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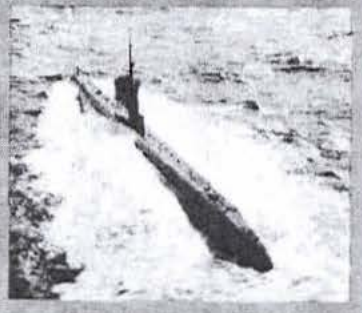

UNITS of "W" class submarine have been used to test new ASW equipment; for further details see, "Soviet ASW in Perspective," on page 4.

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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
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Director

SUMMARY OF SOVIET SPACE EFFORTS IN 1967

Based on the number of launchings, the year 1967 was the most active in the history of the Soviet space program. However, for a year that marked the 50th anniversary of the Bolshevik Revolution and the 10th anniversary of the first Sputnik, the number of space spectaculars was much less than had been generally anticipated.

Nevertheless, Soviet space launches during 1967 were slightly more than 88 percent successful and included some noteworthy accomplishments. Of the 71 space launchings attempted, 63 were successful. The total was 22 more than in 1966, when the success rate was slightly less than 84 percent.

Space missions represented the continuation of a carefully planned space program including manned and unmanned flights with various technical objectives. The objectives included development of military support systems—reconnaissance, meteorological, navigation, and communications satellites—a probable space offensive weapon system, a manned spaceflight system, vehicles for near-earth scientific investigations, and systems capable of lunar and interplanetary environmental investigations.

Reconnaissance program

Twenty-two photoreconnaissance vehicles were successfully launched during 1967—one more than in 1966. Ten of these had a roll capability and carried a

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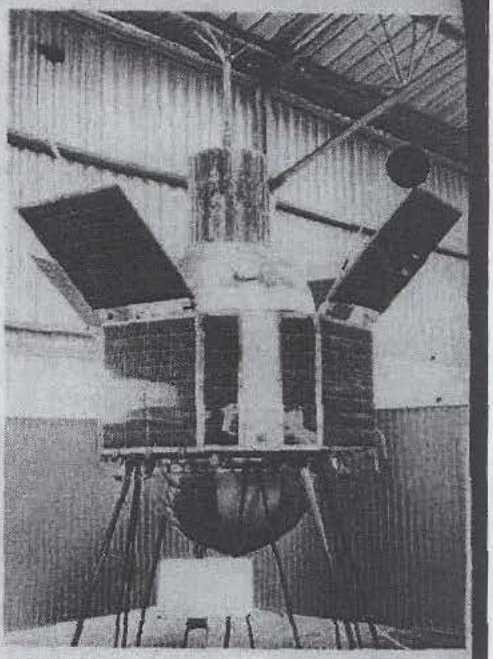
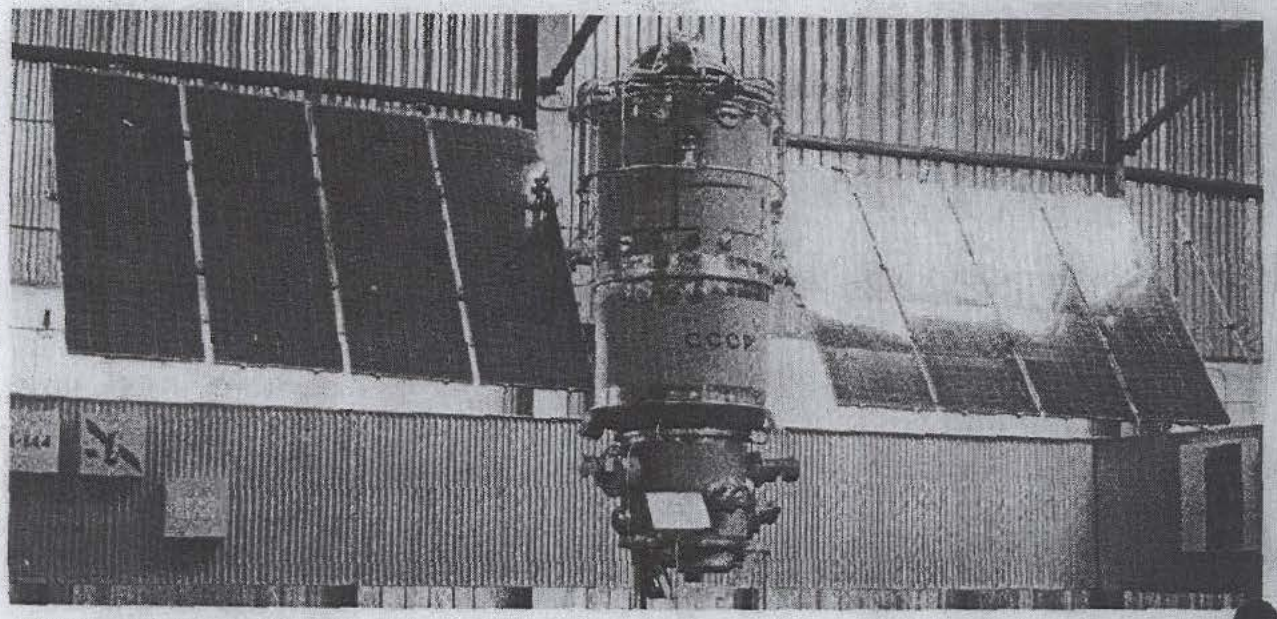
For the first time, more photoreconnaissance missions were launched from the Plesetsk Missile and Space Complex than from the Tyuratam Missile Test Range. Thirteen missions



COSMOS scientific satellite on display. [U]

(11 from Plesetsk and 2 from Tyuratam) used the nominal 65-degree inclination of orbital plane to the earth's equatorial plane. Three other vehicles launched from Plesetsk used the nominal 72-degree inclination. This inclination provides more coverage of Alaska, Canada, and northern Europe. Six missions launched from Tyuratam used the 51-degree inclination. The 51-degree inclination nor-



DISPLAY model of Cosmos 144, the first of three Soviet meteorological satellites launched successfully into orbit during 1967.

mally provides a longer duration over the United States than does the 65-degree inclination.

Since 8 June 1967 and with the launching from Plesetsk of Cosmos 164, all photoreconnaissance satellites have been launched by the SL-4 launch system, which consists of the basic SS-6 booster/sustainer and a third stage designated Venik. The SL-4 can inject 12,000 to 15,000 pounds into a 100-nautical-mile earth orbit. The SL-3 launch system, which had been used to launch the low-resolution satellite vehicles, has not been used for reconnaissance missions since the launching of Cosmos 157 on 12 May 1967. The SL-3 system consists of the basic SS-6 booster/sustainer with a third stage designated Lunik.

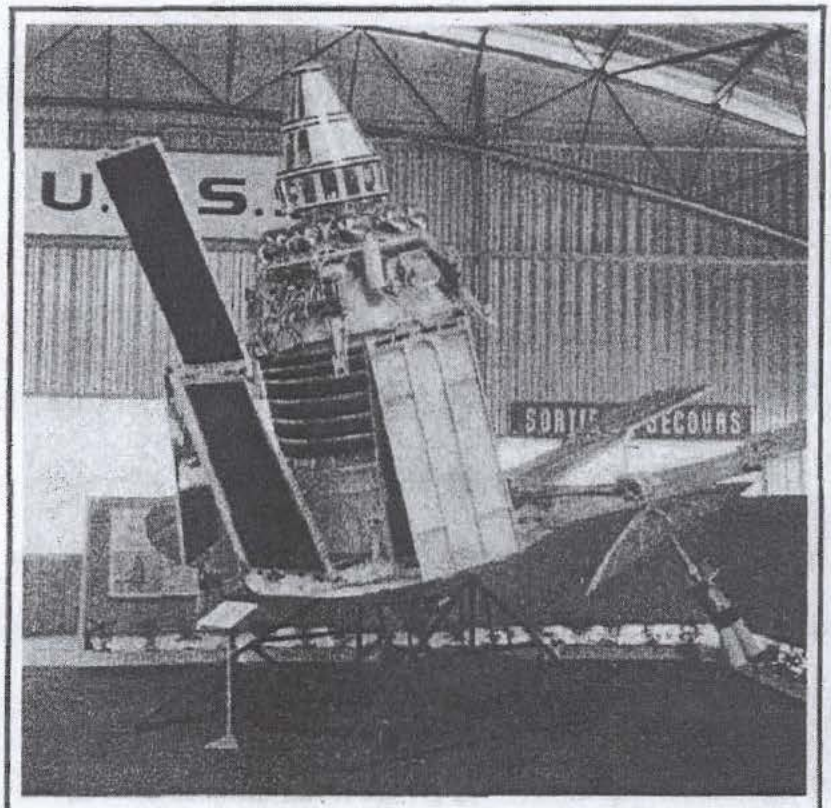
Meteorological satellites

With the successful orbiting of Cosmos 144 on 28 February and Cosmos 156 on 27 April 1967, the Soviets had two meteorological satellites operating simultaneously, permitting coverage of the earth twice each 12-hour period. Their orbital planes were nearly perpendicular to each other.

On 24 October a third meteorological satellite, Cosmos 184, was launched from Plesetsk; it probably will complement Cosmos 144 and Cosmos 156, both of which have been in orbit for a considerable time.

Communications satellites

The Soviets successfully placed four communications satellites into orbit during 1967. On 25 May the Soviet News Agency TASS announced the launch of "another communications satellite, Molniya 1." TASS specified that the purpose of the launch was to check further the experimental exploitation of a system of long-distance two-way television, telephone, and telegraph radio communications. This was the fifth Molniya communications satellite launched from Tyuratam. The orbital parameters of the Molniya 1 satellites are designed for the vehicle to spend a large part of every other orbit over the Soviet Union. All Molniya satellites have been placed in similar orbits, although Molniya 1/6, launched on 3 October, had a highly elliptical orbit, A Soviet announcement stated that the purpose of the vehicle was to ensure exploitation of long-distance communications, implying that with this launching the Soviets now considered the Molniya 1 system operational. On 22 October, Molniya 1/7 was successfully launched from Tyuratam and provided the USSR with a minimum of three active communications satellites to televise the celebrations of the 50th anniversary of the Bolshevik Revolution.



MOLNIYA 1 satellites spend a large amount of orbit time over the USSR. ~~USI~~

Navigation satellites

On 23 November the SL-8 space launch system was used to inject Cosmos 192 into a near-circular orbit at an altitude of about 410 nautical miles. Cosmos 192, launched from Plesetsk, probably was the USSR's first Soviet operating navigation satellite. The Soviets may be able to use their satellite interchangeably with the US Transit satellite system since Cosmos 192 is transmitting on the same frequencies as Transit. The Soviets apparently developed a system that allowed them to take advantage of using Transit, yet eliminated dependence on it by providing an alternative in the event that their use of Transit is denied.

Scientific satellites

Fourteen successful scientific satellites were launched during 1967: seven from Kapustin Yar, six from Plesetsk, and one from Tyuratam. These satellites usually conduct near-earth scientific investigations including data collection for meteorological, radiation, solar plasma, and biological studies.

The scientific mission of Cosmos 166 (launched on 16 June 1967 from Kapustin Yar) probably was to monitor solar radiation in the X-ray region of the electromagnetic spectrum. Satellite monitoring of solar X-rays may become very important for prolonged manned earth orbital flights or manned lunar exploration. Solar flares, which produce large quantities of high-energy charged particles, gen-

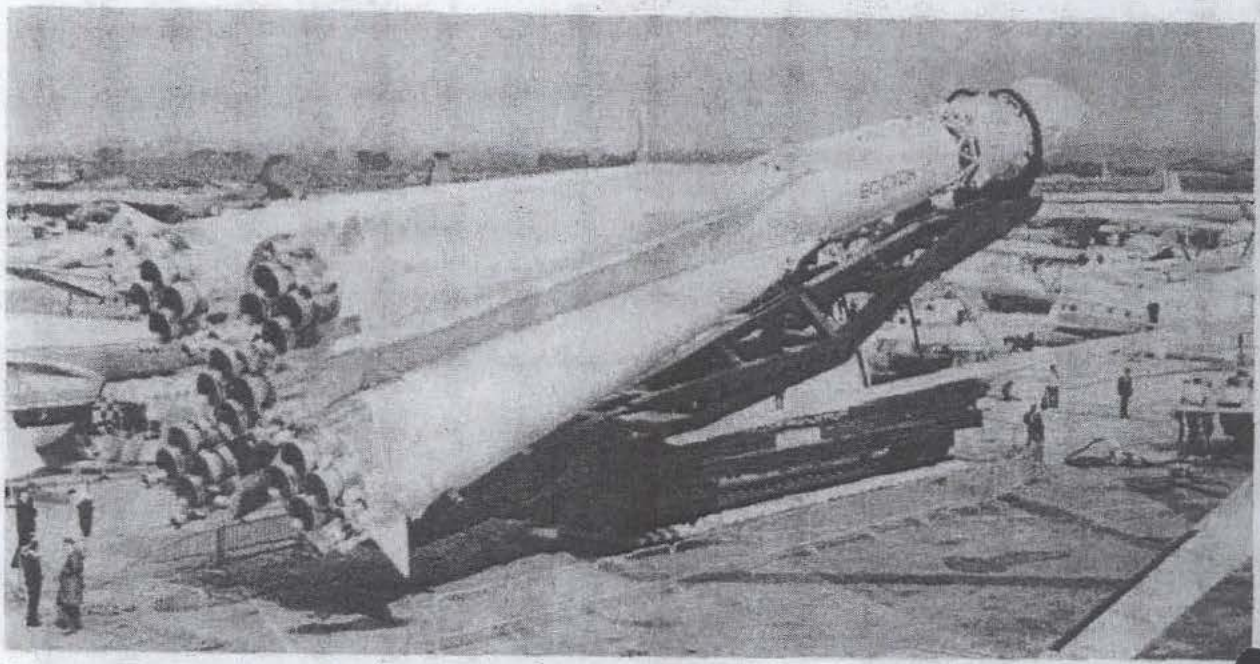
ELECTRON is one of several satellites that monitor the earth's radiation belts. ~~(S)~~

erate increased X-ray radiation. Since the X-rays travel at the speed of light (186,000 miles per second), they reach the earth before the energetic particles and thus can be used as a warning signal. The sun, however, sometimes generates bursts of X-rays that are not followed by dangerous levels of energetic particle radiation. Data from satellites similar to Cosmos 166 should provide the Soviets with a basis for judging the feasibility of using such a warning system.

Cosmos 165 was launched from Plesetsk on 12 June and its orbital elements suggested a scientific near-earth measurement program in which orbital changes were part of the variables.

Offensive military system

Development of a fractional orbit bombardment system (FOBS) continued in 1967. Actual flight testing of what was believed to be hardware for a FOBS began in December 1965. Ten test flights were attempted during 1967; eight were successful. The FOBS operational and control requirements would be similar to those of an ICBM in many respects. Such a vehicle probably would be targeted to attack (impact) on the first orbit but it could be allowed to travel



TWO-stage SS-6 is the basic propulsion system for the SL-3, which uses the Lunik third stage, and the SL-4, which uses the Venik. ~~(S)~~

several orbits without altering the basic concept.

Man-related missions

Manned space flight activity during 1967 was highlighted on 23–24 April by the flight of Colonel Vladimir Komarov aboard Soyuz-1, a new 14,000- to 15,000-pound space ship with maneuvering capabilities and equipped with a docking collar. It was the first Soviet manned space flight in more than two years. The flight ended with the death of Cosmonaut Komarov, after one day in orbit. After Soyuz-1 re-entered the earth's atmosphere, it became entangled in its own parachute and crashed into the earth from an altitude of seven kilometers (about 23,000 feet), according to TASS announcements.

Man-rating of the Soyuz-1 type spacecraft occurred during the Cosmos 133 and Cosmos 140 flights, which were launched on 28 November 1966 and 7 February 1967 respectively. Two other possibly man-related missions were the flights of Cosmos 146, launched on 10 March, and Cosmos 154, on 8 April 1967. Both were placed into low earth orbits with inclinations of approximately 52 degrees by the SL–12 space launch system. The SL–12 launch system is estimated to have a capability of placing more than 50,000 pounds into low earth orbit. The SL–12 is assessed also as having the capability of sending a spacecraft such as Soyuz-1 around the moon and back to earth.

On 30 October 1967 two unmanned possibly Soyuz-type space vehicles automatically rendezvoused and docked in orbit. TASS stated that Cosmos 188—the passive target vehicle—was injected into orbit some 15 miles from Cosmos 186—the command module—which was launched three days earlier, and that the velocity difference between the two craft was about 82 feet per second (about 56 miles per hour). Sensors on Cosmos 186 picked up Cosmos 188 (the target vehicle) almost immediately after the latter achieved orbit, and Cosmos 186 approached to within 1,000 feet of the target vehicle before it had completed half a revolution. Docking was completed before Cosmos 188 made one revolution around the earth. The system used to determine relative position of the target vehicle and to apply thrust for closure was a significant development.

Interplanetary exploration

Another spectacular space achievement was the launch of Venus-4 on 12 June 1967. This vehicle was injected into a trajectory towards Venus and made a "soft" landing on the planet on 18 October after a four-month flight. Soviet press, radio, and TV gave it extensive coverage. The Soviet public announcement on 16 October that the United Kingdom Jodrell Bank deep-space tracking facility had been requested to help track Venus-4 was a good indication that the mission was important to the Soviets and that they desired full worldwide appreciation of that fact or possibly were worried about their own tracking capabilities. It was the 11th known Soviet Venus probe attempt. None of the previous attempts had been completely successful, although some of the probes transmitted data from interplanetary space. Venus-4 was a significant technological first and probably provided the first actual knowledge of the entry density of Venus.

SOVIET SPACE PROGRAM 1967

Missions	*Successes*	*Failures*	*Total*
Fractional Orbit Bombardment System	8	2	10
Military Support Systems			
Photoreconnaissance	22	3	25
Communications	4	0	4
Meteorological	3	0	3
Navigation	1	0	1
Man-Related	5	1	6
Lunar	0	1	1
Interplanetary	1	1	2
Scientific	14	0	14
Undetermined	5	0	5
Total	63	8	71

Prospects for 1968

Progressive development of current Soviet space programs are expected to continue through 1968 unless constrained by economic considerations or technological problems. The unsuccessful attempt to achieve what has been assessed to be an unmanned mission on 22 November 1967 and which was suspected of being a circumlunar mission may be a signpost of Soviet direction. The lunar program portends more manned and unmanned missions with the Soyuz-type spacecraft and greater use of the SL–12 launch system. The Soviets probably will launch several navigation satellites similar to Cosmos 192. Very likely, the Soviets may attempt a manned circumlunar flight before the end of 1968. Support missions for this flight could include rendezvous and docking, orbit maneuvering, and unmanned circumlunar probes.

The Soviets are expected to maintain a strong interest in interplanetary space probes. While the exact nature of this interest is not clear, the number of scientific satellites in support of research for the interplanetary program probably will include a variety of scientific assignments. Moreover, many of the experimentations in near-earth space during 1968 are expected to focus attention on the Soviet long-term concept of interplanetary travel. Initial attempts at construction of space platforms are strong possibilities. Improved communications, navigation, and other near-earth space operations may develop. Testing of the FOBS probably will continue during 1968. The military reconnaissance satellites also are expected to be launched at the current rate of about two per month. In view of the expected number of launchings, the year 1968 should be the most active in the history of the Soviet space program, and with the reactivation of the man-in-space program, it should be far more spectacular than the year 1967. [END]