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NORTH AMERICAN AIR DEFENSE COMMAND

WIR

WEEKLY INTELLIGENCE REVIEW (U)

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WIR 10/66
11 Mar 66

[redacted]

NORAD Weekly Intelligence Review

Issue No. 10/66, 11 March 1966

The WIR in Brief

Portion identified as non-responsive to the appeal

Portion identified as non-responsive to the appeal

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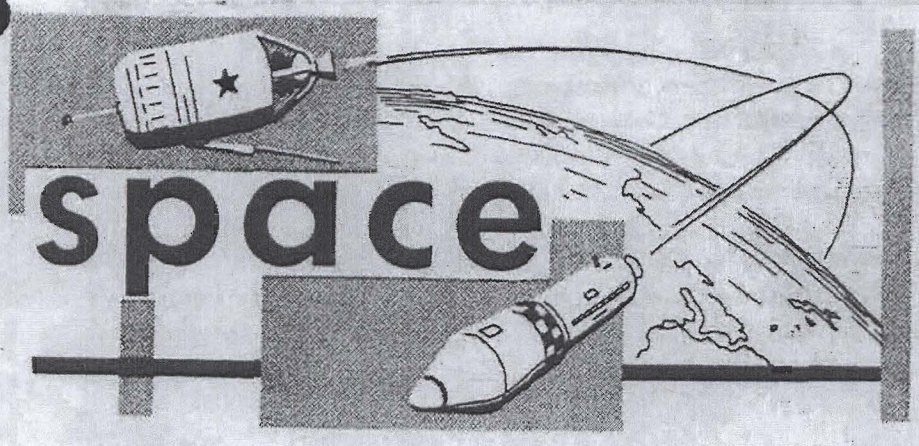
Space

COVER: Soviet Air Force classroom (from Nedelya) (OFFICIAL USE ONLY)

NOTE: Pages 32, 34, 35, 38, 39 and 42 of this issue are blank.

[redacted]



significant intelligence on space developments and trends

Roll Maneuver Gives Photorecce Satellites Sidelooking Ability

50X1 and 3, E.O.13526

Certain of the recoverable photoreconnaissance satellites of the Cosmos series which the Soviets launch frequently from Tyuratam are believed to be capable of both vertical and oblique photography -- the latter for targets which are offset from the satellite's flight path. These are the photorecce Cosmoses which, injected into orbit by the heavy Venik upper stage, are known as "high-resolution" satellites because their main cameras have an estimated target resolution of 5-8 feet.

[redacted] Cosmos 65 (launched 17 Apr 65, deorbited 25 Apr 65), which performed more roll maneuvers than any of the others, indicates that:

- The roll maneuver begins with removal of the horizon sensors from the control loops, [redacted] 50X1 and 3, E.O.13526 [redacted] -- 5% for a roll to the left, 10% for a roll to the right. [redacted] monitor the roll-out for 2 minutes, after which both the pulsing and the roll-out stop.
- 16 seconds elapse before camera operation begins; during this period, [redacted] other payload-related functions.
- 16 seconds after camera activity stops, [redacted] become active again, the horizon sensors are reactivated, and the roll-back starts.
- The roll-back ordinarily is made at the same rate as roll-out, but a faster roll-back for rapidly switching the camera from oblique to vertical targets is possible.

50X1 and 3, E.O.13526

A roll rate of 0.35 degrees per second is estimated for both roll-out and roll-back on the basis of derived calibration techniques. Each pulse indicates about 2.8 degrees of roll, since pulses are emitted at the

rate of 1 each 8 seconds. The most prolonged maneuver (7 pulses) noted for Cosmos 65 apparently equates to a roll-out of about 20 degrees. Since roll-out is monitored for only 120 seconds, the theoretical maximum roll-out would appear to be about 42 degrees.

The roll-out and roll-back maneuvers are started and stopped by gas jet torquing.

Only 1 of the 4 photorecce Cosmoses launched so far this year was a "high-resolution" vehicle, but 10 of the 17 successful photorecce launches of 1965 involved this more sophisticated vehicle.
(FTD; NORAD)
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Recent Intercepts of Soviet Space-Vehicle Transmissions

Following is a list of recently reported intercepts of transmission from Soviet space vehicles which are still in orbit and which may still be active:

Vehicle	Date of Launch	Signal Characteristics	Date of Most Recent Intercept
Cosmos 97	26 Nov 65	50X1 and 3, E.O.13526	
Cosmos 101	21 Dec 65		
Cosmos 103	28 Dec 65		
Cosmos 106	25 Jan 66		
Cosmos 108	11 Feb 66		
Cosmos 110	22 Feb 66		

The Soviets, it would appear, are still having their troubles in attaining longevity of operating life with their space communications systems:

- Both Molniya-series communications satellites launched last year apparently have ceased transmitting.
- No Soviet satellite launched before 26 November last year and still in orbit is transmitting.
- The two most recent Soviet Venus probes went silent before they could execute the critical portion of their mission (transmission to Earth of information about the planet Venus), according to Soviet announcements.

(NORAD; various ELINT sensors)
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Failure Admitted for 2 Latest Venus Probes

The Soviets' 2 latest interplanetary probes, Veneras 2 and 3, have failed in their mission of supplying information about that planet, according to Soviet announcements. However, the Soviets claimed successes in obtaining information about interplanetary space from the probes, as well as propulsion and guidance successes, having reported that Venera 2 passed by its targets at a distance of 14,900 miles and that a "descending apparatus" from Venera 3 had impacted on Venus.

TASS said that "The last radio communications sessions with Venera 2 and Venera 3, as they approached the planet, were not held. The reasons have not been established." But the Soviets reportedly still hope that they may still be able to switch on Venera 2's communications and obtain pictures of cloud-covered Venus.

Venera 3's "descending apparatus" was described by TASS as a sphere about 3 feet in diameter and containing transmitters to send signals back to Earth about the atmosphere and surface of Venus plus emblems bearing the Soviet coat-of-arms. NORAD suspected that such a feat might be attempted (p. 5., WIR 48/65), since Soviet press articles published shortly after the 12 and 16 November launches of the 2 probes hinted strongly at an interest in obtaining information about the surface of Venus and about the chemical composition, temperature, and barometric pressure at various levels of the planet's atmosphere. The Soviets say that the soft-landing by parachute failed, though the probe impacted on Venus.

It can now be said, unless the Soviets succeed in "raising" communications from Venus 2 again, that the USSR has failed in all 16 of its known interplanetary probe attempts to date. Venus was the target of 10 of these attempts; Mars 6. Ignition, propulsion, and stabilization malfunctions caused 10 of the failures; loss of communications 6. (See chart on page 40.)
(Objects dropped on Venus shown on page 41.)

Soviet announcements indicate a continuing lack of consistency in the reliability of Soviet deep-space communications systems. Veneras 2 and 3 failed to communicate with the Earth after 107 days and 105 days, respectively, of flight time, but Mars 1 (launched 3 years previously) transmitted successfully for about 150 days, according to Soviet announcements. Moreover, TASS claims that signals are still being received from Zond 3, which was launched more than 7 months ago into heliocentric orbit.

Curiously, TASS said that 63 communications sessions had been held with Venera 3 before it went silent, only 26 with Venera 2.

The Soviets' next interplanetary attempts will probably be made when the launch "window" for Mars opens in December 1966-January 1967. (NORAD; TASS)

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Cosmos 110 Dog Experiment Described in 'Red Star'

Following is a summary of a NORAD translation of an article in the 2 March issue of Red Star describing the experiments on dogs which are being conducted aboard the Soviet satellite Cosmos 110, which was launched 22 February.

Manned space flights of the future will last longer and will be more complex than those of the past, but first a much deeper study must be made of how living organisms function during space flight. Of particular concern are the effects of weightlessness and radiation. This calls for a more penetrating inquiry into the workings of the body's various physiological systems. Such inquiries can be conducted only on living organisms and in a space milieu which will permit:

- The use of complex methods for obtaining information (inserting probes into the heart and various parts of the vascular system, extracting enough blood to conduct numerous biochemical tests, inserting electrodes into brain matter, and so on) in order to solve the principal problems of space physiology.
- Proof-testing of new systems and materials intended to raise the resistance of the organism to unfavorable influences of space flight.
- The conduct of biological "reconnaissance" for future routes of space flight.
- The conduct of research at the cellular level (microscopy) which will permit definition of fine structural changes in cell formation.

The Cosmos 110 experiment was particularly concerned with the cardio-vascular system, the functioning of which has much to do with survivability. One of the most important problems being studied in this experiment is the neuro-reflex regulation of the cardio-vascular system, for which the following is being accomplished:

- Measurement of arterial pressure by a probe inserted into the artery; this probe is also used for introducing into the organism pharmacological preparations, whose effects on the reflex regulation of the circulatory system are being studied.
- Recording of the biocurrents of the heart by means of inserted electrodes.
- Recording of the pulse from an exposed carotid artery.
- Recording of the mechanical activity of the heart (seismogram) and of respiration.

Also, electrodes are inserted into peripheral nerves (the sinus nerve) for evaluating the activity of that part of the brain which regulates vascular tonus.

One of the dogs (Veterok) is the test animal, the other (Ugolok) is the control animal, which receives none of the pharmacological preparations being tested.

Cabin Arrangements. Each dog is in its own cabin, views and explanations of which are shown on pages 36 and 37.

Briefly, each dog wears a corset-like garment which fastens him to the cabin and which fastens physiological sensors and feeding arrangements to the dog. A cylinder of compressed gas provides pressure to force-feed the dogs and to administer pharmacological preparations to the test animal. The air-conditioning system is an improved modification of that used in the Korabl-series biosatellites of December 1960-March 1961. The dogs can be observed through a transparent cowl at the front of the cabin.

Inside the light-alloy food container are elastic containers which dispense measured portions to the animal at the programed feeding times. Shutters in the tube connecting the elastic containers to the fistula (feeding line) open on command from the programmer; compressed gas then forces the food through a tube directly into the animal's stomach. Feeding is accomplished on command from the ground, with provision for inflight corrections.

The decision to force-feed the animals directly into the stomach instead of by a tube through the mouth was based on the possibilities that the animals might bite through the tube and that the tube might cause sores.

Pharmacological preparations, whose effects on the test dog are being studied, are injected directly into the carotid artery. They are

intended to affect sensitive cells (chemo-receptors) located in the region of that artery.

Radiation Experiments. In addition to the experiments dealing with the cardio-vascular system, Cosmos 110 is equipped to collect data on the effects of space radiation on both higher and lower organisms. For this purpose, the satellite was deliberately injected into an orbit which causes it to spend prolonged periods in a region of high radiation (the proton radiation belt). These studies are concerned with the effects of radiation on organisms, an evaluation of protective measures against radiation, and dosimetry.

Radiation dosages are measured separately for each dog and the effects of radiation on the following lower-order organisms are being studied:

Various pure yeast cultures
Specimens of blood serum
Albumen preparations
Certain cultures of the Chlorella fungus
Certain cultures of lysogenic bacteria

The article was signed by N. M. Sisakyan, V. N. Pravetskiy, and B. B. Yegorov.
(Red Star)
(UNCLASSIFIED)

NORAD Comment: (Begin SECRET) The Soviets as of this writing (1630Z, 9 March) have not indicated whether they will try to recover Cosmos 110 for laboratory study of the two animals. The reference to microscopic study of cells from the animals and the value of the data which could be obtained from laboratory studies indicate that they will try to recover the satellite. Radar signature analysis, however, suggests that the vehicle may be too small to include the retrorockets and other gear necessary for de-orbit and safe landing.
(NORAD)
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Cosmos 110 Cabin for Dog
(from Red Star)

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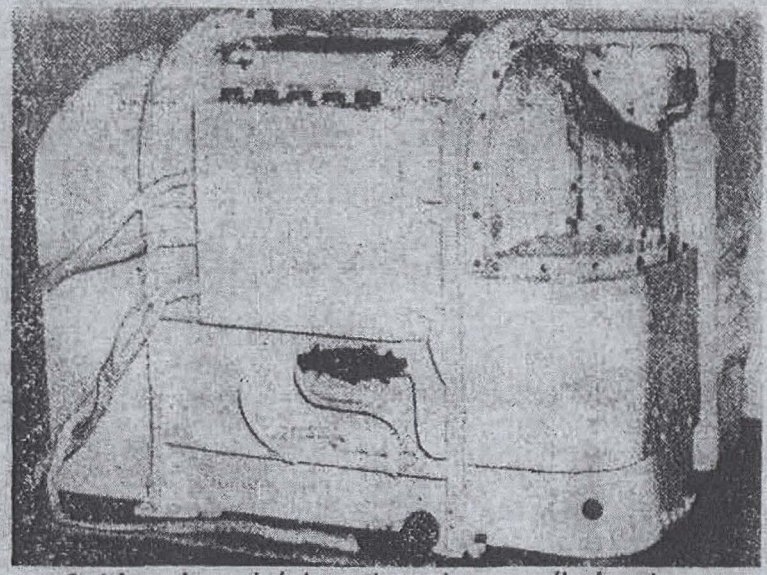
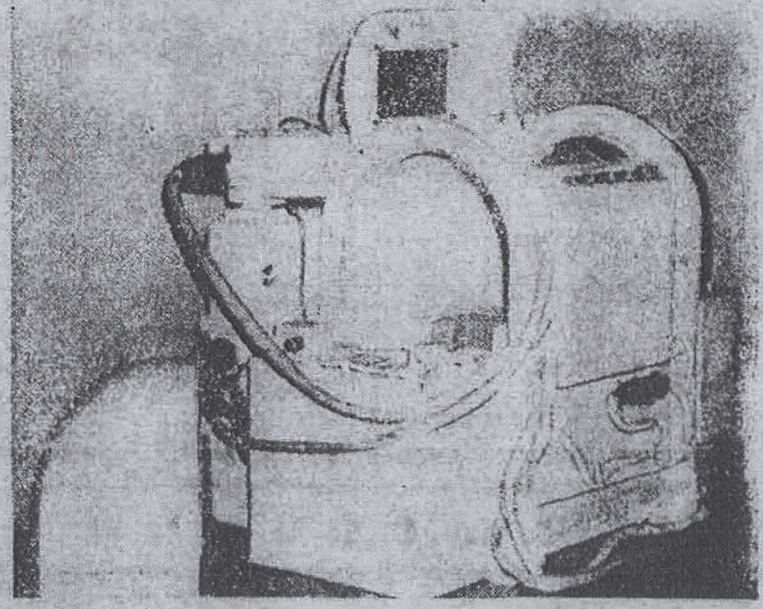


Cabin closed (above) and open (below)



Corset-like garment fastens dog to the cabin and instrumentation and feeding devices to the dog.

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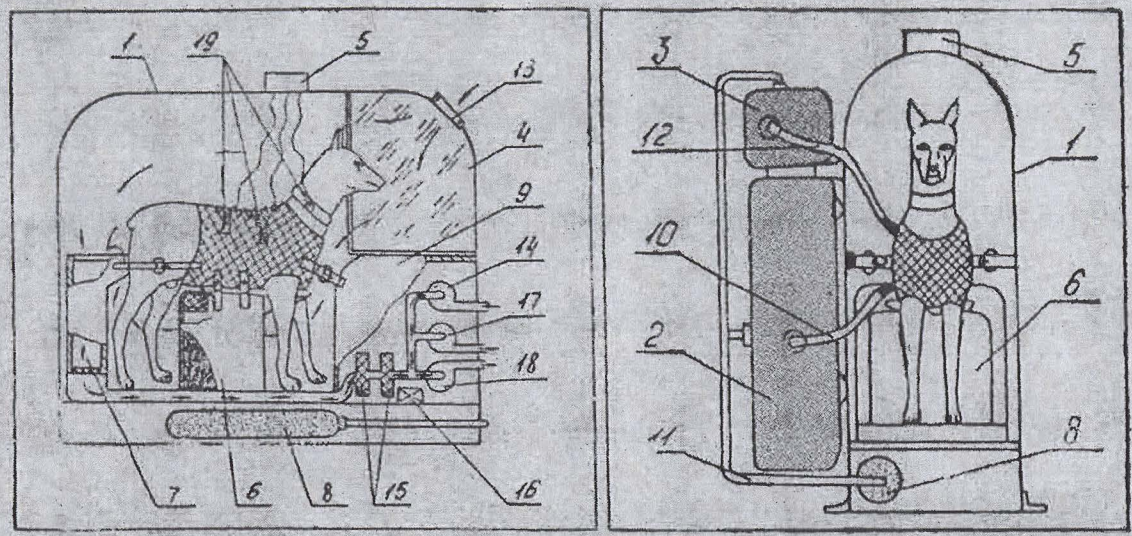
Cosmos 110 Cabin (from Red Star)



1. Sealed container (aluminum alloy)
2. Food container (elastic containers inside)
3. Pharmacological container
4. Transparent cowl (through which dog is observed)
5. Physiological sensor box
6. Container for liquid wastes
7. Container for solid wastes
8. Container of compressed gas (for feeding and for administering pharmacologicals)
9. Life-support gear (ventilators, filters, instruments)
10. Fistula (feeding line) directly to stomach.
11. Compressed-gas line (to containers for food and pharmacologicals)
12. Hose for administering pharmacological preparations (into carotid artery)
13. Entrance for conditioned air
14. Ventilator
15. Filter (for air which has passed through solid-wastes box)
16. Electronic back-up for ventilator
17. Back-up ventilator
18. Filter for removing solid particles and liquids from exhaust air
19. Physiological sensors

SOVIET INTERPLANETARY PROBES (1960-1966)

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DATE	TARGET	SOVIET NAME	CAUSE OF FAILURE	SUBSTANCE OF SOVIET ANNOUNCEMENTS
10 Oct 1960	Mars	None	Premature cutoff of 3d stage engine	None
14 Oct 1960	Mars	None	Premature cutoff of 3d stage engine	None
04 Feb 1961	Venus	Heavy Sputnik	Stabilization failed in parking orbit prior to feasible time for 4th stage ignition.	A satellite collecting data on the near-Earth space environment.
12 Feb 1961	Venus	Venus 1	Communications failed 11 days after launch.	A Venus probe successfully launched into transfer trajectory. Payload details given.
25 Aug 1962	Venus	None	Tumbling 4th stage produced no useful thrust.	None
01 Sep 1962	Venus	None	Tumbling 4th stage produced no useful thrust	None
12 Sep 1962	Venus	None	Partial failure of attitude stabilization.	None
24 Oct 1962	Mars	None	Malfunction subsequent to 4th stage ignition.	None
01 Nov 1962	Mars	Mars 1	Communications failed about 5 months after launch; stabilization failed.	Mars probe successfully launched. Payload details given. Later it was announced that stabilization had failed.
04 Nov 1962	Mars	None	4th-stage injection failure.	None
27 Mar 1964	Venus	Cosmos 27	4th-stage injection failure.	A Cosmos satellite collecting data on near-Earth space environment.
02 Apr 1964	Venus	Zond 1	Communications failed less than 2 months after launch.	Launched to assist in development of equipment for "distant interplanetary flight."
30 Nov 1964	Mars	Zond 2	Last known signal received 7 April 1965	Launched "toward" Mars, but power supply only half that expected.
12 Nov 1965	Venus	Venera 2	Communications failed before reaching Venus	Venus probes successfully launched, #2 to pass close to Venus, #3 to soft-land on that planet; missions: to get data on Venus's atmosphere and surface.
16 Nov 1965	Venus	Venera 3		
23 Nov 1965	Venus	Cosmos 96	4th stage exploded on ignition.	A Cosmos satellite collecting data on the near-Earth space environment.

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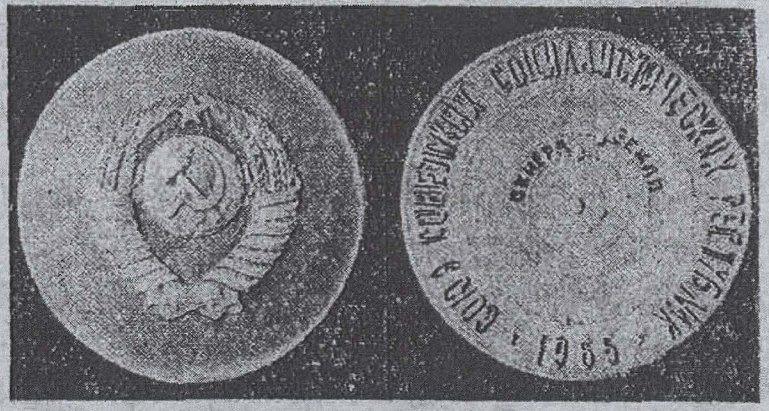
Globe and Emblem Dropped on Venus by Venera 3 (from Red Star)



The globe at left was dropped on the surface of Venus on 1 March 1966 by the Soviet spacecraft Venera 3, according to Red Star. The contours of the Earth are engraved on the globe, inside of which is a medal (above). On one side of the medal is the coat of arms of the USSR, on the other is an outline of the planets of the solar system, with the names of Earth and Venus inscribed in Russian.

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