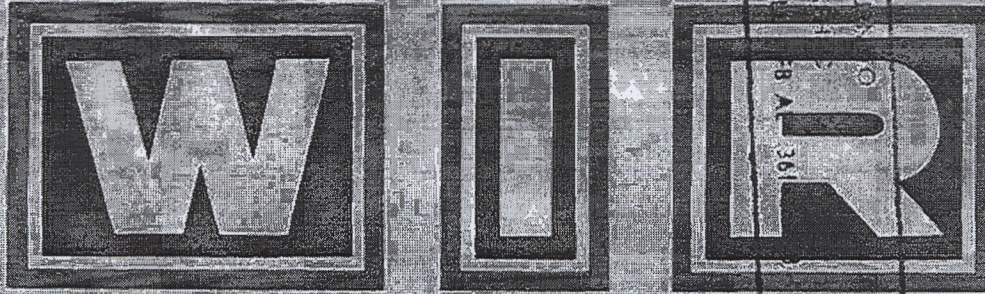




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ISCAP APPEAL NO. 2009-068, document no. 59  
DECLASSIFICATION DATE: December 5, 2014

NORTH AMERICAN AIR DEFENSE COMMAND



WEEKLY INTELLIGENCE REVIEW (U)

K410.607-195

SCANNED BY ACD 2008

00880660

2-6-5  
8 Jan 1965

EXEMPTED FROM  
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REVIEW DATE Jun 97 REVIEWER 64  
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WIR 2/65

8 Jan 1965

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# NORAD

Weekly  
Intelligence  
Review

Issue No. 2/65, 8 January 1965

## The WIR in Brief

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to the appeal

### Space

1964 UNPRECEDENTED IN NUMBER AND  
VARIETY OF SOVIET SPACE LAUNCHES  
But no outstanding advances in space technology  
shown.

#### ZOND 2 SIGNALS INTERCEPTED

Frequency was about 922.750 mc/s.

CORRECTION: COSMOS 4 LAUNCH DATE IN-  
CORRECTLY GIVEN

Error in last week's WIR.

SOVIETS CONFIDENT THEY WILL BE FIRST  
ON OTHER PLANETS, CARTOON SUGGESTS

Portion identified  
as non-responsive  
to the appeal

Portion identified  
as non-responsive  
to the appeal

COVER: GANEF tactical air defense  
missile (caption ~~SECRET~~  
photo OFFICIAL USE ONLY)  
NOTE: Pages 31, 32, 34, and 35 of  
this issue are blank.

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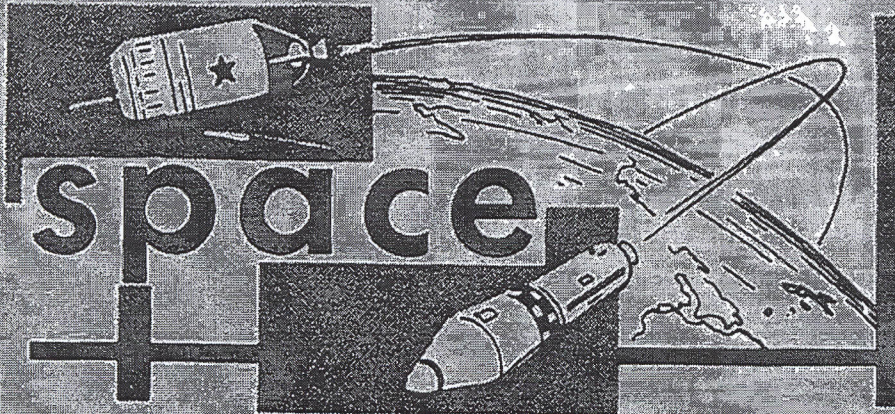
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significant  
intelligence  
on space  
developments  
and trends

### 1964 Unprecedented in Number and Variety of Soviet Space Launches

The Soviets launched a greater number and variety of space vehicles in 1964 than they did in any year preceding. The stepped-up launch pace was probably the outstanding feature of the Soviet space program for the year.

The most important military space development was the appearance of a fully operational photoreconnaissance satellite system, consisting of certain Cosmos vehicles launched from Tyuratam. Launches were numerous and well timed to take advantage of the best lighting conditions for photography.

The most spectacular Soviet launch was the Voskhod event, in which 3 men were orbited for one day.

Zond 2, launched in 1964, could be a historic event if it should succeed in 1965 in its probable mission of passing near Mars and collecting and transmitting data and video on that planet. Its payload may be similar to or an improvement over that of Mars 1, which was launched 1 November 1962. If it succeeds, it will be the first to do so of the Soviets' 13 interplanetary attempts to date.

The Soviets failed to demonstrate any outstanding advances in space technology in 1964, although advances which could be revealed this year may have been under development. A number of 1964's launches appear to have involved test vehicles -- a possible indicator that 1965's program will be even more diverse than that of 1964.

**Number of Launches.** The Soviets in 1964 attempted almost as many space launches as they attempted in 1962 and 1963 combined, despite the fact that 1962 itself was a record-breaker for the Soviets in number and diversity of launches. The Soviet space-launch record since Space Year 1 (1957) stands as follows: (Chart on page 33.)

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	<u>Earth Orbit*</u>	<u>Space Probes#</u>	<u>No. of Vehicles</u>	<u>Failed** Launches</u>	<u>Total** Attempts</u>
1957	2		2		2
1958	1		1		1
1959		3	3	2	5
1960	3		3	4	7
1961	5	1	6	2	8
1962	19	1	20		20
1963	16	1	17	2	19
1964	28	2	35	6	36

\* Includes space probes which failed to achieve transfer trajectory.

# Lunar and interplanetary probes.

\*\* Probably incomplete.

Variety of Launches. The 1964 program included new vehicles as well as almost all types of launches attempted in previous years; namely:

- 2 lunar probes
- 2 Venus probes
- 1 Mars probe
- 1 multimanned flight
- 12 photoreconnaissance satellites
- 1 maneuverable vehicle
- 2 pairs of Electron-series research vehicles
- 6 Kapustin Yar Cosmos-series research vehicles
- 2 multiple-payload (Cosmos) vehicles of unknown purpose

### SPACE EVENTS

Manned Flight. Only 1 manned vehicle -- Voskhod 1 -- was launched during 1964, in comparison with 2 Vostoks launched each year since 1961. However, Voskhod 1 carried 3 passengers, each of the Vostoks carried but 1.

Voskhod was probably a completely new vehicle, not a modified Vostok. It probably weighed about 15,000 pounds, in comparison with the 10,000 pounds for each of the Vostoks. Apart from the new vehicle's size and passenger capacity, the most notable features of the Voskhod were:

- The reported test of ion engines to orient the ship.
- The reported use of reverse-thrust rockets for landing the vehicle. (These would be of use in a soft lunar landing.)
- The confidence of the Soviets in the ship's pressurization system, implicit in the fact that the cosmonauts made the flight without pressure suits.





Nothing that is known or estimated about the mission is indicative of any technological breakthrough in life-support systems or space-vehicle design. The pressurization system was probably based on the principles used in the Vostok system; the highly reliable chemical-oxygen system of the Vostoks would not need any radical changes to meet the increased requirements of the Voskhod; the Vostok cabin-atmosphere control system could have been modified to meet the increased needs for cabin air circulation and for heat-rejection; the additional auxiliary power required for a 3-man over a 1-man flight would be relatively insignificant, when considered in terms of lighting, air circulation, and heat control; and cabin instrumentation would not be significantly different, since essentially the same parameters would be measured.

Chief scientific gain to the Soviets from the flight was additional information on the effects of space flight on humans.

The launch of Voskhod was preceded by 6 days by a full-dress rehearsal in the launch of Cosmos 47, which used the same propulsion systems, had the same orbital parameters, emitted similar electronic signals, and was recovered after the same number of revolutions. Cosmos 47 video showed at least 1 dummy cosmonaut aboard. The fact that both vehicles were brought down after 16 orbits tends to negate reports that Voskhod 1 was de-orbited prematurely because of illness on the part of one of its passengers.

Lunar Probes. The Soviets twice attempted in 1964 (21 March and 20 April) to launch lunar probes. Third (Venik) stage propulsion failed in both cases.

Interplanetary Probes. The launch "windows" for both Venus and Mars opened during the year, and the Soviets made 3 interplanetary probe launch attempts -- 2 for Venus and 1 for Mars. These 3 attempts contrast in numbers with the 6 made in 1962 when the launch windows were last open for both planets.

- The first Venus probe, launched 27 March, achieved parking orbit but the 4th stage failed to inject the probe into transfer trajectory toward Venus. The Soviets named this vehicle Cosmos 27, thus complying with a UN Resolution which requires nations to report successful satellite launches without, at the same time, acknowledging the true nature -- and failure -- of the vehicle's mission.

- A few days later -- 2 April -- the Soviets launched another probe, Zond 1, which achieved transfer trajectory. The Soviets later reported communications with the probe and 2 successful applications of midcourse guidance. Communications apparently failed, however, less than 2 months after launch, judging by the discontinuance of Soviet announcements concerning Zond 1. Loath to admit, for fear of failure, the true mission of this vehicle, the Soviets gave it the noncommittal name Zond 1 (Probe 1, or Sounder 1)





and said that its mission was to explore interplanetary space. The time of launch and apparent trajectory, as well as the midcourse-guidance maneuvers, indicated, however, that the vehicle was a Venus probe.

- Zond 2, presumably a Mars probe, though not acknowledged as such by the Soviets, was launched 30 November. The Soviets claim that it is operating successfully, despite initial TASS reports that its power (RF power, apparently) was only about half that expected. It now appears, however, that Zond 2 will miss its planetary target by too great a distance to furnish useful information. Preliminary Western calculations made in mid-December indicated that the probe would miss Mars by more than 50,000 n.m. unless one or more course corrections were made soon. Soviet announcements about Zond 2's progress to date have failed to state that such corrections have been made.

Zond 2's payload is probably very similar to, but possibly an improvement over, the payload of Mars 1, which was launched 1 November 1962. If this is the case, Zond 2 is probably about 4 times as heavy as and much more highly instrumented than the US's Mariner 4, which is now en route to Mars.

The Soviets claimed another "first" when they said that plasma engines were used -- in addition to "the usual" engines -- to orient Zond 2 in space.

Photoreconnaissance Vehicles. The Soviets launched 12 photoreconnaissance satellites between April and October. These launches were all well timed -- both as to time of year and time of day -- to allow for the best possible lighting conditions for photography of North American targets. These vehicles passed over the US and southern Canada, as well as over other Free World targets, during daylight hours when the vehicles were at their closest approach to Earth. An FTD analysis indicates that 2 different camera systems may have been used -- one with a target resolution of 20-30 feet, the other 5-8 feet. These resolutions are more than adequate for targeting purposes. These vehicles may also be of use in refining, for targeting purposes, the geodetic tie-in between the USSR and North America. Since they were large, these vehicles may also have carried sensors and instrumentation for collecting SIGINT, ELINT, and geophysical and bioastronautic data. They may also have tested life-support systems and innovations in space-vehicle design.

All of these vehicles were de-orbited, and, presumably, recovered, except Cosmos 50, which apparently exploded during the de-orbit attempt.

Maneuverable Vehicles. Only one maneuvering vehicle -- Polyot 2 -- was launched by the Soviets during 1964. Polyot 2 appeared to have made only 2 maneuvers -- a 1-degree change and a 2-degree change in orbital inclination. These maneuvers cannot compare in magnitude or intricacy with those used by the US in putting Syncom 3 into an Equatorial, synchronous orbit of high precision.





The lack of more activity in this field is difficult to understand, unless the Soviets have been awaiting test in space of the plasma engine, which they consider will be suitable for maneuvering. Maneuverable vehicles will be needed for missions which require rendezvous and docking, such as the assembly of space stations, resupply and change of crews of space stations, and the launch of manned lunar and interplanetary vehicles from orbiting launch platforms.

Scientific Research Satellites. The Soviets' 2 pairs of Electron-series vehicles and 6 of their Cosmos-series vehicles were almost certainly intended to collect data on the near-Earth space environment.

These Cosmoes were launched singly into orbit; average apogees and perigees were 450 and 250 kilometers. The Electrons were launched in pairs into orbits of high eccentricity and about 61-degree inclination. Two pairs of vehicles were launched -- Electrons 1 and 2 on 30 January, and Electrons 3 and 4 on 10 July (after Nos. 1 and 2 stopped transmitting). One vehicle of each pair (Electrons 1 and 3) had perigees of about 400 kilometers and apogees of about 7,000 kilometers, while the other vehicle of each pair (Nos. 2 and 4) had perigees on the order of 500 kilometers and apogees of about 67,000 kilometers.

The instrumentation loads of the 1964 Cosmoes have not been announced. The Soviets said, however, that Electron 1 carried counters and detectors to identify and measure various types of radiation and to count meteorites, and a mass spectrometer for studying the ion composition of the upper atmosphere. Electron 2, it was said, carried similar instrumentation, plus devices for studying solar X-rays and the chemical composition of cosmic rays, a charged particle trap, and a radio receiver for recording electromagnetic waves from outer space on frequencies of 725 and 1525 mc/s. The payloads of Electrons 3 and 4 were said to be similar, respectively, to those of Electrons 1 and 2.

The orbital parameters of the Electrons were so selected as to take simultaneous readings of similar types of data in both the inner and outer radiation belts.

Scientific data on space may have also been collected by Soviet satellites other than those mentioned, including various test and photoreconnaissance vehicles.

Cosmos Vehicles of Unknown Mission. The Soviets have said that all their Cosmos-series satellites are devoted to the collection of scientific data on space. The missions of some of those launched in 1964, which did not seem to be telemetering scientific data, are not clear.

Twice in August multiple payloads were launched by a single rocket (Cosmoes 38, 39, and 40 from Tyuratam, and Nos. 42 and 43 from Kapustin-Yar) into essentially similar orbits, although they gradually became separated in time, perhaps as a result of mechanical separation initiated after orbit.





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was achieved.

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One vehicle, Cosmos 41, was injected into a highly eccentric orbit, using the propulsion systems of interplanetary probes. It may have tested 4th-stage ignition, which has had a history of unreliability, and/or it may have been an attempt to supplement the data collected by the Electron-series vehicles. However, its communications failed.

There is also a possibility that Cosmoses 38, 39, 40, and 41 were intended to test a communications-relay system. The Soviets, in this case, may have intended that Cosmos 41 take up a 24-hour orbit.

Another vehicle, Cosmos 44, had the orbital parameters -- except for Equatorial inclination -- of a meteorological satellite. It ceased transmitting shortly after injection into orbit.

## SPACE TECHNOLOGY

Propulsion and Payload Capabilities. No new propulsion systems appear to have been used for Soviet space events during 1964, except for the reported use of reverse-thrust rockets for landing Voskhod 1 and the reported test use of an ion engine on Voskhod 1 and plasma engines on Zond 2 for orienting these vehicles in space. Payload capabilities, therefore, did not increase during the year.

All Tyuratam launches used the SS-6 ICBM booster/sustainer; some of them also used a Lunik or Venik third stage; and the space probes also used a 4th stage. All Kapustin Yar launches used a smaller 2-stage vehicle, the 1st stage of which was probably either the SS-4 MRBM or the SS-5 IRBM.

The Soviets claimed that a new and more powerful propulsion system was used to launch Voskhod 1, but all the evidence indicates that this vehicle was launched by the much-used SS-6 ICBM booster/sustainer and injected into orbit by the heavy Venik upper stage customarily used for interplanetary probes. The only "new" facet of the operation, from the standpoint of launch propulsion, was the use of the Venik instead of the lighter Lunik upper stage for a manned flight.

The SS-10 ICBM, first launched 11 April, has been assessed as a possible space-launch vehicle. An event of 23 October may have involved launch of a variant of the SS-10.

The Soviets suffered 6 known launch failures during the year, but on the whole their launch vehicles exhibited high reliability. Their 4th interplanetary stage, which has had a history of frequent failure, showed improved reliability during 1964 -- failing only once in the 4 times used.



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Launch and Orbital Techniques. The Soviets displayed little versatility in the Equatorial inclinations of their satellites in the past, and they improved only slightly in this respect in 1964. The inclinations of Soviet launches of 1964 were confined to the 49- to 65-degree region. Launches of higher Equatorial inclination would be advantageous for weather, photoreconnaissance, and other type satellites.

The Soviets' first multiple-payload launches were executed in 1964. The two Cosmos launches of this type were unexceptional, but the two Electron launches, in which 2 vehicles were sent into widely differing orbits by one launch vehicle, were unprecedented. In order to achieve the desired orbits, the Soviets had to separate the first payload from the carrier rocket while the latter was still providing thrust to the second payload. The Soviets claimed to have accomplished the separation without disturbing the trajectory of the carrier rocket.

Space Tracking. Soviet space tracking facilities were still largely confined, during 1964, to optical and beacon-tracking facilities in the USSR and aboard certain Soviet ships deployed for the purpose into the Pacific and about the coasts of Africa. A tracking station, probably optical, was established in Cuba.

The Soviets may be trying to establish tracking sites in still other countries, to give their tracking net the desired global coverage.

Guidance. The Soviets appeared to be able to inject their space vehicles reliably and accurately into orbits of the desired parameters.

Space Communications. The Soviets displayed no notable innovations in space communications during the year -- either in the systems used or in the application of satellites as relays for ground-to-ground communications.

Soviet space vehicles continued to have relatively short transmitting lives; for example, all of the vehicles still transmitting as of the end of the year were launched less than 6 months ago. A number of Soviet space events have been unsuccessful because of premature loss of communications.

The Soviets apparently lost contact with Zond 1, their 1964 Venus probe, less than 2 months after launch. Transmissions were still being received at the end of the year from Zond 2, which was launched 30 November 1964.

Soviet communications technology and facilities are essentially adequate for support of the USSR's space program, except, apparently, for the unreliability of their spaceborne power supplies. The Soviets, however, still apparently hold the distance record -- Mars 1's 106 million kilometers -- for space communications.







## PROSPECTS FOR 1965

The Soviet space program, though it competes with the military, with industrial growth, and with the consumer, and imposes a strain on such resources as the nation's scarce materials, scarce skills, and machine-tool time, still has a high priority in the USSR. Thus, despite some minor economies which the new Soviet leadership may introduce, a relatively high level of Soviet space activity can be expected in 1965. This activity will probably include the following features:

- The development of practical applications of space.
- Advances in the development of manned space flight.
- Continuation of the exploration of interplanetary and cislunar space.
- Continuation of the collection of scientific data on the near-Earth space region.

The Soviets will continue to launch photoreconnaissance satellites during the year for mapping terrain, confirming the existence of known targets, detecting new targets, locating and evaluating defensive installations, evaluating military industrial capabilities, reconnoitering troop movements, and locating Western naval forces.

The Soviets may also try to develop the following satellite capabilities of military significance:

Communications (medium altitude)  
24-hour orbit satellites  
Weather surveillance  
Navigation assistance  
Geodetic satellites  
Nuclear test monitoring  
Early warning  
Passive (including electronic) surveillance

The Soviets can be expected to try to maintain their present lead over the US in manned space flight. Thus, they are likely to repeat the Voskhod flight but extend the flight time to 1-2 weeks. In fact, it is quite probable that they will launch a vehicle more advanced than Voskhod 1 which will have some capability for orbital maneuvering. Such a vehicle is needed for developing techniques to be used on such frequently mentioned missions as rendezvous and docking. A rendezvous capability would be an asset to the development of future inspection-interceptor satellites.

In support of their manned flight and other programs, the Soviets will continue to orbit satellites which will collect data on the near-Earth space region and/or test the functioning of various inflight systems and components.





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The Soviets can be expected to launch one or more probes of the planet Venus when the launch "window" is open for such an event, during November 1965. Since 1960, they have launched one or more probes toward Venus and Mars each time that the launch "window" has been open for those planets.

The Soviets will probably also launch one or more lunar probes during the most propitious period -- the first quarter of the year. Such probes are likely to be soft landings of instrumented packages which will collect data on the texture and load-bearing characteristics of the lunar surface and on the characteristics of the near-lunar space region. Another possible, though less likely, mission is a circumlunar photographic flight with return to Earth; a demonstration of high-speed re-entry would probably have to precede such a mission. Both missions would use the Earth parking-orbit technique. Both are essential to the development of the capability for landing a man on the Moon, a goal to which the Soviets are apparently dedicated.

The year 1965 might also see the maiden launch of a large Soviet booster having 2-3 million pounds of thrust in a single-chambered version. Such a development would significantly enhance the scope and nature of Soviet space ventures by providing payload capabilities of, perhaps, up to 30,000 pounds for near-Earth orbit missions.

(SPADATS; FTD; CIA; NORAD)

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## Zond 2 Signals Intercepted

A cooperating sensor on 30 December 1964 intercepted signals from Zond 2, a Soviet space probe which was launched on 30 November and is headed in the general direction of Mars.

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(Cooperating sensor)

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## CORRECTION

### Cosmos 4 Launch Date Incorrectly Given

The article on page 9, last week's WIR, quoted the Soviets as stating that Cosmos 4 was launched 4 April 1962 and successfully landed 29 April 1962. The actual launch date, which the Soviets correctly stated, was 26 April 1962.

(Aviation & Cosmonautics)

(UNCLASSIFIED)





## Soviets Confident They Will Be First On Other Planets, Cartoon Suggests

A cartoon which appeared in the 8 November issue of the Soviet magazine Ogonek shows the mythological characters after whom the planets of the solar system were named studying Russian. Though merely a piece of whimsy, the cartoon is implicitly telling the Soviet reader that the first Earthmen to visit the other planets will be Russian-speaking, not English-speaking.

(Ogonek)

(UNCLASSIFIED)



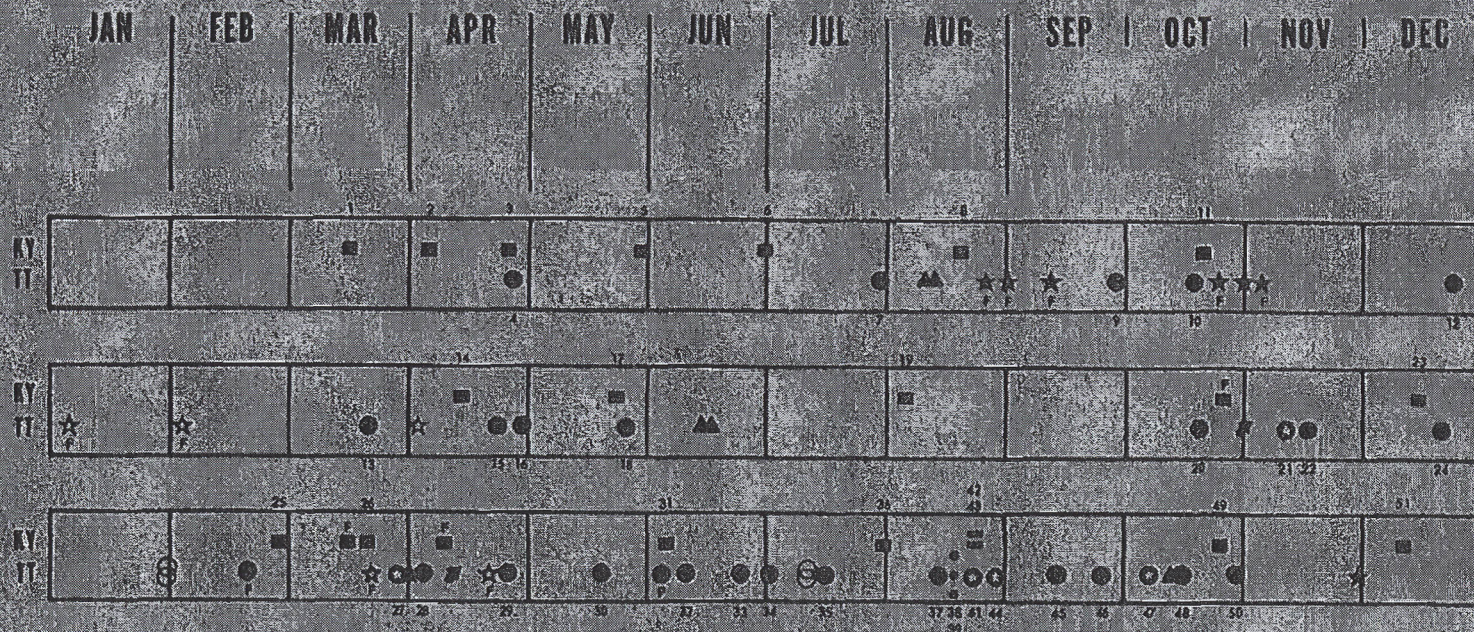
Обучение в космическом масштабе.

(Study on a cosmic scale.)



# Soviet Space Events, 1962-1964

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## LEGEND

	Cosmos Vehicles		Non-Cosmos Vehicles	
	Kapustin Yar	Tyuratam	Tyuratam	
Standard Cosmos	■	●	▲	Manned Flights
Nonstandard Cosmos	■	●	★	Interplanetary
Multiple-Payload Cosmos	■	●	★	Lunar Probes
Cosmos Numbers	40	50	⊙	Electron Pairs
Propulsion Failures	P	P	⚡	Polyots
			P	Propulsion Failures

NOTES: Cosmos 27, shown here as a nonstandard type Cosmos vehicle, actually was an attempted probe of the planet Venus.  
Listing of launch failures is probably incomplete.