ORTH AMERICAN AIR DEFENSE COMMAND

Weekly Intelligence Review (U)

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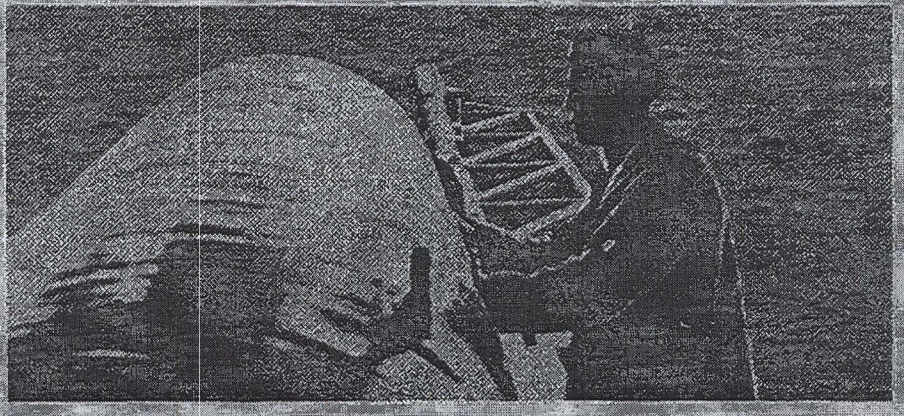

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NORAD Weekly Intelligence Review

Issue No. 16/64, 17 April 1964

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COVER: Unspecified Soviet naval missile (Soviet press photo)(OFFICIAL USE ONLY)

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significant intelligence on space developments and trends

50X1 and 3, E.O.13526

New Evidence that Recoverable 'Cosmoses' Are Performing Photoreconnaissance

An FTD analysis [redacted] from Cosmos 20 suggests that this recoverable vehicle may have been taking photographs of Free World areas during its 8-day flight and, if this is true, that the film was probably recovered after the vehicle was de-orbited on command from the USSR. If Cosmos 20's mission included photoreconnaissance, then it is further possible -- and likely -- that other recoverable Cosmoses launched from Tyuratam (TT) engaged in similar activity. Essentially the same vehicle was apparently used on all these flights, all transmitted [redacted] and in most cases there was a strong similarity in orbital parameters. (See chart on page 34.)

The estimate that Cosmos 20 may have had a photoreconnaissance mission -- in addition to other possible missions -- [redacted] These transmissions, although they contained no video signals, were monitoring and reporting on certain payload activity which is best explained as photographic.

50X1 and 3, E.O.13526

- All the payload activity represented by this telemetry occurred when Cosmos was overflying sunlit portions of the Earth, that is, areas which could be photographed.
- Most of this payload activity occurred when Cosmos 20 was overflying areas of intelligence interest to the Soviets -- land areas outside the Soviet Bloc. Payload activity has been noted over the following areas, among others: the US, Canada, Greece, Turkey, Iraq, Iran, Afghanistan, Libya, Pakistan, Japan, the Aleutians, Cuba, and Wake Island. An on-board programmer, using ephemeris data available, apparently was commanding the payload on and/or off just as the vehicle was passing over the border of a country or past an island. Daylight passes over the US occurred near mid-day.

- [redacted] 50X1 and 3, E.O.13526 Such changes or adjustments would probably be required for photoreconnaissance from a satellite.
- Cosmos 20's orbital parameters were ideal for photoreconnaissance -- it was always over a sunlit portion of the Earth during the perigeal portion of its orbit, that is, the portion closest to the Earth.

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The theory that Cosmos 20 was engaged solely in photography of cloud cover can be rejected because of the highly selective nature of the areas over which payload activity occurred. ELINT could have been collected by Cosmos 20 but it would not explain the payload activity monitored [redacted] since ELINT would also be collected when target areas were in darkness.

A typical daily cycle of operations for Cosmos 20 can be described as follows: The vehicle would be quiet for about the first five orbits after "dumping" the previous day's take on an ascending -- daylight -- pass over the USSR. During these first orbits, Cosmos 20 would be passing over Europe and the Atlantic during daylight hours. Payload activity would be resumed as the satellite made ascending passes over the US and Canada -- usually twice each day. It would then go quiet again until passes were made over Pacific islands, when it would be active again for a half a minute at a time. Activity would also be resumed when the vehicle made daylight passes over the Middle East. Then, on an ascending pass, the day's "take" would be dumped over the USSR. Sometimes there were exceptions to this routine: the payload was not always active on daylight passes over the US, and telemetry may have been dumped twice daily over the USSR on some orbits.

The suspicion that other recoverable TT Cosmoses also engaged in photoreconnaissance is heightened by the fact that the orbital parameters of these satellites were also near optimum for such a mission. All were in relatively low orbits, and perigee always occurred when the vehicle was overflying the sunlit portion of the Earth's surface. Also, daylight passes over the US occurred near mid-day.

50X1 and 3, E.O.13526

In this connection, video-type signals have been [redacted] from four TT Cosmoses -- Nos. 4, 7, 9, and 15. Further, both cloud-cover and ground photography have been demodulated from Cosmos 9's video signals (see WIRs 29/63 and 39/63). Demodulated ground photography showed parts of northern Syria and southern Turkey. [redacted] the ground resolution of this coverage, which is limited by the [redacted] would be about [redacted] at a point directly below the satellite and about [redacted] at the extremities of the picture. These resolutions are more than adequate for cloud-coverage photography but less than adequate for ground reconnaissance.

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Exposed film recovered from a de-orbited satellite would not be scan-limited. Recovered film exposed by the same camera used for the demodulated video on Cosmos 9 would have a ground resolution of 30 feet for pictures taken from a motionless platform at an altitude of 200 statute miles (about 174 n.m.), assuming a focal length of 11.75 inches for the camera lens. This resolution would be degraded by the effects of ground speed of the satellite (about 5 miles per second) and by small changes in satellite attitude which cannot be entirely eliminated.

The large (10,000-pound) TT Cosmoses are believed to be multipurpose vehicles. In addition to their photoreconnaissance -- transmitted and/or recovered -- all the 1962 members of this series are known to have carried packages which registered corpuscular radiation from the Sun. Some or all of them may have tested life-support and instrumentation systems to be used with manned flights. And any or all of them may have collected ELINT, tapes of which would have been recovered after de-orbit.
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Space Vehicles Given Deceptive Names to Conceal Failures

Soviet leaders have consistently sought to conceal space-launch failures and delays by a variety of means. Aborted and delayed launches are never announced, a practice facilitated by Soviet refusal to announce launches beforehand. Target dates for the execution of specific types of space missions are never announced in advance, not even in terms of broad time ranges; thus, an admission of failure to meet target dates is never forced on the Soviets.

A different sort of subterfuge is used when the vehicle is orbited or launched successfully but the mission later fails because of failure in upper staging, midcourse guidance, communications, or payload operation. In these cases, the Soviets may try to conceal their failure by admitting only to a lesser mission, the execution of which cannot be disproved by the West. This ruse calls for assigning the vehicle a name consistent with the lesser mission.

- The Soviets proclaimed on 2 January 1959 that they had launched a vehicle that had escaped the Earth's gravitational attraction. Its intended destination, the Moon, was not announced but was implicit in the Soviet-assigned name -- Lunik. When the vehicle missed its target and went into heliocentric orbit, the Soviets tried to cover up their failure by stating that the vehicle's name was Mechta (Russian for "dream."). The Soviets must have later realized that this move

deceived no one, for the numbering of later lunar launches (Luniks 2, 3, and 4) by implication confirmed that the 2 January 1959 vehicle was Lunik 1 and was, therefore, intended as a lunar probe.

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- On 4 February 1961 the Soviets sent a very heavy vehicle into a low, highly circular orbit. [redacted] the vehicle decayed naturally on 26 February without having accomplished any apparent mission. The Soviets named this vehicle Sputnik 4 and said that it was a scientific vehicle collecting date on the near-Earth space environment. They have since referred to the vehicle as "the heavy artificial Earth satellite," but all the evidence indicates that this launch was an attempted probe of the planet Venus which aborted when the fourth stage failed to inject the payload into a transfer trajectory toward its target. (US intelligence refers to this vehicle as Sputnik 7.)
- On 11 November 1963, the Soviets orbited a vehicle which they named Cosmos 21; they said that it was performing the usual Cosmos mission of collecting and transmitting data on the near-Earth space environment. This vehicle had none of the characteristics of either the Kapustin Yar or the Tyuratam Cosmoses. The third stage was the same as that used with interplanetary or lunar probes, the vehicle's orbital parameters were those of a parking orbit (low, and highly circular), and [redacted] The true mission of this vehicle still is not known to the West, but Cosmos 21 was a member of the Cosmos series in name only.

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- On 27 March the Soviets orbited another vehicle which had all the earmarks of a Venus probe. The Venik third stage was used to inject the vehicle into a parking orbit, the electronic configuration was compatible with that of a Venus probe, and it was launched at a time suitable for a Venus probe. The Soviets dubbed this vehicle Cosmos 27 when the fourth stage failed to inject it into transfer trajectory toward its target.

The case of Zond 1, which was launched on 2 April, is only slightly different from the preceding examples. Zond 1 is undoubtedly another Venus probe attempt, but the Soviets to date have refrained from designating it as such, not because it has failed but because they wish to keep themselves covered in case it does fail. This policy of caution undoubtedly stems from the failure of all 12 previous Soviet interplanetary-probe attempts and from the embarrassment of publicly designating two of them as probes once they had been injected into transfer trajectories toward their targets. (The first of these, launched on 12 February 1961, was announced as a "Venus probe,"; the second, launched 1 November 1962, was named Mars 1. Both suffered communications failures, and midcourse guidance of Mars 1 almost certainly would have been unsuccessful, since the vehicle was tumbling.)

The Soviets have also been deceptive in refusing to report certain orbital launches which ended in failure. Adlai Stevenson, US Ambassador to the UN, on 6 June 1963 charged the Soviets with failure to report 6 orbital launches to the UN; they are supposed to report these in accordance with General Assembly Resolution 1721 (XVI) -- a resolution which the Soviets themselves endorsed. Five of these were interplanetary probe failures, one was a lunar probe failure -- all had entered parking orbit but suffered fourth-stage failure. (See WIR 24/63.) The Soviets have since adhered to the UN resolution by reporting all vehicles which have achieved orbit, but they still have not reported the 6 launches mentioned by Mr. Stevenson, and they are still covering up payload failures with deceptive names.
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No Western Intercepts from Zond 1 Since 4 April

No known Western sensors have intercepted any signals from the Soviet space probe Zond 1 since 4 April.

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TASS has been relatively reticent (as of this writing -- 14 April) about this vehicle, which is very likely a Venus probe. To date, TASS has announced only that the vehicle was launched successfully into a predetermined trajectory; that it is intended to assist in the development of equipment "for distant interplanetary flight"; that a course correction was made at about 21:18 hours, Moscow time, on 3 April, when the vehicle was about 300,000 n.m. from the Earth; and that the probe was expected to be about 450,000 n.m. from the Earth at 1800 hours, Moscow time, 4 April, when it would have a right ascension of 5 hours, 56 minutes, and an inclination to the ecliptic of 4 degrees, 22 minutes.

It is too early yet to draw any conclusions from the lack of Western intercepts and from TASS's apparent reticence regarding Zond 1.
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Cosmos 28 Apparently De-orbited After Nearly 8 Days in Space

The Soviets apparently de-orbited Cosmos 28 sometime between 0734-0739Z, 12 April, on Revolution 126. The vehicle had been launched from Tyuratam at about 0945Z, 4 April 1964.

Shemya radar failed to detect the payload on Orbit 126, during which it should have passed within Shemya's field of coverage. Cosmos 28 would not have suffered natural decay until sometime in July 1964.

TASS announced that Cosmos 28 was performing the usual mission of research of the near-Earth space environment, but indications are that some or all of the de-orbited Cosmoses launched from Tyuratam may have had photoreconnaissance in addition to other possible missions.
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More Space Events Forthcoming; Missile-Range Ships Still at Sea

Soviet space activity has been at a relatively high level since mid-February, when three Soviet AGMs (missile-range instrumentation ships) deployed to mid-Pacific. Since this deployment, the Soviets have launched:

An abortive lunar or interplanetary probe (19 February)
Cosmos 25 (from Kapustin Yar) (27 February)
Cosmos 26 (from Kapustin Yar) (18 March)
Cosmos 27 (really an abortive Venus probe) (27 March)
Zond 1 (a space probe, probably a Venus probe) (2 April)
Cosmos 28 (launched 4 April, de-orbited 12 April)
Polyot 2 (said to have maneuvered) (12 April)

The AGMs (also referred to as SMRISs), which were deployed along the Earth trace of the Zero (first) Orbit of vehicles launched from Tyuratam, are believed to have played some role in the Venus probe attempts and in the Cosmos 28 operation.

More Soviet space activity is anticipated, since the AGMs remain in the Pacific, although they have moved from their previous positions.

A manned flight in the near future is not only a distinct possibility but would be highly desirable from the Soviet viewpoint. With the Chinese Communists daring the Soviet Communists to expel them from the world Communist movement, Moscow needs to stage some impressive event which will win it friends and influence enemies. Manned flights, with which the Soviets have had so much success to date, would be an ideal solution. Possible missions might include:

- Flights of unprecedented duration.
- A rendezvous and docking operation involving two vehicles.
- A brief flight by two men in one vehicle -- in either a modified Vostok vehicle or in a new capsule.
- A flight by a scientist -- most likely an astronomer -- who would perform some useful work in flight, such as making celestial observations, photographic or otherwise. The scientist might fly alone or as a passenger in a vehicle "piloted" by a pilot-cosmonaut.

A flight by a scientist would be practicable and would have high propaganda value. The flight last year by Valentina Tereshkova, who had no special aeronautical or technical qualifications, has paved the way for flights by individuals other than qualified aircrewmen. A flight by a scientist would be indicative both of continued Soviet preeminence in manned flight capabilities and of Soviet interest in the peaceful uses of space.

In this connection, an article by Professor K. Sergeyev in the 1 January 1964 issue of Pravda commented: "... The time undoubtedly has already come when scientists, researchers, geoastronavigators, and flight engineers with various specialties will take their places, side by side with the brave pilot-cosmonauts, in the spacious cabins of new space ships."

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Polyot 2 Maneuvers Apparently Exaggerated by the Soviets

TASS claims that Polyot 2, which was launched on 12 April 1964, has executed repeated orbital maneuvers involving a considerably modified inclination of orbital plane. There is some evidence of possible maneuvering by this vehicle but none of the magnitude suggested by the TASS description. An attempt is being made at NORAD to backtrack Polyot 2's present orbit to determine how far it will pass from the Tyuratam launch point for its Zero orbit; the difference in distance, if any, will give some indication of the magnitude of change, if any, in orbital plane that may have been effected.

Launch occurred at about 0930Z, 12 April. Orbital parameters for the payload have been furnished as follows:

	SPADATS	TASS
Inclination to Equator	58.1 degrees	58.06 degrees
Period	92.4 minutes	92.4 minutes
Apogee	266 n.m.	270 n.m.
Perigee	172 n.m.	167 n.m.

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At last report, this vehicle was still [redacted]

Polyot has been assigned the international designation 1964-19A and the SPADATS designation Object No. 784. 50X1 and 3, E.O.13526

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HF Welding Used in USSR to Make Titanium Tubing for Aerospace Use

High-frequency (HF) resistance welding is a new joining process under study in the US and USSR for possible aerospace use. In this process, the metal to be welded is melted by the heat generated by resistance to the flow of electrical current in a circuit of which the workpiece is a part, plus the application of pressure. Chief advantages of HF welding are high welding speeds and the small size of the weld and of heat-affected areas. The narrowness of the welds results from the "skin effect" of the HF current which runs on the surface of the part.

HF welding of titanium and its alloys is of special interest in aerospace applications, owing to its strength, light weight, and heat resistance. The Soviet aircraft and missile industries have used titanium in making components; activities associated with the Soviet aircraft industry have rolled it into sheets, forged it, and extruded it.

The US and Soviet titanium-welding programs are similar except that the US has welded only flat strip of titanium alloy, whereas the Soviets have succeeded in making pilot production runs of tubing of unalloyed titanium. This Soviet work appears to be developmental but, unless there are some undisclosed difficulties associated with the process, the Soviets can now be credited with an HF-welding production capability. Six to 9 months would be needed to adapt US technology to the fabrication of tubing such as the Soviets have accomplished.

HF welding has been under development in the USSR since 1958. The latest work entails the production of unalloyed titanium tubing 32 mm (1.28") in diameter with a wall thickness of 2 mm (0.080"). Flat strip was formed into a tube and welded along the longitudinal joint. Current for the HF welding was induced in the tube by an induction coil encircling the tube. A production rate of 28-30 meters (93-100 feet) per minute was achieved.

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Cosmoses Launched from Tyuratam and Later De-orbited

Vehicle	Launch Date	De-orbit Date	No. of Orbits	Inclination to Equator (degrees)	Period (minutes)	Apogee (n. m.)	Perigee (n. m.)
1962							
Cosmos 4	26 Apr	29 Apr	47	65.08	90.6	188	149
Cosmos 7	28 Jul	1 Aug	64	64.9	89.9	190	113
Cosmos 9	27 Sep	1 Oct	63	65.03	90.9	199.6	164.3
Cosmos 10	17 Oct	21 Oct	63	64.93	90.1	207.8	111.2
Cosmos 12	22 Dec	30 Dec	126	64.59	90.40	212	115
1963							
Cosmos 13	21 Mar	29 Mar	127	64.94	89.74	176.5	111.5
Cosmos 15	22 Apr	27 Apr	79	65.09	89.7	189	90
Cosmos 16	28 Apr	8 May	158	64.8	90.4	216	113
Cosmos 18	24 May	2 Jun	143	64.98	89.4	152.6	111.6
Cosmos 20	18 Oct	26 Oct	127	65	89.6	169	108
Cosmos 22	16 Nov	22 Nov	95	64.90	90.32	206	105
Cosmos 24	19 Dec	28 Dec	142	65.03	90.51	226	109
1964							
Cosmos 28	4 Apr	12 Apr	126	64.65	90.37	207.9	111.9

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