

DECLASSIFIED UNDER AUTHORITY OF THE INTERAGENCY SECURITY CLASSIFICATION APPEALS PANEL, E.O. 13526, SECTION 5.3(b)(3)

ISCAP APPEAL NO. 2009-068, document no. 44
DECLASSIFICATION DATE: December 5, 2014

GRADED TO UNCLASSIFIED FOR

PUBLIC RELEASE
BY NORAD/NORTHCOM/CSO
SEPTEMBER 2009

FOR OFFICIAL USE ONLY

20082

SCANNED BY ACD

INTELLIGENCE
PRIVILEGED INFORMATION

NOT TO BE QUOTED OR DISSEMINATED OUTSIDE OF ACD
FOR SPECIFIC QUESTIONS ON PROPER HANDLING IN
EXTERNAL PUBLICATIONS SEE TRACY NUMBERS

EXEMPTED FROM
DECLASSIFICATION IAW EO 12958
REVIEW DATE JUN 97 REVIEWER 67
REFER TO NORAD
EXEMPTION (S): (1) 2 3 4 5 6 7 8 9

RAND LIBRARY

~~SECRET~~

REC'D: SEP 22 1964

MICROFILMED BY ADM

38-64
18 Sept. 1964
copy 1

SPECIAL HANDLING REQUIRED
This document is releasable only
to U.S. and Canadian Nationals

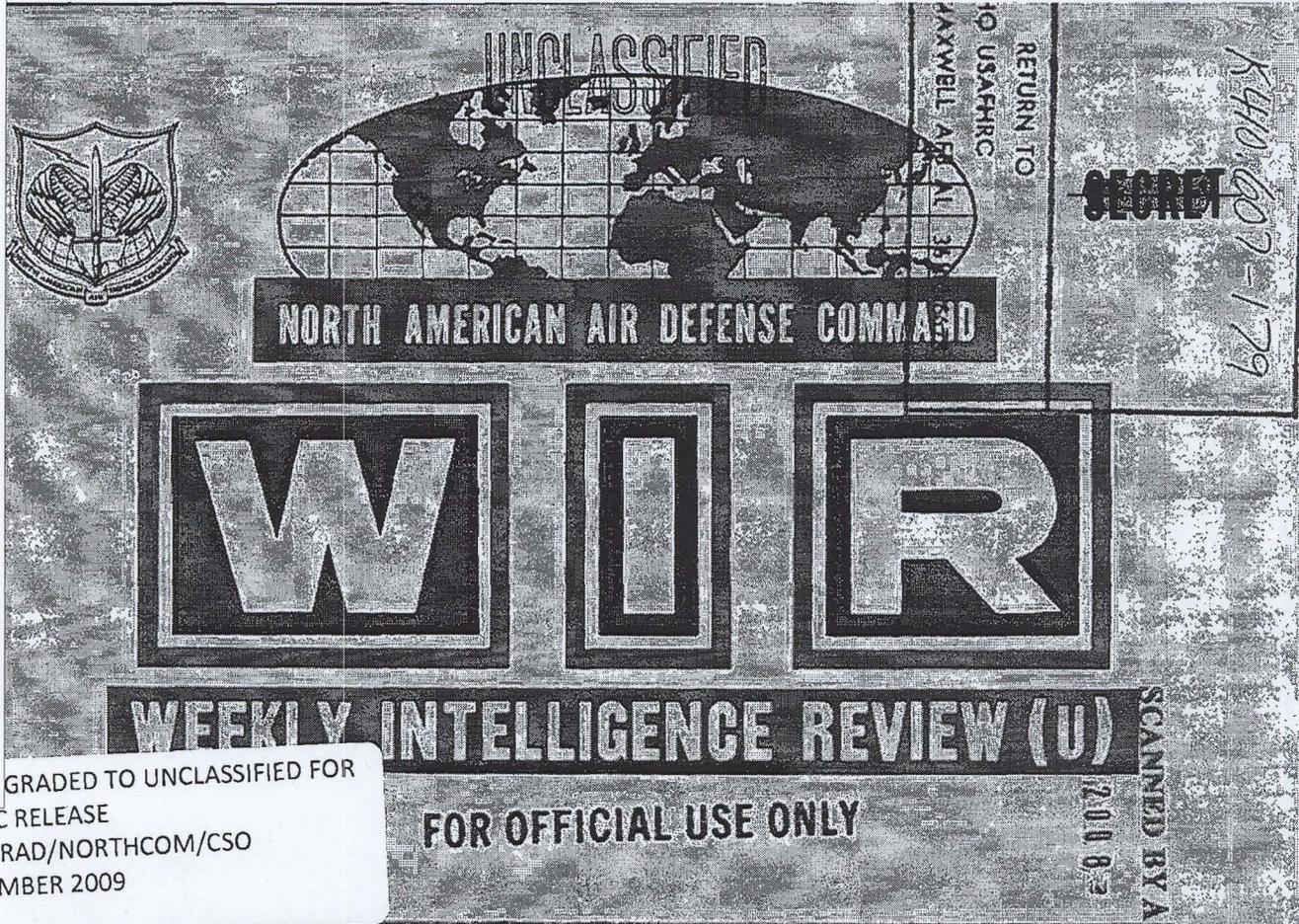
EXCLUDED FROM AUTOMATIC
REGRADING, DOD DIRECTIVE 5200.10
DOES NOT APPLY

WIR 38/64
18 Sep 1964

SEP 21 1964

Postal Registry No. 225 516 3

UNCLASSIFIED



NORTH AMERICAN AIR DEFENSE COMMAND

W I R

WEEKLY INTELLIGENCE REVIEW (U)

RETURN TO
TO USAFHRC
MAXWELL AIRFB AL 361

K410.607-179

00880644

UNCLASSIFIED
~~SECRET~~
NORAD

Weekly
Intelligence
Review

RETIRO
HOUSARFCG
MAYELT
3 112-6678
K410.607-179

Issue No. 38/64, 18 September 1964

The WIR in Brief

Portion identified
as non-responsive
to the appeal

Portion identified
as non-responsive
to the appeal

Portion identified
as non-responsive
to the appeal

MISSILE RANGE FIRING LOG PRESENTED
For 31 August-14 September.

Space

THE NAME 'COSMOS' NOW A POOR IDENTIFIER.
Becoming a catch-all for vehicles not suitable
for major propaganda play. A review of the
Cosmos program.

COSMOS 45 PROBABLY RECOVERABLE, IF SO,
IT IS 21st OF ITS TYPE.

A standard Tyuratam Cosmos launch.

'THE MOON AWAITS US' -- A NEW SOVIET BOOK
This book should dispel doubts about whether
Soviets plan manned Moon shot.

Portion identified
as non-responsive
to the appeal

COVER: Tail of BEAR bomber.
(OFFICIAL USE ONLY)
NOTE: Pages 28, 30, 31, 34, 35,
38, 39, 42, 43, and 44 of
this issue are blank.

FOR OFFICIAL USE ONLY

UNCLASSIFIED

-1-
~~SECRET~~

RECORDED BY ADM

00880644



Portion identified as non-responsive to the appeal

Missile Range Firing Log Presented

US radar detected the following Soviet missile launches between 2400Z, 31 August, and 2400Z, 14 September 1964:

<u>Time & Date</u>	<u>Type</u>	<u>Launch Site</u>	<u>Range</u>
0213Z, 09 Sep	SS-9 ICBM	Tyuratam	7,000 n.m.
1742Z, 10 Sep	SS-9 ICBM	Tyuratam	3,400 n.m.
1132Z, 11 Sep	SS-5 IRBM	Kapustin Yar	2,000 n.m.
0945Z, 13 Sep	*Cosmos 45	Tyuratam	Orbital

*Launched by SS-6 ICBM booster and sustainer.

The probable SS-9 firing of 9 September apparently was an R&D vehicle, [redacted] It was the second ICBM launch in the current 5-month firing period announced for the mid-Pacific impact area, which is located near the Equator. The first launch in the current series, also an SS-9, occurred 5 August. Only 2 range-instrumentation vessels monitored the latest firing, instead of the 3 ships which usually form a triangular pattern around the expected impact point.

The SS-9 launches of 9 and 10 September are believed to be, respectively, the 9th and 10th SS-9 firings. The first SS-9 was launched 3 December last year.

(Shemya & Diyarbakir RADINT; DIA)

(SECRET NO FOREIGN DISSEMINATION Except US, UK & Canada)

Portion identified as non-responsive to the appeal

50X1 and 3, E.O. 13526



~~SECRET~~



significant
intelligence
on space
developments
and trends

The Name 'Cosmos' Now a Poor Identifier

When Cosmos 1 was launched on 16 March 1962, the Soviets said that it was the first of a series of scientific research satellites which would:

- Collect data on:

- Charged particles in the ionosphere
- Corpuscular streams and low-energy particles of solar origin in the near-Earth space region
- The Earth's radiation belts
- The intensity of primary cosmic rays, including variations in their intensity
- Short-wave radiation of the Sun and other celestial bodies
- Composition of the upper strata of the Earth's atmosphere
- Magnetic fields in near-Earth space
- The effects of micrometeorites on apparatus in space

- Photograph cloud formations.

This announcement, while true in essence, has proved to be misleading:

- The name "Cosmos" is being applied to certain satellites not assigned any of the Cosmos missions, for example:
 - 1) Vehicles with secret missions, such as photoreconnaissance.
 - 2) Test vehicles.
 - 3) Certain other vehicles which attain orbit, and thus must be reported to the UN, but which fail to accomplish their primary mission.

-6-

~~SECRET~~



- Certain vehicles which are performing important segments of the Cosmos mission, such as the Electrons, have received non-Cosmos designations.

It is now possible, on the basis of the evidence available -- RADINT, ELINT, Soviet announcements, trends and needs of the Soviet space program -- to divide the Cosmos-series vehicles into 3 categories:

- Nonrecoverable research vehicles launched from the Kapustin Yar (KY) Missile Test Range.
- Recoverable photoreconnaissance satellites -- prototypes and operational vehicles -- launched from the Tyuratam (TT) Missile Test Range.
- Other vehicles assigned to the Cosmos series but which do not fall in either of the 2 preceding categories.

KAPUSTIN YAR RESEARCH COSMOSES

(Nos. 1, 2, 3, 5, 6, 8, 11, 14, 17, 19, 23, 25, 26, 31, 36)

Mission. All of the successful KY Cosmos launches appear to have been designed for participation in the research program announced for the Cosmozes, except possibly for the multiple launch (Cosmozes 42 and 43) of 22 August. As a partial exception, the first Cosmos appears to have been merely a test of the launch system and ground support and ground tracking facilities at KY. No one Cosmos has executed all the announced Cosmos missions, but each of these missions has been or could have been performed in some degree by one or more of the KY Cosmozes.

Payload Characteristics. There appears to be a basic, standard KY Cosmos satellite vehicle, but there is no standard payload configuration, owing to numerous apparent differences in instrumentation, telemetry, and, possibly, power supplies. A few of the vehicles, however, have been identical or nearly so, such as Cosmozes 3 and 5; at least they performed nearly similar missions.

The basic KY Cosmos payload appears to be of spherical shape, about 5 feet in diameter, in the 300- to 800-pound weight class, and spin stabilized at about 1 rpm. Whatever the basic vehicle satellite weight, total weight would vary with differences in instrumentation, communications gear, and power supply. Electrical power for operation of onboard systems, including communications, is probably derived from solar cells, possibly supplemented in some cases by chemical batteries. (See page 37.)

The nature of the instrumentation is not known for each vehicle, but Soviet announcements [redacted] indicate the nature of some of the payloads. (For many of the Cosmozes, [redacted] [redacted] At any rate, there appears to be a wide variation in instrumentation. For example:

50X1 and 3, E.O. 13526





- Cosmos 2 appears to have carried 18 or more ion traps. These varied in design, in order to collect data at a variety of orbital altitudes.
- Cosmoses 3 and 5 carried ion traps, fluorescent-screen electron indicators, and a Geiger counter.
- Cosmos 8 carried transmitters which emitted signals on 20 and 90 megacycles, probably to work with ground stations in measuring the electron density of the ionosphere.

50X1 and 3, E.O.13526

Data was usually recorded and then "dumped" on command over the USSR. Some vehicles appeared to have no playback capability -- indicating either a failure or a capability for real-time transmissions only.

None of the KY Cosmoses was de-orbited; those that have re-entered appear to have done so as a result of natural orbital decay.

Orbital Parameters. All KY Cosmoses to date have been launched into orbits with Equatorial inclinations of a nominal 49 degrees. This particular inclination is favorable for data taking, since precession causes the apogee and perigee to shift completely through one orbit once each 100 days or so. The 65-degree orbit characteristic of Tyuratam-launched vehicles provides only a negligible shift of perigee and apogee per revolution.

Perigees have ranged from about 115-150 n.m. Apogees varied widely (190 to 865 n.m.), apparently in order that data could be collected at a wide range of altitudes in the near-Earth region. These altitudes, all of them below the Van Allen belts, lie within the principal region of interest for military manned space flight within the next decade.

Launch Vehicle. The standard KY launch vehicle is a 2-stage device. The first stage has never been identified positively, but it is probably either the SS-4 IRBM, or the SS-5 MRBM.

50X1 and 3, E.O.13526





50X1 and 3, E.O.13526

Reliability. Launch reliability of the KY Cosmozes has varied for some unknown reason. The first 2 launch attempts (late 1961) failed, not unexpectedly for initial trials; then in 1962 and 1963, 10 consecutive launches were successful; but in the past 12 months there have been 3 failures out of 9 launches.

Reliability of mission achievement of the KY Cosmozes can only be surmised, since the West never knows the exact mission of any specific vehicle.

[redacted] suggesting some measure of success. However, some degree of mission failure seems indicated in those cases when transmissions ceased within a day or two after launch; also, the lack of playback capability of various KY Cosmozes could represent mission failures.

TYRUTAM PHOTORECONNAISSANCE VEHICLES

(Nos. 4, 7, 9, 10, 12, 13, 15, 16, 18, 20, 22, 24, 28, 29, 30, 32, 33, 34, 35, 37, 45)

Mission. The primary mission of the recoverable Cosmos vehicles launched from Tyuratam is believed to be concerned with photoreconnaissance. Early vehicles were probably developmental, later vehicles appear to have executed operational missions over Free World areas, particularly the United States and southern Canada. This mission was long suspected, since all vehicles of this series were de-orbited, providing an opportunity for recovery of film. Now there is little doubt that these vehicles are associated with photoreconnaissance:

- All launches have been so timed that conditions were optimum for photography of the US and southern Canada: the vehicles were at perigee when making daylight passes -- usually near mid-day -- over photoreconnaissance target areas.
- Orbits were relatively low, thus were favorable both for photoreconnaissance and for de-orbit.

50X1 and 3, E.O.13526

- Khrushchev has boasted that Soviet satellites are photographing Free World areas; the TT Cosmozes, so far as is known, are better suited than other Soviet satellites for this purpose.



50X1 and 3, E.O.13526



A variety of secondary missions are indicated, or are possible, for various members of this series:

- Video signals received from Cosmoses 4, 7, 9, and 15 suggest that these vehicles were testing a video system to be used in a meteorological satellite, which the Soviets have said they would develop in accordance with a joint US-USSR agreement on meteorological satellites. De-modulated signals from Cosmos 9 showed both cloud-cover and ground photography, although the quality of the latter, limited as it was by the characteristics of the video, would not be suitable for detailed photo-reconnaissance.
- The Soviets claim to have determined, before launch of the dual Vostok 3/Vostok 4 flight of mid-August 1962, that the cosmonauts would not be endangered by the artificial radiation belt created by the US's high-altitude nuclear burst of 9 July 1962. The necessary sampling appears to have been accomplished by Cosmos 7, which was launched 28 July 1962.
- Any of these vehicles, which appear to be identical or similar to the manned Vostok vehicles in size and general configuration, could have tested life-support or other inflight systems for manned flight. In this connection, it is noted that Cosmoses 4 and 7 made almost the same number of orbits before de-orbit as did Vostoks 3 and 4, which were launched later. (See page 36.)
- These vehicles could be more suitable than the KY Cosmoses for collecting certain types of space-environment data, namely, where very heavy instrumentation would be used or where recovered data would prove more precise or complete than telemetered data.
- Some or all of them may have had infrared and/or ELINT reconnaissance missions.

Payload Characteristics. The standard TT Cosmos payload appears to be a very large, recoverable vehicle. In flight, it is Earth-oriented. Basically cylindrical in shape with a conical nose, it appears to be about 6 to 8 feet in diameter and about 23 feet long. It is believed to be identical with or very similar to the manned Vostoks, which weigh about 10,000 pounds.

A distinctive feature of this vehicle, other than its size, is the inclusion of de-orbit and recovery equipment, including retrorocket and parachute installations. The retrorocket is believed to be liquid propelled, possibly a modified version of the sustainer of the GUIDELINE/SA-2 air-defense missile.

50X1 and 3, E.O.13526





Other payloads, such as research instrumentation and test equipment, could easily be accommodated, in view of the high volume and weight-carrying capabilities of the basic payload vehicle. No clues are available as to the nature of these payloads, other than those contained in Soviet open literature; all or most of the monitored data was probably recovered rather than telemetered.

It seems possible that recovered vehicles or components not damaged during de-orbit could have been reused.

Orbital Parameters. There was a great deal of consistency in the orbital parameters of these vehicles, particularly the later ones. Orbits were usually inclined to the Equator at an angle of about 65 degrees, except for Cosmos 32 and 35, which had inclinations of about 51 degrees. Both inclinations are suitable for photoreconnaissance of Free World areas, but the 51-degree inclination is probably somewhat better for both reconnaissance and recovery. For example, Cosmos 32 was over or near the US for about 9.5 hours of its 8-day flight, instead of the 6 hours of the 65-degree vehicles; 9 of the 9.5 hours were in sunlight, instead of the 3.5 hours for the usual TT Cosmos.

Average altitudes were usually in the 140-200 n.m. range, while orbital periods ran from 89.5 to 90.5 minutes.

All the vehicles were de-orbited after 3-10 days of flight. Most of them -- including all those launched this year -- were de-orbited on Revolutions 126-128, after nearly 8 days of flight.

Most of them were launched between 0830 and 1030Z (1230-1430 hours local time at the TT launch site). Launch at this time put these vehicles at perigee over the US and southern Canada during the best hours for photography.

Launch Vehicle. The recoverable TT Cosmoses were launched by 3-stage carrier rockets. The SS-6 ICBM booster and sustainer were used in all cases for launch, while injection into orbit was accomplished by a third stage, usually the so-called Lunik stage which was first used with the first three Soviet Moon flights. On a few occasions during the past year, the heavy Venik third stage may have been used in possible testing of a new re-entry vehicle, but the only evidence for this estimate is the appearance of the transmitting frequency usually associated with the Venik.

The SS-6 booster-sustainer is a partial-parallel configuration -- 4 boosters clustered around a lengthened sustainer engine. Gross weight is estimated at about 500,000 pounds, vacuum thrust at 895,000 pounds.

The Lunik upper stage is believed to weigh 18,000 pounds and to have a vacuum thrust of about 11,500 pounds.

The Venik upper stage is believed to weigh 55,700 pounds and to have a vacuum thrust of 65,000 pounds.





Reliability. The launch reliability of the TT Cosmoes is difficult to assess, since in the early stages of flight they are difficult to distinguish from other Tyuratam launches, including ICBMs; reliability should be relatively good, however, in view of the high reliability of the TT Cosmos launch vehicle, the SS-6 ICBM.

Reliability of de-orbit also appears to be high; de-orbit appears to have been successful for every one of the standard TT Cosmos vehicles.

50X1 and 3, E.O.13526

The frequency and regularity of launches this year, plus the consistency of orbital parameters, however, indicates that the TT Cosmos now has at least sufficient mission reliability to be considered an operational system.

NONSTANDARD COSMOS VEHICLES

A large number of Soviet space launches of the past 10 months which have been assigned Cosmos numbers by the Soviets do not fall into the pattern established during the first 2 years of Cosmos launches. All but one of these nonstandard launches took place at Tyuratam, the other one was launched from Kapustin Yar.

Cosmos 21. This vehicle was launched from Tyuratam on 11 November 1963 and injected into a relatively low, circular orbit (similar to a parking orbit) by the heavy Venik third stage. It decayed naturally 2.5 days after launch, apparently having accomplished no mission except achieve orbit. The parking orbit and Venik staging were previously characteristic only of Soviet interplanetary probes and more recent lunar probe attempts.

50X1 and 3, E.O.13526

Since launch appears not to have been timed for either an interplanetary or lunar probe, this event could have been a test, perhaps of a new type recovery vehicle, or of fourth stage ignition, failure of which has been responsible for numerous Soviet space probe failures.

Cosmos 27. This vehicle was very similar in propulsion and orbital parameters to Cosmos 21. Since it was launched at a time nearly optimum for a flight to Venus, it is believed that this vehicle represents a failure of a Soviet Venus probe rather than a standard TT Cosmos.

TT Cosmoes 38, 39, and 40. This is the first Soviet launch of 3 payloads by one rocket and the first multiple-Cosmos launch. Separation of all 3 payloads occurred after powered flight, and all 3 are in nearly identical orbits with an Equatorial inclination of about 56 degrees (the first time this inclination has been used), a period of about 94.5 minutes, apogee of





400-430 n.m., and perigee of 110-112 n.m.

50X1 and 3, E.O.13526

The primary mission, however, may be a test of the ability of the Soviet space-tracking system, which relies principally on beacon tracking, for simultaneous track of multiple satellites traveling closely together -- possibly preparatory to an attempted rendezvous mission. Another possibility is that these vehicles are in some way related to the development of an economical, multiple-satellite communications system. They may also have been used to test a rocket other than the standard SS-6 ICBM for space use; the Soviets announced that these vehicles had been launched by a booster of a new type.

Cosmos 41. This vehicle, launched from Tyuratam on 22 August, was injected into a parking orbit and then re-injected, shortly before the end of Zero Orbit, into a very eccentric orbit of high apogee (about 21,500 n.m.), a period of nearly 12 hours, and an inclination of about 65 degrees.

The purpose of this vehicle is not known, but several possibilities are apparent, including:

- A test of fourth-stage ignition.
- Test of a synchronous (24-hour) satellite, to be used for communications. (Soviet interest in 24-hour orbits is indicated in an article in the July-August issue of the Soviet space-science journal, "Cosmic Research.")

Whatever its mission, Cosmos 41 may have been the fourth in a recent series of vehicles which appeared to incorporate heavy Venik upper staging. Other members of this estimated series are Cosmos 21 (launched 11 November 1963) and launch failures of 19 February and 4 June 1964.

Cosmoses 42 and 43. These two vehicles represent the first multiple-payload launch from Kapustin Yar. The satellites were separated after powered flight and went into very similar orbits with apogees of nearly 600 n.m., perigees of about 125 n.m., and the usual orbital inclination of 49 degrees. The mission of these vehicles is not known but the following are possibilities:

- Test of the capability of the KY vehicle to launch multiple payloads.
- Test of the capabilities of the Soviet space-tracking system to track vehicles in near-by orbits, preparatory to an attempt at rendezvous.
- Part of an economical, multiple-satellite space communications system.





Cosmos 44. Cosmos 44 was launched from Tyuratam into an orbit having the usual 65-degree inclination, an apogee of about 465 n.m., and a perigee of about 330 n.m. It may have been intended to be a meteorological satellite, since its orbital parameters are close to optimum for this purpose. Video signals reported from this vehicle would also be indicative of a meteorological mission, if they are confirmed. This vehicle also diverges from the pattern of TT Cosmos launches in that it was launched 5.5-7.5 hours later than the usual TT Cosmos launch, and it is spin-stabilized rather than Earth-oriented. The Soviets, of course, have committed themselves to developing a system of weather satellites in cooperation with US weather satellites. The appearance of a prototype at about this time has long been estimated, and the video system previously tested on Cosmoses 4, 7, 9, and 15 should be more than adequate for weather reconnaissance.

Retrospect and Prospect. The first 2 years of the Cosmos program (October 1961-September 1963) were comparatively uneventful. There were 3 initial failures, not unexpected, and then a series of 19 successful launches. It soon became evident that there were 2 distinct types of vehicles -- relatively small, nonrecoverable vehicles launched from Kapustin Yar for scientific research; and large, recoverable vehicles launched from Tyuratam, which were later identified by the West as photoreconnaissance satellites.

An abrupt change has occurred in the past 12 months: (See chart on page 33.)

- The tempo of standard TT Cosmos launches has increased sharply, apparently as the photoreconnaissance system has reached full operational status.
- Failures are again appearing -- at both sites.
- New types of vehicles which are unlike either the early KY or TT Cosmos launches have been receiving the "Cosmos" label.

The appearance of these newer types of vehicles signals some increased diversification of the Soviet space program. The new vehicles undoubtedly fill various legitimate needs of the Soviet space program, but they also tend to fill the gap left by the absence to date this year of Soviet space spectacles, that is, they tend to give the Soviet program an image of steady forward movement.

At any rate, Soviet policy for naming Earth satellite vehicles now appears to be:

- To assign special names to vehicles or series of vehicles which lend themselves to special propaganda exploitation -- such as the Vostoks, Polyots, and Electrons. (Thus, the Soviets' weather satellites, when they become operational, will probably get a special designation.)
- To assign the name "Cosmos" to all other vehicles, including routine research vehicles, test vehicles, vehicles which attain orbit but otherwise





fail, and vehicles having classified missions.
(SPADATS; FTD; NSA; CIA; DIA; RCAF; NORAD)
(~~SECRET NO FOREIGN DISSEMINATION~~ Except US, UK & Canada)

Cosmos 45 Probably Recoverable; If So, It is 21st of Its Type

Cosmos 45, which the Soviets launched from Tyuratam (TT) at about 0945Z, 13 September 1964, is probably the latest in a series of recoverable Soviet photoreconnaissance vehicles. Its orbital parameters have been reported as follows:

	<u>By SPADATS</u>	<u>By TASS</u>
Inclination	64.91 degrees	64.9 degrees
Period	89.64 minutes	89.69 minutes
Apogee	316.5 km	327.0 km
	170.8 n.m.	176.6 n.m.
Perigee	200.3 km	206.0 km
	108.2 n.m.	111.2 n.m.

50X1 and 3, E.O.13526

TASS has issued its usual announcement that this Cosmos vehicle is executing the scientific research mission which was announced for all Cosmos-series vehicles on 16 March 1962, shortly after launch of Cosmos 1. This vehicle, however, is believed to have a photoreconnaissance mission, and it will probably be recovered. It is very similar to other Cosmoses launched from Tyuratam with respect to orbital parameters, electronic configuration, and hour of launch. Thus, it is the 21st of its series, the 9th launched this year.

(SPADATS; TASS)
(~~NO FOREIGN DISSEMINATION~~ Except US, UK & Canada)





"The Moon Awaits Us" -- a New Soviet Book

Western journalists generated doubts in their readers minds a year ago about the existence of a Soviet man-on-the Moon program when they drew unwarranted conclusions in describing certain remarks by Premier Khrushchev about a Moon shot. Any doubts which still remain should be dispelled by the appearance of a new Soviet book, "The Moon Awaits Us."

Izvestia states that the book is "... about one of the most important problems of cosmonautics of the future -- a flight to our planet's nearest celestial neighbor.

"Man's dream of many centuries of visiting the Moon has its own history; it inspires numerous enthusiasts and attracts explorers. And Soviet cosmonauts should by all rights be counted among them. The reader will find out (from this book) about the difficulties which will be met on this starry journey and about possible variations in executing the first 'landing' in space."

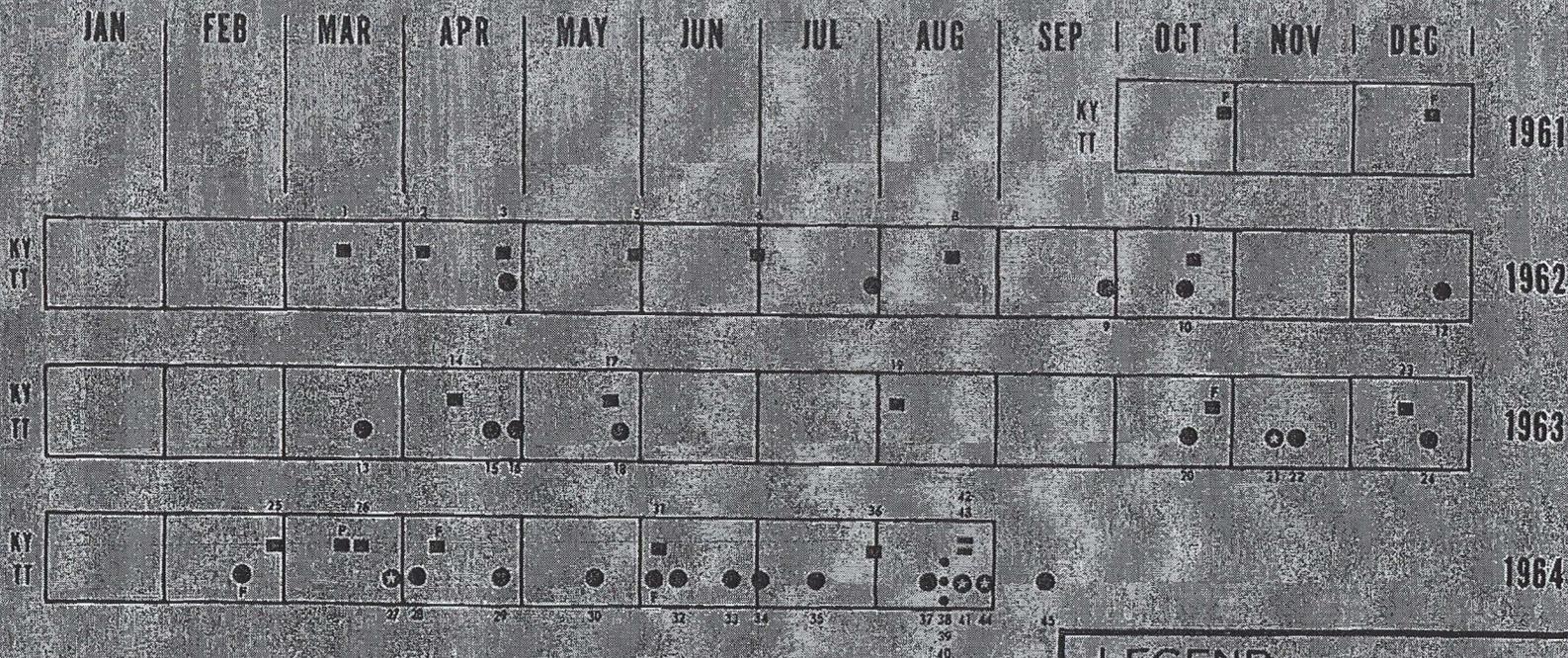
(Izvestia)

(OFFICIAL USE ONLY)



~~SECRET~~

COSMOS-SERIES SATELLITES (SOVIET)



NOTE:

- 1) The early failures, not unexpected for a new program.
- 2) The 12 consecutive successes of 1962.
- 3) The similarity of the 1963 program to that of 1962, except for an unexplained period of inactivity in the middle of the launch season.
- 4) The sharp increase in number of vehicles in 1964 and the appearance of multiple launches and of other "non-standard" launches.

LEGEND

	Kapustin Yar	Tyuratam
Standard Event (successful launch)	■	●
Nonstandard Event (successful launch)	■	⊙
Multiple Payload (successful launch)	≡	⋮
Launch Failures	F	F

~~SECRET~~

~~SECRET~~

NOVA



WIR 38/64

~~SECRET~~

The Manned Vostok Vehicle
 (The Cosmos-series vehicles launched from Tyuratam are believed to be similar to the Vostoks. Both are re-entry-type vehicles.)



Mating the Lunik Stage to the Vostok.

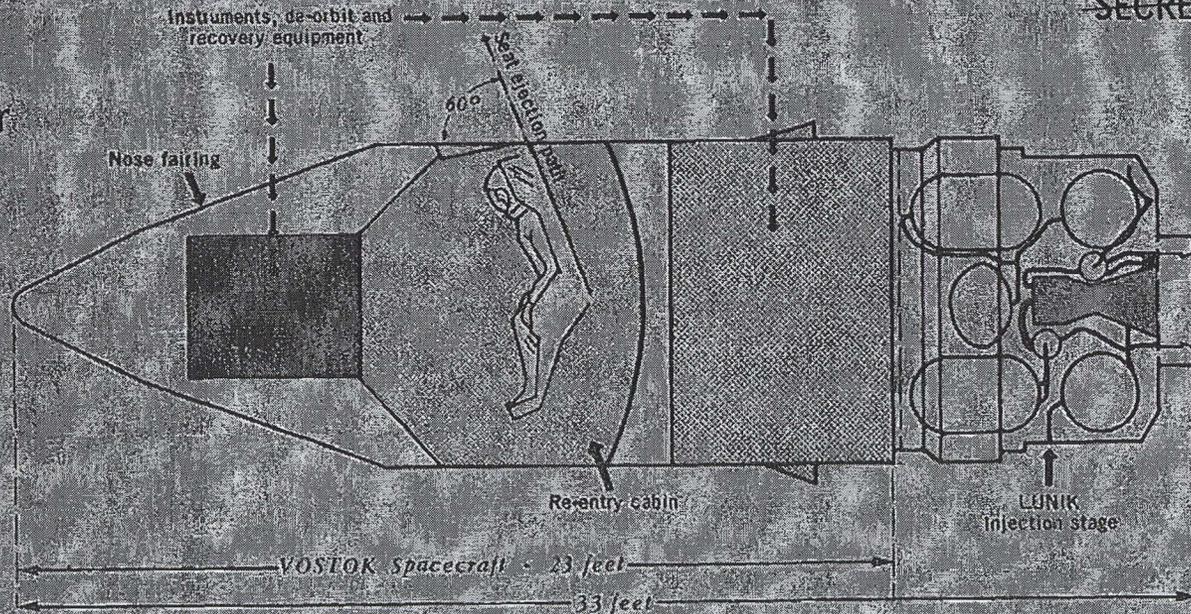
~~SECRET~~

-36-

~~SECRET~~

~~SECRET~~

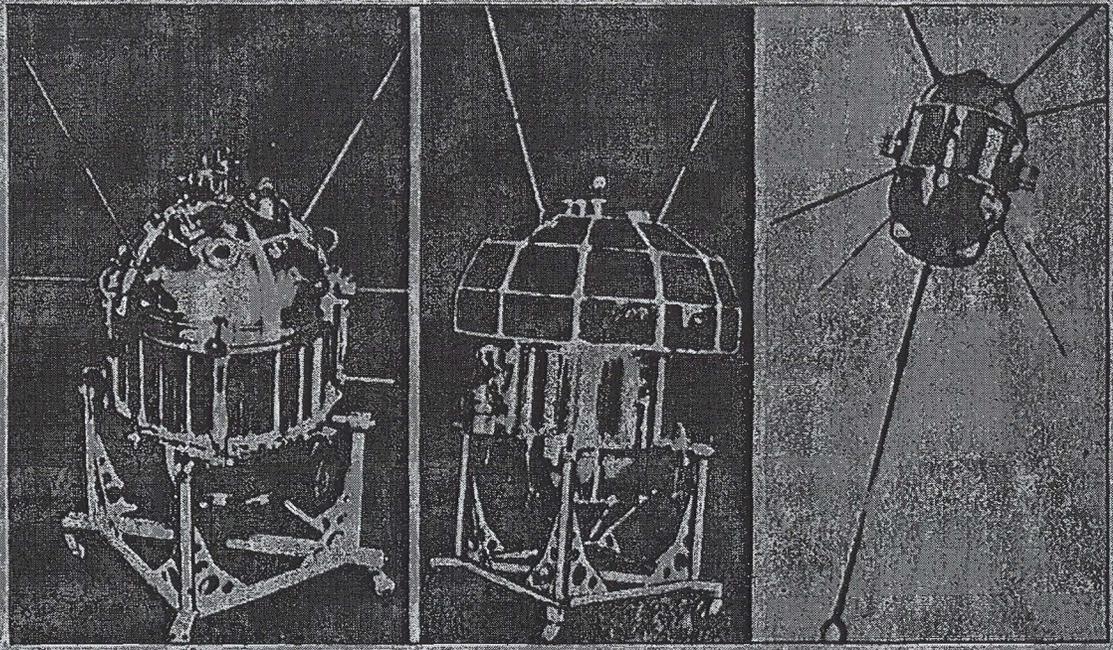
Vostok-Interior Arrangements



NOVA
 WIR 38/64

~~SECRET~~

-37-



~~SECRET~~

COSMOS (KAPUSTIN YAR SERIES) SPACECRAFT CONFIGURATIONS

NOVA

WIR 38/64