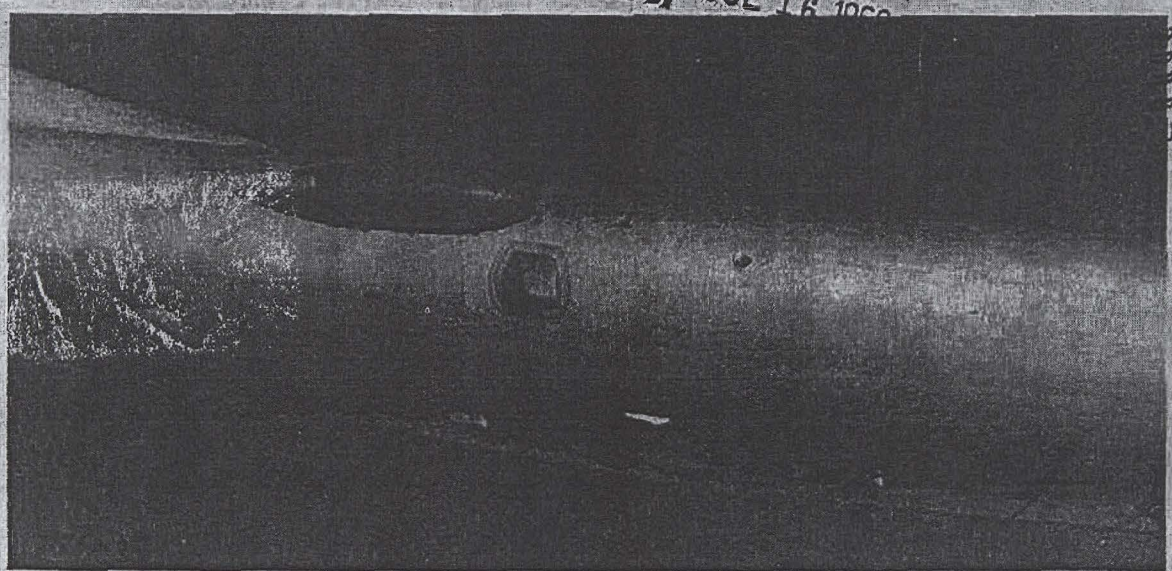
NORTH AMERICAN AIR DEFENSE COMMAND

WIR

WEEKLY INTELLIGENCE REVIEW (U)



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NORAD Weekly Intelligence Review

Issue No. 28/68 12 July 1968

The WIR in Brief

COVER: Aft starboard fuselage of BEAR D (from COMICEDEFOR) (OFFICIAL USE ONLY)

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Portion identified as non-responsive to the appeal

30 Soviet Missile/Rocket Firings, 8 Space Launches in June ~~(S)~~

The level of Soviet missile, rocket, and space-launch attempts during June 1968 was much higher than in May but very little higher than in June 1967:

	June 1968	Previous Month (May 68)	Last Year (Jun 67)
Missile launches	23	15	28
Vertical rocket launches	7	2	--
Space launches	8	3	7
TOTALS	38	20	35

A listing of the June 1968 launches is shown on page 29. Most of the missile firings during the month involved troop training. Unusual features of the month's activity:

- Three ICBMs and two MRBMs were launched from operational sites.
- Two solid-propellant KY-5/6 missiles were launched. These were the first launches of components of this system, which is still in the R&D stage, since 22 March.
- One unidentified missile, similar to the 12 February launch, was fired during June.

(NORAD)
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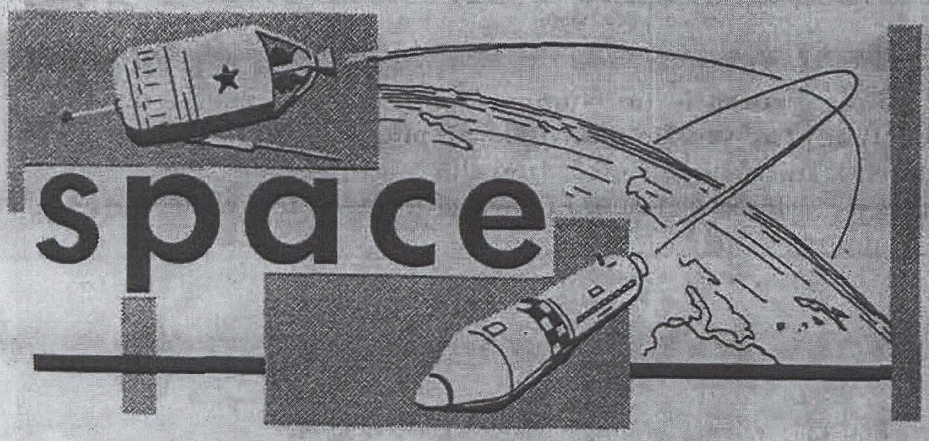

significant intelligence on space developments and trends

Recsat Cosmos 228 Deorbited After 12 Days of Flight (S)

Cosmos 228, a military reconnaissance satellite which was launched from Tyuratam at about 1200Z, 21 June, was de-orbited 12 days later on Revolution 193, on 3 July. The normal flight period for Soviet recsats is just under 8 days.

A secondary piggyback payload separated from Cosmos 228's main payload on 1 July 68, on Revolution 159.

Cosmos 228 thus appears to have paralleled Cosmos 208 (launched 21 March) in every important respect:

- Both were launched from Tyuratam by the SL-4 propulsion system into orbital altitudes and periods normal for Soviet recsats.
- Both were de-orbited after flights of about 12 days.
- 50X1 and 3, E.O.13526
- Both carried the same type of recce payload -- a low-resolution camera system and ELINT-collection gear.
- A piggyback payload separated from each of the two satellites late in the flight -- 8 days after launch in the case of Cosmos 208, 10 days after launch of Cosmos 228. Neither of the piggyback payloads was deorbited; both suffered orbital decay.

Both Cosmos 208 and Cosmos 228 are assessed as having monitored cosmic radiation in the vicinity of the South Atlantic magnetic anomaly off the coast of Brazil, where the Earth's magnetic field makes an unusually sharp dip in altitude.

One possible reason for detaching the secondary payload is that the piggyback might interfere with de-orbit of the main payload, perhaps because of the way it was mounted.

It may be significant that Cosmos 208 was launched on 21 March, the vernal equinox (when the sun is directly over the Equator), while Cosmos

228 was orbited on 21 June, which is the summer solstice (when the sun reaches its highest latitude) for the Northern Hemisphere -- or the winter solstice for the Southern Hemisphere, including the region of the South Atlantic magnetic anomaly. If this choice of launch dates was deliberate, these events may be repeated about 21 September.
(NORAD)
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Recsat Cosmos 229 De-Orbited Routinely on 4 July (S)

Cosmos 229, the high-resolution photo-reconnaissance vehicle launched 26 June from Plesetsk, was de-orbited routinely 4 July during the early portion of Revolution 125. The satellite crossed the Equator at 04/0554Z at 306 degrees West longitude. Impact occurred about 04/0615Z at about 50N-71E.
(NORAD)
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Cosmos 230 Probably a Research Satellite, the 7th Kapustin Yar Space Launch This Year (S)

Cosmos 230, which the Soviets orbited from Kapustin Yar at about 0701Z, 5 July, is believed to be a geophysical satellite. It was launched by the SL-7 propulsion system into an orbit with a 48-degree inclination and a 92-minute period.

This is the 7th Soviet space launch attempt (one was a failure) from Kapustin Yar this year, equaling the number usually orbited from this launch complex in an entire year. All 7 launches involved the SL-7 propulsion system. Three other Soviet satellites have been orbited by the SL-7 system this year: Cosmos 204 (5 March), Cosmos 211 (9 April) and Cosmos 222 (31 May). All were launched from Plesetsk. The last two had classified missions of an unidentified type (p. 7, WIR 26/68).
(NORAD)
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Launch of Unmanned Mars Lander Feasible for Soviets in Early 1969 (S)

The Soviets are likely to launch a probe of the planet Mars early next year when the launch window for such an event opens again. The probe's mission probably would be to land on Mars and, as a minimum, transmit to Earth data concerning the temperature, density, and composition of the

Martian atmosphere. A more extensive mission may be attempted if the Soviets decide to launch the probe with their large SL-12 propulsion system.

Background. The likelihood that the Soviets will launch a probe of some type toward Mars early next year is supported by the fact that they have launched between 1 and 3 interplanetary probes each time that the launch window has opened for Venus or Mars since 1960, except for the Mars window of 1966. They have the technology and know-how for such a project, and they have the motivation: to surpass the achievements of the US's Mariner 4, which in 1965 sent video of the Martian surface to the Earth over a distance of more than 100 million nautical miles. (Chart on p. 32.)

None of the six known Soviet Mars probe attempts has succeeded. Four have suffered failures in propulsion, one in attitude control, and one in communications.

The reason the Soviets did not fly a Mars probe in 1966, the most recent launch-window opening, is not known, but it was probably related to the results of the US's Mariner 4. Soviet policy with respect to high-prestige space missions (manned, lunar, and interplanetary) has been to mount only those which leapfrog or obviously surpass US accomplishments. Thus, if the Soviets in 1966 had been planning a flyby of Mars, photographic or otherwise, they would have canceled it because it could have done little more than duplicate Mariner 4's mission. On the other hand, if they had been planning something much more ambitious, such as a Mars lander, their plans would have been outdated by Mariner 4's finding that the Martian atmosphere is much thinner than anyone had previously estimated.

Propulsion and Payload. The Soviets presently have two space-propulsion systems which could launch an unmanned Martian lander:

- The SL-6, which the Soviets have used for all their 18 interplanetary attempts to date, for all but 9 of their 27 lunar attempts, and for launching a few satellites which had to be injected into very high orbits.
- The SL-12, which the Soviets have been using in their program to send a payload around the Moon and back to Earth for recovery.

Both vehicles have four stages. The SL-6 is believed capable of injecting 1,800 - 2,000 pounds toward Mars, the SL-12 8,400 - 9,000 pounds.

The SL-12 would seem to be preferable because its heavier payload could be designed to perform a more sophisticated mission and/or have a longer operating lifetime on the Martian surface. The Soviets may have intended as early as 1965 or 1966, when they began to plan the 1969 Mars event, to use the SL-12, to pre-empt US plans in 1971 for a Voyager

mission to Mars which is scheduled to be launched by the large Saturn 1-B booster.

The SL-12, however, presents several configuration problems, if it is to increase significantly the weight of a payload to be landed on Mars. Assuming use of a spherical entry body and a required ballistic coefficient of 0.17 slug per square foot, the landing capsule would have to be 13.8 feet in diameter, a size incompatible with the estimated diameter of the SL-12 fourth stage. This problem could be bypassed through use of a "hammerhead" payload (a technique not demonstrated yet) or by an entry body of variable geometry (one using flaps or similar devices to retard speed during entry of the Martian atmosphere).

Entry-body design problems could be alleviated or greater payloads landed if the entry angle could be controlled so that it is significantly less than 90 degrees. But this would require a high order of entry-angle control accuracy which the Soviets have not demonstrated to date.

Landing Mode. The simplest Mars landing mode, similar to that used on the Soviet's Venus 4, is shown schematically on page 33. The capsule/lander separates from the spacecraft bus just prior to entry, the bus burning up in the atmosphere of Mars. The capsule decelerates aerodynamically to Mach 1.0 above the surface, at which time an afterbody separates and a subsonic parachute deploys to decelerate the landing vehicle to an impact speed of about 100 feet per second. The shock of final impact is absorbed by a crushable material, or the velocity is reduced to near zero by a small rocket on the parachute shroud lines, similar to Voskhod's. These modes are simple, adequate for supporting a minimum lander mission, and are fairly insensitive to near-surface winds.

A retro system, it is believed, would allow little, if any, increase in payload.

The capsule landed by an SL-6 would be expected to work for three hours after impact, transmitting to Earth data on atmospheric temperature and pressure and surface composition at the rate of about 1 bit per second over an FSK (frequency shift key) communication link [redacted] The capsule's center of gravity would be offset with petals (similar to those on Luna 9 and Luna 13) deployed for post-landing stability.

The gross usable landing payload weight for a 320-pound entry capsule launched by the SL-6 would be about 80 pounds, with an instrumentation weight of about 10 pounds (comparable to that of Venus 4) and an anticipated total data return of about 10,000 bits (about twice that of Venus 4).

The SL-12 probably could land 165 pounds with a scientific payload of about 40 pounds. Such a payload could include all the equipment of the SL-6 capsule plus a simple life-detection experiment, and the post-landing mission time could be extended from the 3 hours of the SL-6 to 3 days.

About 30,000 bits of information, including some time for a biological growth experiment, could be transmitted. A surface photographic mission conceivably could be included instead of the life-detection experiment, but such a mission would be very limited and would lessen post-landing mission time.

But if a low entry angle could be programed, a photographic mission combined with a life-detection experiment would be possible.

Probable Mission in 1969. The next Soviet Mars mission theoretically could be a flyby, an orbiter, an entry probe (which operates during descent only), or a lander.

A flyby is most unlikely, because it could be little more than a duplication of the US's Mariner 4 event; this would be against past Soviet policy.

The unretarded entry probe, which operates only between entry and impact, is unlikely because of the excessively low ballistic coefficient (0.02 slug per square foot) required. The resulting entry weight of 45 - 70 pounds would not permit incorporation of gear for direct communication with Earth, without which no useful mission would be performed.

The orbiter mission is less likely than the lander mission because:

- The Soviets, in their programs of flights to extraterrestrial bodies (the Moon and Venus) have consistently flown landers before orbiters.
- The Soviets have generally stated that their next missions to the planets will involve landers.
- The SL-6, which might be used, is not capable of the orbiter mission.

The Soviets could use either the SL-6 or SL-12 for a 1969 Mars lander. The SL-12 could launch heavier payloads, which presumably could perform more sophisticated missions, and this is the vehicle that the Soviets will use if they want to accomplish in 1969 missions that the US does not plan to perform until 1971 or 1972. But the SL-6, which is more of a proven vehicle than the rarely launched SL-12, could be used for the 1969 Mars lander mission because it is still adequate for achieving significant firsts in this area. The Soviets, in this case, would not use the SL-12 on a Mars mission until a much later date.

A 1969 Soviet Mars probe would probably be launched between 20 March and 9 April, arriving at Mars 28 August 1969.

(CIA)

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Molniya-Type Satellite Launched ~~(S)~~

The Soviets launched a Molniya-type communication-relay satellite from Tyuratam at about 1525Z, 5 July 1968. As is usual for Molniya-type satellites, this craft was first placed into parking orbit of the Earth and then was injected into a highly eccentric orbit with an apogee of about 40,000 kilometers and an orbital period of about 12 hours.

The Soviets had in June a total of 4 Molniya communication-relay satellites in orbit which were still operating. A minimum of 3 are needed to maintain around-the-clock communication between Moscow and the Soviet Far East and other remote areas of the USSR -- the main mission of the Molniyas.

The Molniyas may also serve during forthcoming Soviet lunar launches as relays between the USSR and the vessel Kosmonavt Vladimir Komarov, which will supplement the operation of the Soviet's deep-space tracking and control centers in the USSR. A comsat terminal has been installed for this purpose aboard the Komarov.

(NORAD)

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Soviet Missile and Space Launches, June 1968 (U)

Launch Date & Time (Z)	Vehicle	Rangehead
01 Jun, 0513	SS-5 IRBM	Kapustin Yar
01 Jun, 1059	Cosmos 223	Plesetsk
01 Jun, 1101	KY-5/6 missile (R&D)	Kapustin Yar
04 Jun, 0644	Cosmos 224	Tyuratam
04 Jun, 1018	SS-4 MRBM	Kapustin Yar
06 Jun, 0738	SS-4 MRBM	Kapustin Yar
06 Jun, 1331	Vertical firing	Kapustin Yar
06 Jun, 1643	SS-11 ICBM	Tyuratam
06 Jun, 1739	SS-9 ICBM (failure)	Tyuratam
06 Jun, 1759	Vertical firing	Kapustin Yar
07 Jun, 1709	SS-7 ICBM	Drovyannaya
07 Jun, 1718	SS-8 ICBM	Tyumen
11 Jun, 2130	Cosmos 225	Kapustin Yar
12 Jun, 0351	SS-11 ICBM	Tyuratam
12 Jun, 1042	SS-4 MRBM	Kapustin Yar
12 Jun, 1315	Cosmos 226	Plesetsk
14 Jun, 1453	Vertical firing	Kapustin Yar
15 Jun, 1425	ESV Failure	Tyuratam
18 Jun, 0615	Cosmos 227	Tyuratam
18 Jun, 1306	SS-4 MRBM	Kapustin Yar
18 Jun, 1610	SS-4 MRBM	Kapustin Yar
18 Jun, 1900	Unidentified missile	Plesetsk
20 Jun, 0700	SS-7 MRBM	Plesetsk
21 Jun, 0742	SS-5 IRBM	Kapustin Yar
21 Jun, 1200	Cosmos 228	Tyuratam
22 Jun, 0704	KY-5/6 missile (R&D)	Kapustin Yar
24 Jun, 0620	SS-11 ICBM (low apogee)	Tyuratam
24 Jun, 2201	SS-4 MRBM	Sovetskaya Gavan
25 Jun, 1641	SS-4 MRBM	Kapustin Yar
26 Jun, 0430	Vertical firing	Kapustin Yar
26 Jun, 0921	Vertical firing	Kapustin Yar
26 Jun, 1100	Cosmos 229	Plesetsk
26 Jun, 1504	SS-4 MRBM	Kapustin Yar
27 Jun, 0202	KY-6	Plesetsk
28 Jun, 0400	SS-7 ICBM	Plesetsk
28 Jun, 0436	Vertical firing	Kapustin Yar
29 Jun, 2201	SS-4 MRBM	Sovetskaya Gavan
30 Jun, 1738	SS-7 ICBM	Verkhnyaya Salda

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Soviet Attempts to Probe Venus and Mars vs. Available Launch Windows

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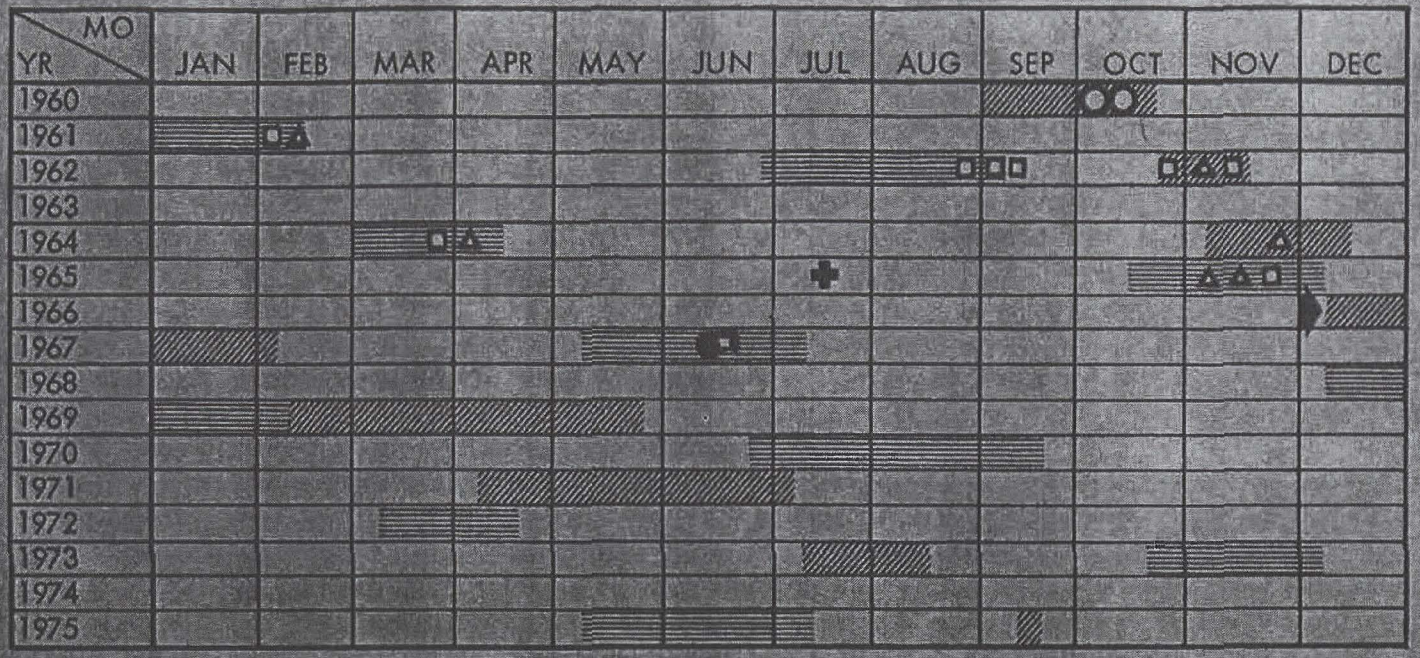

Legend

○	LAUNCH SYSTEM FAILURE
□	PARKING ORBIT EJECTION FAILURE
△	SPACECRAFT FAILURE
●	MISSION SUCCESS
	MARS LAUNCH WINDOW
	VENUS LAUNCH WINDOW

NOTES:
In a total of 18 known Soviet attempts, 6 Mars and 11 Venus probes have been mission failures, and 1 Venus probe has been a success.
Neither the US nor the USSR has undertaken a probe of any planets but Venus and Mars.

✚ Zond 3 -- a deep-space probe sent into planetary orbit but not aimed at any planet. Photographed other side of Moon and sent video to Earth from various distances.

▶ First launch window opening for either Mars or Venus during which the Soviets apparently did not try to launch a probe.

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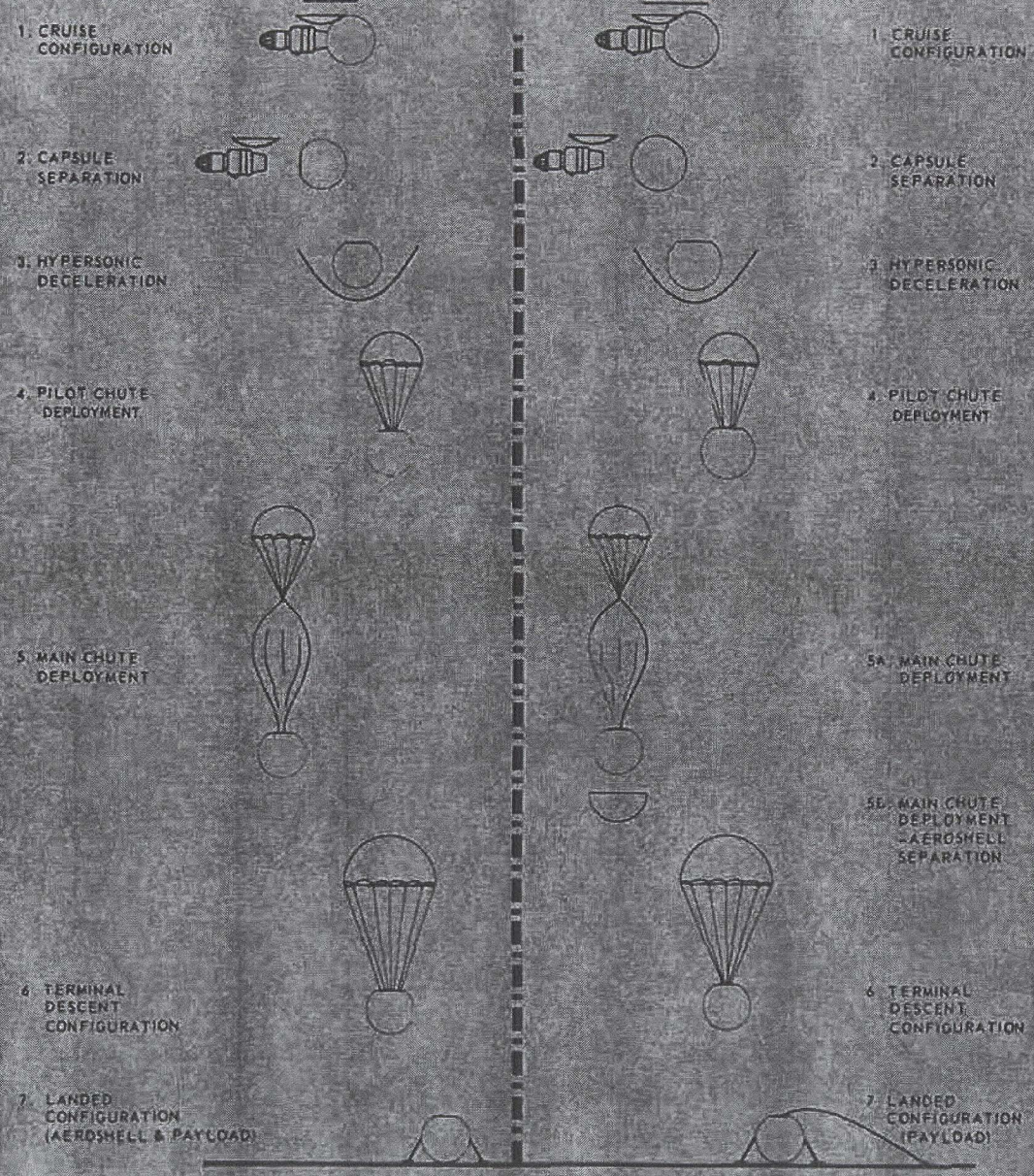

Capsule Descent Profile for Mars Entry by Soviet Probes (U)

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