased only slightly (from 48 to 50) and there was no significant increase in diversity of the missions attempted. However, the Soviets registered important "firsts" with their lunar probes, and a number of test and experimental missions were flown -- all suggesting that the Soviets will take major steps in 1967 toward putting a man on the Moon.

Other important features of the Soviet space effort in 1966:

- Military missions again accounted for more than half of all launches.
- There were no manned space flights, in contrast with the 2 made in 1961, 2 in 1962, 2 in 1963, 1 in 1964, and 1 in 1965.

- A third spaceport came into use on 17 March when the ICBM complex at Plesetsk launched Cosmos 112, a recce satellite. Plesetsk has now launched 6 space vehicles, in addition to an R&D solid-propellant missile and a number of operational ICBMs.

SPACE EVENTS

Military Reconnaissance Satellites. The Soviets launched 23 recce satellites during the year, but 2 of them failed to achieve orbit. The remaining 21 accomplished photorecce missions and many of them probably collected ELINT. Some of them may also have conducted infrared reconnaissance and collected scientific data, since the equipment for the basic photographic mission would occupy only a fraction of the weight and volume available for payloads. (Chart on page 42.)

Portion identified as non-responsive to the appeal

Lunar Probes. The Soviets launched 6 lunar probes in 1966, the same number as in 1965. All but 1 reached the Moon or its vicinity. Cosmos 111 (launched 1 March) achieved parking orbit but failed in the ejection attempt.

Luna 9 (launched 31 January) softlanded on the Moon and sent to Earth the first pictures taken from the surface of the Moon.

Luna 10 (launched 31 March) became the first man-made satellite of the Moon. It reportedly transmitted data on radiation and micrometeorite density in the vicinity of the Moon and on the Moon's magnetism.

Luna 11 (launched 24 August) was a partial failure. It orbited the Moon but the video signals which it transmitted were undemodulable. The Soviets, claiming that it was repeating the data-collection mission of Luna 10, said nothing about the video mission.

Luna 12 (launched 22 October) successfully transmitted video of the lunar surface. The resulting photography, however, was much less sharp than that taken by US moon probes.

Luna 13 (launched 21 December) repeated the mission of Luna 9 by sending back video images of the lunar surface, but it also reportedly probed the physical makeup of the lunar surface with an explosive mechanical device.

Interplanetary Probes. No interplanetary probes were launched during 1966, since the launch windows for Venus and Mars did not open. Two Venus probes launched in November 1965 reached their target in March 1966 but failed to return any information about the planet. Venera 2, the Soviets said, passed within 13,000 n.m. of Venus, while Venera 3 impacted on Venus as planned. Transmissions from both probes failed shortly before reaching Venus, according to the Soviets.

Research Vehicles. The Soviets claim that all their Cosmoses are scientific research vehicles. Of the 34 launched in 1966, however, only the 7 launched from Kapustin Yar are believed to have had primary missions of collecting data on the near-Earth space environment. Of the remainder, 21 were military reconnaissance vehicles, the other 6 had a variety of missions.

The 7 research-type Cosmoses launched in 1966 equaled exactly the number of vehicles of this type launched in 1962, 1964, and 1965. Five were launched in 1963.

Proton 3 was said to be carrying on unique studies of cosmic rays, but it is believed that this effort was a secondary mission.

Other Soviet satellites, including the Cosmos-series military reconnaissance vehicles, may also have collected some scientific data.

Utilitarian Vehicles. The Soviets in 1966 launched 2 Molniya-series prototype communications-relay satellites, a prototype of a weather satellite (Cosmos 118), and an operational weather satellite (Cosmos 122).

The two Molniyas, as usual, were injected into eccentric 12-hour orbits which permitted about 9-10 hours of communications-relay time each day. They also transmitted video of the Earth's cloud cover in tests to determine whether this data would be of value to meteorologists.

Cosmos 122 transmitted optical and infrared video of the Earth's cloud cover, which the Soviets later relayed to the US in accordance with an agreement to exchange information obtained by weather satellites. The data from Cosmos 122 met the qualitiative requirements of the agreement but was received too late to be of any operational value.

Tests and Research Related to Future Flights. A number of Soviet spacecraft collected data which could be of use in planning future spaceflights, but a few deserve special mention.

Cosmos 110 carried into space 2 dogs and various organisms for the purpose of studying the effects of extended exposure to weightlessness and space radiation on living things and the effectiveness of shielding and medication against space radiation. The vehicle was de-orbited 22 days after launch.

Two Proton-series vehicles were launched, but one did not achieve orbit. Proton 3 reportedly collected unique cosmic-ray data, but the primary mission of this and its sister vehicles is believed to have been systems testing of a large spaceship and of a large 2-stage booster which will figure in forthcoming launches of lunar probes and of manned orbiting laboratories.

The Soviets claimed that Cosmos 133 (launched 28 November) was a scientific research vehicle, but its low orbit and short life argue against this assertion. All indications are that this satellite was another Proton-type launch. However, instead of collecting cosmic-ray data, this vehicle may have carried on advanced testing of life-support and other systems which will be used in the operational versions of this spacecraft. For instance:

- Life support systems may have been tested.

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- A retrofire system for this vehicle was successfully tested. Cosmos 133 was de-orbited 2 days after launch. None of the Protons was de-orbited.

Cosmos 125 (launched 20 July), apparently an Agena-type vehicle, involved test of a sophisticated attitude-control system and a restartable engine. The latter was ignited 3 times in space, each time causing a change in orbital altitude.

SPACE TECHNOLOGY

Propulsion Systems and Payload Capabilities. No new space propulsion systems were introduced during the year by the Soviets. The mainstay of their program is still the SS-6 ICBM, which can orbit payloads of up to 15,000 pounds. The largest propulsion system used to date is the SL-9, which was used to orbit the large Cosmos 133 and the 12.2-metric-ton Protons.

Launch reliability continued to be good. Only 4 space-launch failures were noted; these are believed to have involved a Molniya, a Proton, and 2 recce satellites.

Failures of upper propulsion staging to ignite on command in space occurred during the year but they were fewer than in preceding years.

Spacecraft Systems. The Soviets appear to be able to design and build spacecraft systems which are adequate in general for their intended missions. However, they have been deficient in two important areas:

- The transmitting life of Soviet spacecraft frequently has been limited by the lack of long-life power-generation systems, such as fuel cells or solar cells of high reliability.
- The photo-video system in use on Soviet lunar probes and other spacecraft is no better than the facsimile systems in commercial use in the West and much inferior to the system used on US lunar probes.

Spacetracking. The Soviets appear to rely chiefly on optical and beacon systems for tracking space vehicles. However, the ongoing deployment of ABM radars in various areas of the Soviet Unit and efforts to improve the capabilities of existing types of ABM radars will contribute significantly to the Soviet ability to track satellites which do not radiate when within "view" of Soviet sensors.

PROSPECTS FOR 1967

The Soviet space program, though it competes with high-priority military, industrial, agricultural, and consumer programs for resources, is not likely to suffer any diminution in scale of effort in 1967.

Certain utilitarian programs, such as those involving weather and communications satellites, are expected to continue their orderly progress.

The Soviets will probably attempt to launch 24 reconnaissance satellites during the year, about the same number as were attempted in 1966.

Tests of orbital bombardment systems are expected to continue, perhaps at an intensified pace.

Tests of high-speed re-entry vehicles for use on both military missilry and spacecraft returning from the Moon or deep space are expected.

The Soviets will launch 2 or 3 planetary probes each time the launch windows open during the year -- in January for Mars, in June for Venus.

The Soviets are expected to resume their manned flights this year. They should be able to break some records now held by the US and achieve a number of "firsts." They are expected:

- To orbit as many as 5-8 men in one spacecraft.
- To have 2 manned spacecraft in space at one time, possibly to practice rendezvous and docking.
- To achieve the first transfer of a spaceman from one orbiting vehicle to another.
- To break records, presently held by the US, in number of men orbited and total man-hours of spaceflight.
- To orbit a payload of 40,000 - 50,000 pounds.

The Soviets also are expected to launch vehicles which will make circumlunar flights and then return to the Earth's surface. The first such flights will probably be unmanned, and will proof-test equipment for high-speed re-entry of the Earth's atmosphere. But manned circumlunar flight might occur late in 1967 if earlier flights by the Cosmos-133-type vehicle prove successful. The Soviets can be expected to wage a maximum effort to stage such an event before 7 November 1967, the 50th anniversary of the Bolshevik Revolution.

(NORAD; FTD ; CIA; DIA)

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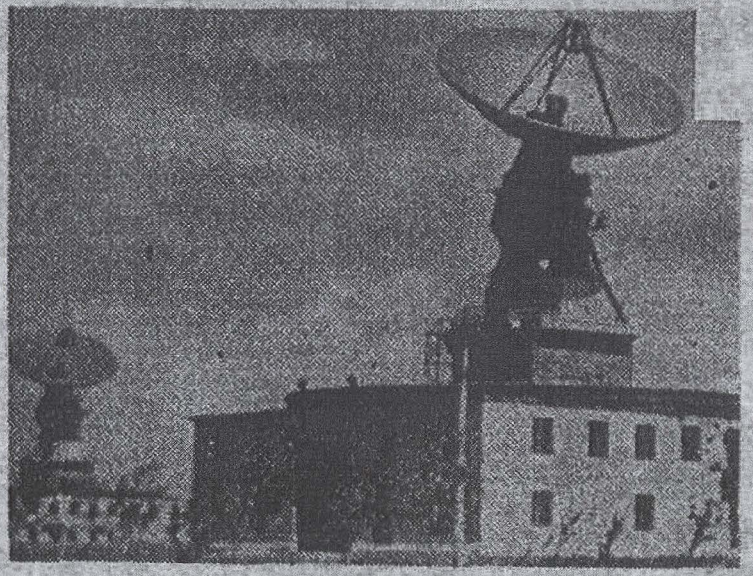
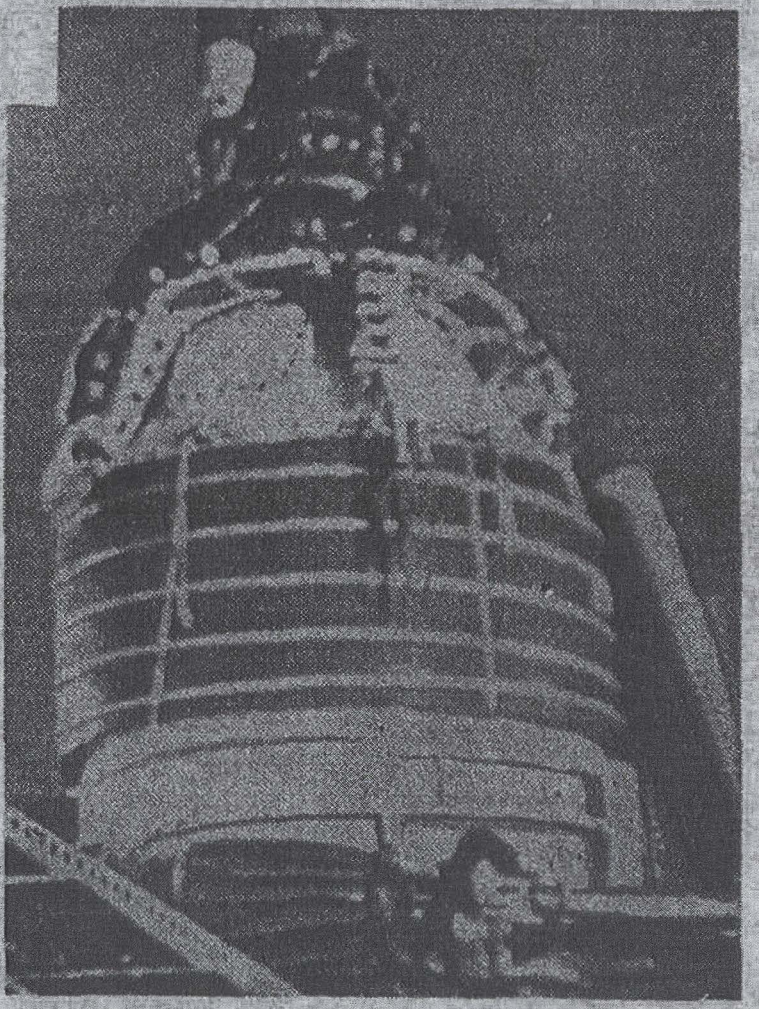
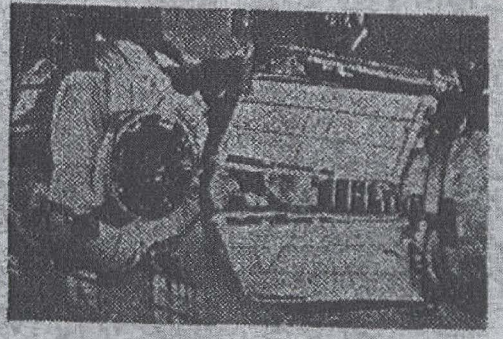
A Molniya Ground Station (from Izvestia)



A Molniya Satellite (from Izvestia)





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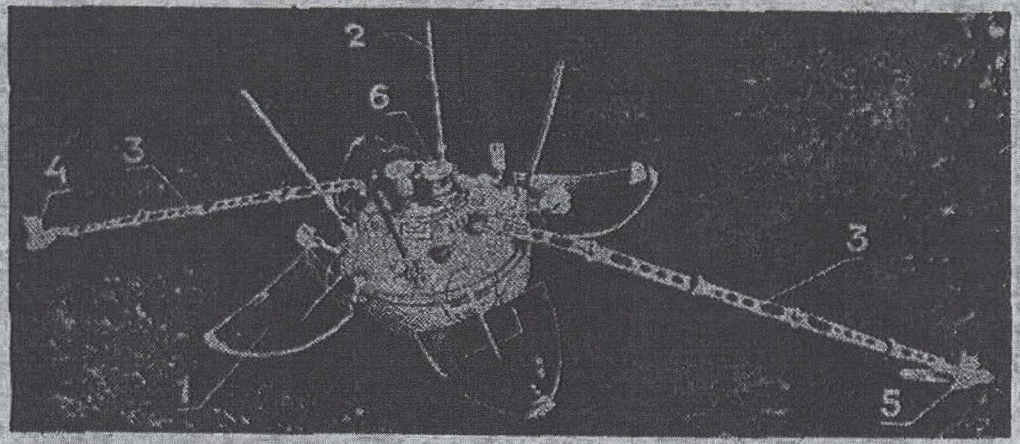

Luna 13 (drawing)
(from Pravda)

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1. Blade antennas
2. Whip antennas
3. Instrument deployer
4. Mechanical soil gauge
5. Radiation-density gauge
6. TV camera

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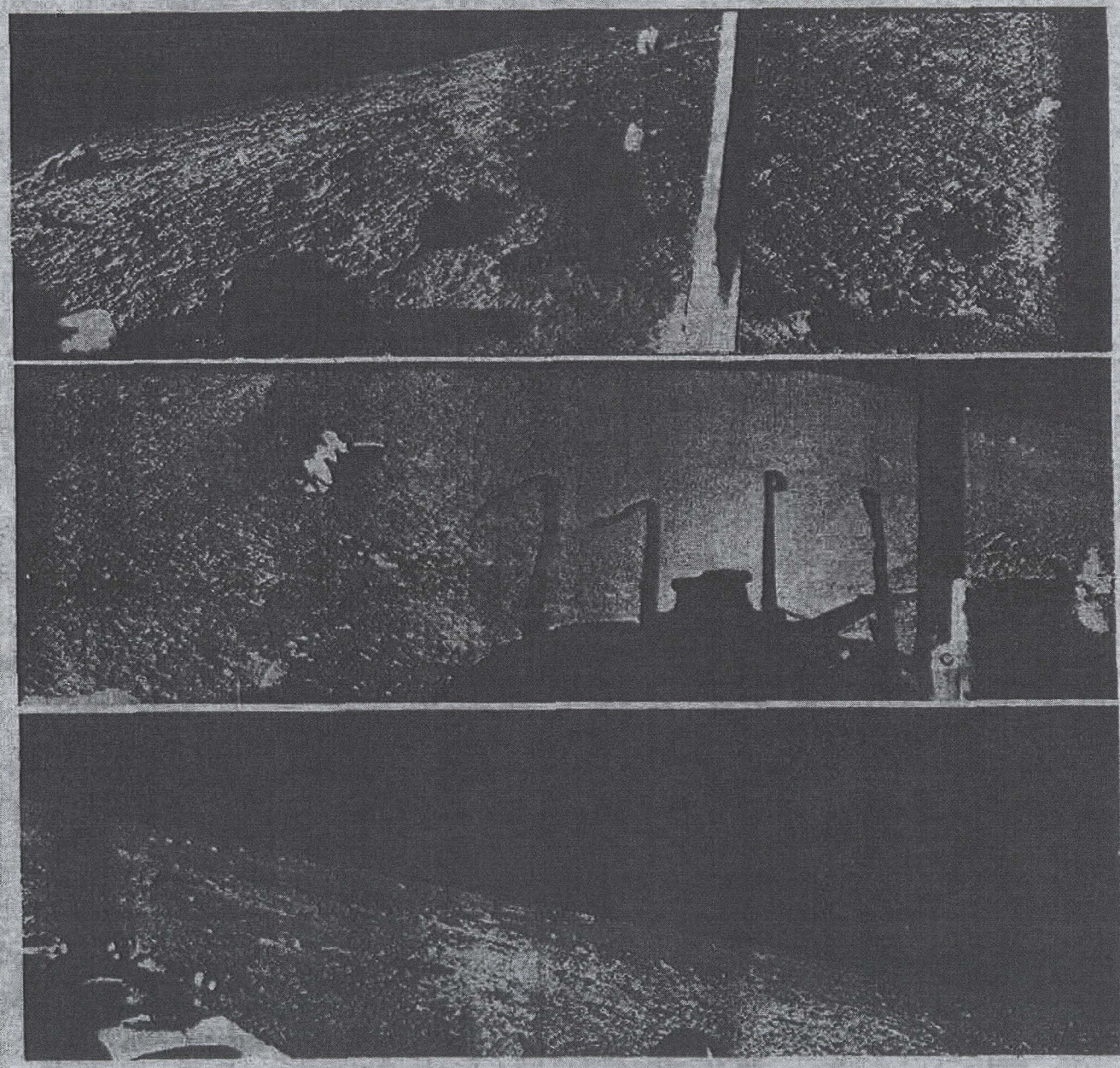

Lunar Panorama Taken by Luna 13 (from Pravda)

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TABLE I

Minutes of Coverage of The Target Area With Adequate Sunlight for Each Day After Launch

Days After Launch \ Cosmos Number / Inclination	Cosmos 67 51 deg	Cosmos 69 65 deg	Cosmos 121 72 deg
First day	31	17	18
Second day	34	17	18
Third day	38	17	15
Fourth day	40	18	17
Fifth day	40	17	15
Sixth day	45	18	15
Seventh day	48	18	17
Eighth day	51	17	18
Total for entire mission	327 minutes	139 minutes	133 minutes

TABLE II

Number of Orbits Passing Over Specified Target Area on Which Some Photography Can be Accomplished

Days After Launch \ Cosmos Number / Inclination	Cosmos 67 51 deg	Cosmos 69 65 deg	Cosmos 121 72 deg
First day	4	3	3
Second day	6	4	3
Third day	7	3	3
Fourth day	7	3	3
Fifth day	7	3	3
Sixth day	7	3	3
Seventh day	8	3	3
Eighth day	8	3	3
Total for entire mission	54 orbits	25 orbits	24 orbits

Advantages of 51° over 65° and 72° for Orbital Inclination of Soviet Photorecce Satellites

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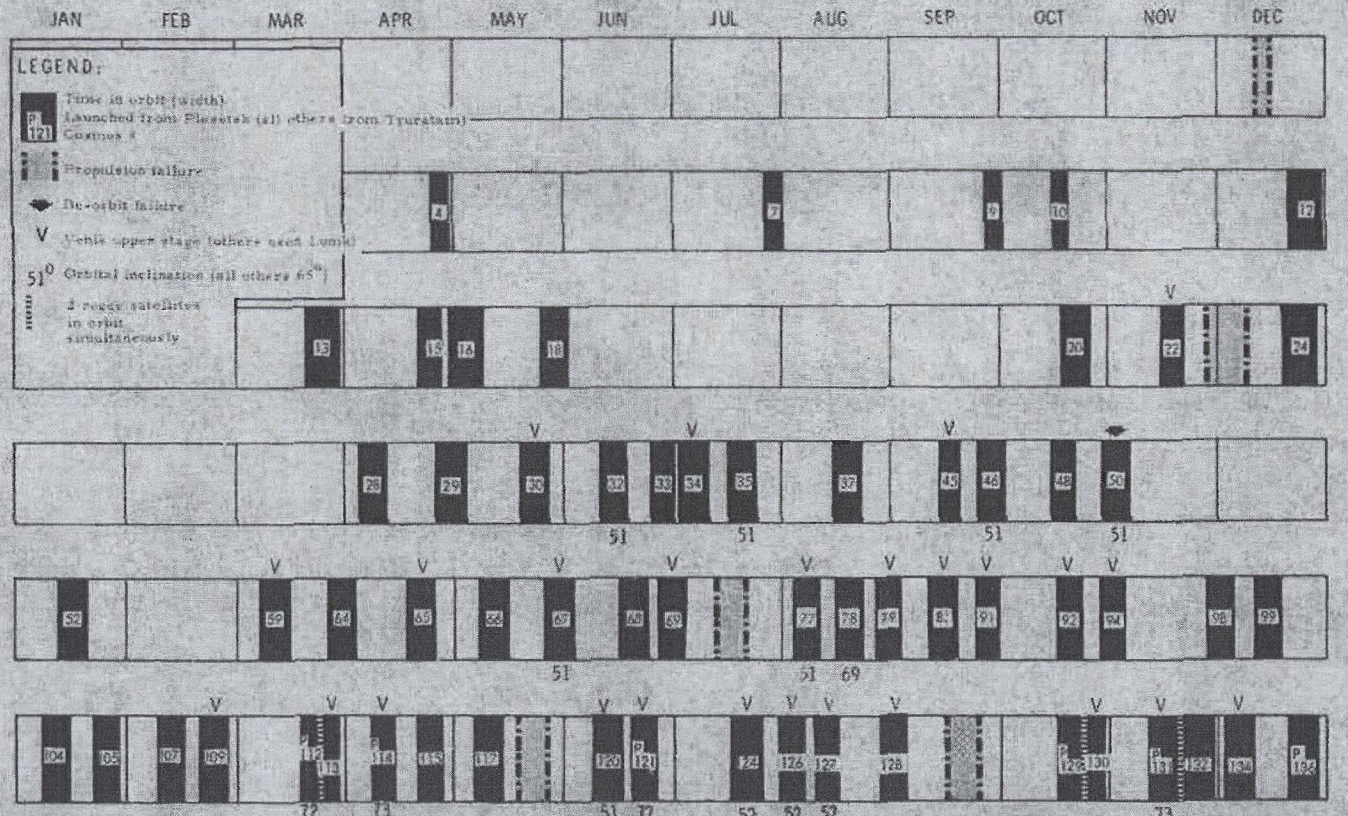
Military Reconnaissance Satellites
(most of the recoverable Cosmoses)



The Soviets claim their Cosmos satellites are research vehicles, but those cited above are believed to be primarily military reconnaissance satellites. Their orbits were uniformly so low that they could have collected little data of value for space research.

All were suitable for photorecce. 7) Launches were timed so that payloads passed over Free World targets in daylight and when they would be closest to Earth (at perigee). 8) perigees were low. 9) payloads were stable with reference to the Earth's surface. 10) payloads were active over potential photorecce targets. 11) some payloads changed attitude, as if to cover priest targets. 12) those launched were de-orbited except for Cosmos 50, which exploded when de-orbit was attempted.

Some vehicles may have conducted IR or UV reconnaissance. Certain payloads are suspected of having assisted in test of IR and/or UV missile-launch detection systems.

All were launched by SS-6 ICBM and injected into orbit by either light Lunik 3d stage or by heavy Vostok 3d stage. Payload weight range: 10,000-15,000 lbs.

Estimated camera resolution: 20-30' for most Lunik-injected payloads, 5-8' for most Vostok-injected payloads.

Most of the de-orbits during 1964-1966 occurred slightly less than 8 days after launch.

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