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Issue No. 26/64

26 Jun 1964

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[redacted]

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NORAD Weekly Intelligence Review

Issue No. 26/64, 26 June 1964

The WIR in Brief

Portion identified as non-responsive to the appeal

CONTROLLED DETONATION STUDIED FOR ROCKET PROPULSION; FLIGHT TESTING STILL FAR OFF

Energy-release rate theoretically could be 100 times that of conventional rocket engine.

Portion identified as non-responsive to the appeal

Space

COSMOS 32 DE-ORBITED; REGULARITY OF LAUNCHES SUGGESTS OPERATIONAL PHOTO-RECONNAISSANCE SYSTEM

Last 4 vehicles de-orbited after 126-128 revolutions.

COSMOS 33 LAUNCHED FROM TYURATAM; WILL PROBABLY BE DE-ORBITED

Has usual characteristics of TT Cosmos.

Portion identified as non-responsive to the appeal

Portion identified as non-responsive to the appeal

COVER: Counterrotating propellers on Soviet aircraft (OFFICIAL USE ONLY)

NOTE: Pages 30, 31, 34, 35, and 36 of this issue are blank.

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Controlled Detonation Studied for Rocket Propulsion; Flight Testing Still Far Off

Soviet physical chemists have been interested since 1963 in applying the principles of controlled detonation to rocket-engine technology, and they have published extensively on their work in this field. The importance to the Soviets of this research and the possibility of some Soviet progress in it may be inferred from the recent nomination of B. V. Voitsekhovsky and his co-workers in detonation research for a 1964 Lenin Prize.

(A detonation wave is a shock wave sustained by the energy released during the chemical reactions occurring in the wave. Its flame velocity (a few thousand meters per second) is much greater than that of a normal combustion wave (a few meters per second). The mass of reacting propellant is the same but the velocity of reaction is higher.)

Soviet studies have been concerned both with achieving a better understanding of combustion instability in large rocket engines and with developing techniques for using controlled detonation in rocket combustion chambers. Direct use in the combustion chamber is the most obvious application of controlled detonation, since theoretically it could result in an energy-release rate as much as 100 times that of a conventional rocket engine.

Voitsekhovsky at Novosibirsk and US experts at the University of Michigan have used experimental chambers in attempts to control the detonation process. This work has included the study of the combustion process in the

presence of a pressure gradient, with emphasis on direct application in rocket engines. However, flight testing of a rocket propelled by a controlled-detonation engine is unlikely in the foreseeable future.
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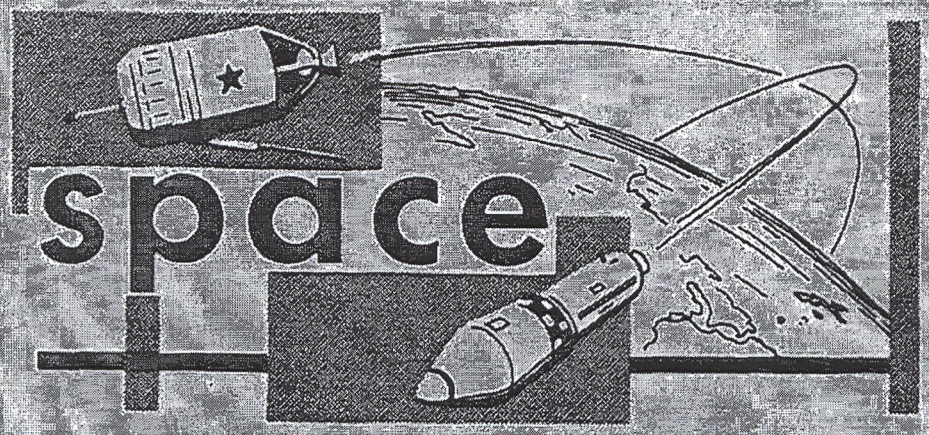

significant intelligence on space developments and trends

Cosmos 32 De-Orbited; Regularity of Launches Suggests Operational Photoreconnaissance System

The Soviets apparently de-orbited Cosmos 32 at about 1030Z, 18 June 1964, on Revolution 128, after the vehicle had been in orbit nearly 8 days. This vehicle, which was launched from Tyuratam (TT) at about 1100Z, 10 June, would not have decayed from natural causes until about October 1964.

It is now believed that the TT-launched Cosmoses represent an operational Soviet photoreconnaissance system. A photoreconnaissance mission, with film recovered after de-orbit, is indicated for these vehicles by a number of factors:

- Launches are so timed and executed that these vehicles make daylight passes over the US at or near perigee and at times most favorable for photoreconnaissance, that is, between about 1030 and 1430, local standard time, when there is maximum illumination of the target by the Sun.
- These vehicles are normally recovered after 5-10 days in orbit -- which allows adequate time for complete photographic coverage of the US, using a 70-80 degree angle coverage on the camera. This angular coverage would permit overlapping coverage with an earth swath width of about 260 s.m.
- Analysis of [redacted] of one TT Cosmos (No. 20) indicated payload activity only when the vehicle was making daylight passes -- usually over the US, southern Canada, Pacific islands, and other areas of potential intelligence interest.
- The orbital parameters -- apogee, perigee, period, and inclination -- have been very similar, indicating a repetitive mission.
- The average altitude of these vehicles is between 170-180 statute miles -- which is more suitable for ground photoreconnaissance than for cloud-cover photography. For the latter mission the optimum altitude would be about 400 s.m.

- All payloads appear to be in the 10,000-pound category, which is adequate for carrying multiple sensors to perform a variety of missions, including photoreconnaissance.
- All vehicles have been stabilized and Earth-oriented, factors which make them ideal space platforms for a number of Earth-directed sensory systems, including photoreconnaissance.
- At least four of these vehicles transmitted video signals, the resolution of which exceeded that required for a meteorological mission.

An operational status for this photoreconnaissance system is suggested by the increasing frequency of launch of vehicles in this series and by the regularity now evidencing the period before de-orbit. The last 4 vehicles were de-orbited after 126-128 revolutions, nearly 8 days after launch.

Cosmos 32 resembled the other TT Cosmoses in all respects save one: uniquely among all Soviet space events to date, its equatorial inclination was about 51.2 degrees. All other TT Cosmoses -- indeed, all other TT space launches except Electrons 1 and 2 and Polyots 1 and 2 -- have had inclinations of about 65 degrees. The 51.2-degree inclination, however, is even better than that of 65 degrees for photoreconnaissance of the US, southern Canada, and Communist China -- the Sino-Soviet border areas in particular. The Soviets could well use the 51-degree equatorial inclination again. (Map on p. 29)
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Cosmos 33 Launched from Tyuratam; Will Probably Be De-Orbited

The Soviets launched Cosmos 33 from Tyuratam (TT) at about 1000Z, 23 June 1964. Its orbital parameters, time of launch, radar signature, and telemetry are similar to those of most previous TT launches and, like the others, it will probably be de-orbited. Its orbital parameters have been given as follows:

	SPADATS	TASS
Inclination	65.01 degrees	65 degrees
Period	89.48 minutes	(not announced)
Apogee	290.4 kilometers	239 kilometers*
Perigee	209.1 kilometers	209 kilometers

* The TASS announcement probably should have read "293" instead of "239."

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The primary mission of Cosmos 33 is probably photoreconnaissance. (See preceding item about Cosmos 32 and its predecessors.) It will probably be de-orbited about 1 July, judging by the history of the past 4 TT Cosmos launches.

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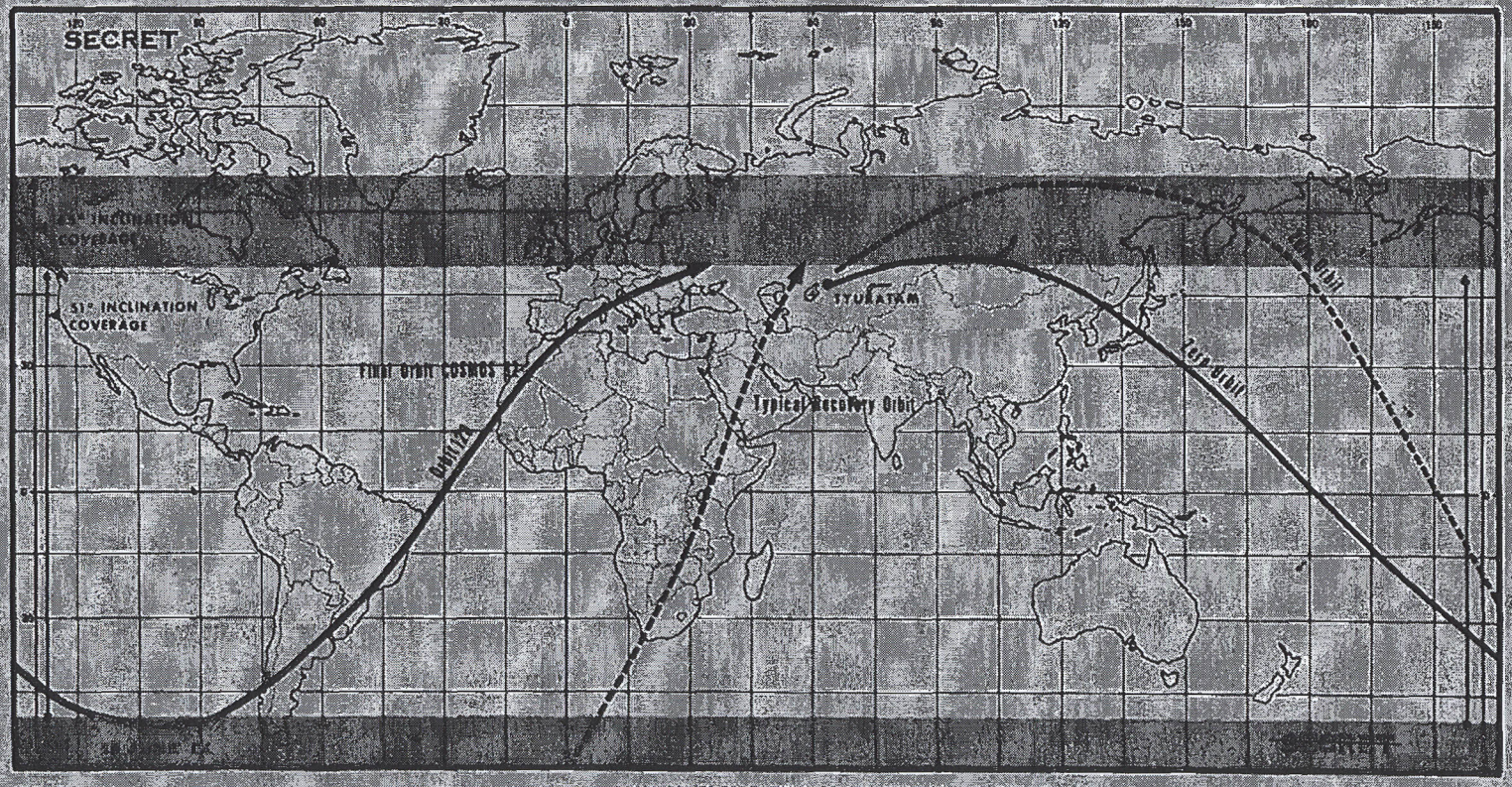
RECOVERY ORBITS OF SATELLITE WITH 65 AND 51 DEGREE INCLINATION



EARTH TRACE ZERO/FINAL ORBIT WITH 65° INCLINATION

EARTH TRACE ZERO/FINAL ORBIT WITH 51° INCLINATION

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