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FEATURED ARTICLES

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PART I: TRANSLATIONS COMPLETED

NASA translations are listed in Section A. Translations in the TT F-1 series are published and distributed as NASA Technical Translations. Translations in the TT F-8000 series are available upon request from OTIEP. Requests for translations in the JPL AI/Trans. series should be directed to the Jet Propulsion Laboratory. Non-NASA translations that are provided to OTIEP and are of interest to NASA Technical programs are listed in Section B.

A: NASA Translations

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87. Academy of Sciences, USSR, Yakutsk Subsidiary
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Trudy Yakuts. Filiala, Akad. Nauk SSSR. Ser. Fiz.; No. 3, 1960. 166 p. $2.75 (OTS)

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SPORADIC SOLAR LOW-FREQUENCY RADIO EMISSION. NASA TT F-8056
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89. Cichowicz, L. and Zielinski, J.
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Geodezja i Kartografia 9, No. 3-4, 159-95 (1960).

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ON THE NATURE OF RADIOGALAXIES. NASA TT F-8051
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EXPERIMENTAL DETERMINATION OF POTASSIUM VAPOR PRESSURE IN THE 550 TO 1280°C TEMPERATURE RANGE NASA TT F-66
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DYNAMICS OF VISCOELASTIC SHELLS AND PLATES. NASA TT F-8058
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93. Gringauz, K. I., Bezrukikh, V. V. and Ozerov, V. D.
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104. Sharkiadze, D. V.
AN UNSTEADY FLOW PROBLEM IN MAGNETIC HYDRODYNAMICS. NASA TT F-8046
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ELECTROSTATIC EFFECTS INDUCED BY THE MOTION OF A RAREFIED PLASMA IN A NONUNIFORM MAGNETIC FIELD. NASA TT F-8057
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PART II. TRANSLATION IN PROCESS

Translations "in process" will be listed in Part I upon completion Requests for these translations should be made only after they are announced in Part I.

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RESULTS OF OBSERVATIONS OF MARS IN THE USSR DURING THE GREAT OPPOSITION OF 1956.
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Paper presented at the 13th General Assembly of the Union Radio Scientifique Internationale, London, Sept. 12, 1960.

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THE FIRST MAP OF THE FAR SIDE OF THE MOON.
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CERTAIN PROBLEMS ON THE VISCOSITY OF LIQUID METALS.
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AUTHOR INDEX

*Refers to Translation List No. 2; ** Refers to Index No.

THE FLIGHT OF VOSTOK 2. On August 6, 1961, at 9AM Moscow time, a powerful Soviet rocket placed in orbit around the Earth, the new cosmic ship-satellite Vostok 2, which was piloted by cosmonaut Major Herman Titov.

Air Force officer Titov successfully completed 17 orbits around the Earth in twenty-five hours, and covered a distance of more than 700,000 km (about twice the distance from the Earth to the Moon).

THE LAUNCHING (Excerpts from report by Tass Correspondent A. Romanov).
"It was a very hot day. Our car speeded smoothly over the paved highway cutting through the limitless flatlands of the desert. We passed through several villages and townships. The road suddenly made a sharp turn and before us in the distance appeared a number of huge structures. When we came closer we noticed through the maze of metallic constructions the silvery cigar-shaped body of a multi-stage rocket. Huge gantries, gently but firmly, supported the rocket. This was the launching pad. I could notice near the rocket many people busily engaged in last minute preparations.

"An elevator came down from the top of the rocket and a short, wiry young man jumped lightly out of it. He was wearing a gray tennis shirt and light gray trousers. He approached a group of people headed by the Chief Designer, the man who is responsible for all preparations for the flight into space. I would not have noticed the young man in the gray shirt if someone standing nearby had not said, "This is the cosmonaut Herman Titov." Titov has lively gray eyes and a smile plays continuously on his lips. He didn't seem to be older than 26 years.

"In the evening of this day, August 5, 1961, all preparations were completed. We met the astronaut again and we had a chance to talk to him for a little while.

"The next morning a hot Sun was hanging over the area giving a gold reflection to the silvery spaceship atop the huge missile and to the structures on the cosmodrom. At the commanding post were gathered members of the governmental commission, well-known Soviet scientists, designers, test engineers, and the staff of the launching group.

"When the chairman of the governmental commission announced that all flight preparations were completed, all personnel left the launching area. Only a few key people could be seen near the rocket. A blue bus drove up to the rocket. Herman Titov emerged from the bus and walked over to the launching pad. He was wearing an orange colored spacesuit and a helmet with the inscription USSR. After shaking hands with his comrades, future cosmonauts number 3, 4, and 5, Titov entered the elevator. At the elevator he was met by the chairman of the commission, some scientists and the Chief Designer. They all hugged him and shook hands with him.

"In order to enter the elevator, Titov had to walk up a staircase. At the top of the staircase he turned around and said a few words of greeting to the people of the Soviet Union.

"One of the scientists handed Titov a log book with a pencil fastened to it by means of a string. After the elevator reached the top of the rocket Titov then entered the cabin of the spaceship and the gantries were slowly removed.

"We were located on a special platform for the purpose of observing the rocket take-off. The platform was located about one and a half km from the rocket. By means of radio we could hear everything that was taking place. The voice over the radio announced X -10 minutes. The chairman of the governmental commission asked the cosmonaut about his feelings at this moment, and Titov replied, "I feel excellent".

"X -1 minute...10 seconds...5 seconds...start! From our distance we could see the silvery rocket completely freed from its supports, it began to rise very slowly. It seemed to us extremely slow. It was exactly 9AM Moscow time. The rocket began to take on speed and took on the form of a fireball. At that moment it seemed like there were two Suns above the Earth in the sky. At a comparatively low altitude the cosmic ship changed its course somewhat inclining its nose and began its speed departure towards its orbit. Soon the rocket disappeared completely in the blue sky."

DETAILED ACCOUNT BY ORBIT. The purpose of the flight was to accomplish the following: (a) to investigate the influence on a human organism of an extended flight along an orbit around the Earth and the following reentry and landing on the Earth's surface; and (b) to investigate the work ability of a man during extended exposure to a condition of weightlessnes

Orbital Data (preliminary): Minimum distance from the surface of the Earth was 178 km; the maximum distance was 257 km. Angle of orbital inclination towards the equator was 64°56'. The initial rotational period of the spaceship-satellite was 88.6 min. The weight of Vostok 2, without the weight of the last stage of the carrier rocket, was 4731 kg.

Equipment: a two-way radio communication was established with the pilot Titov. A transmitter which operated on the frequency of 19.995 mc was installed aboard the spaceship. The systems for maintaining normal life conditions for the cosmonaut functioned normally.

The Second Orbit: During his second orbit around the Earth, the cosmonaut reported a number of communiques which testified to the fact that the flight was successful. The structure of the spaceship and its equipment operated normally. Major Titov felt fine and was in good spirits. The two-way radio-telephone communication with Titov on ultra shortwave and shortwave operated normally. The cosmonaut was continuously observed from Earth by television.

While passing over Africa, Major Titov broadcasted greetings to the people of Africa.

Telemetry measurements were continuously made of the spaceships instrumentation and of the cosmonaut. His pulse frequency was 88 beats per minute, the breathing frequency was between 15 and 18 per minute. While passing over the Soviet Union at 10:38 AM Moscow time, Titov transmitted greetings to the Russian people. He stated that Vostok 2 was very successful with all systems of the ship functioning normally, and that he was feeling fine. The second orbit was completed at 11:48 AM Moscow time.

The Third Orbit: During the third orbit Titov passed over Europe and again sent greetings to Earth. It was at the end of the third orbit, between 12:30 and 1:00 PM that Titov ate a three course lunch. After eating he reported: "I ate lunch and feel excellent."

The Fourth Orbit: During the fourth time around the Earth Vostok 2 passed over the cities of Madrid, Paris, Copenhagen, Leningrad, Ulan-Ude, Shanghai, and Sidney. In accordance with the flight program, Titov rested for one hour at the beginning of the fourth orbit. After resting he did physical exercises and then resumed his normal activies of the flight program. At the end of this orbit he passed over the continent of South America and more greetings were sent to the people below by Titov. In the reports the cosmonaut transmitted he stated that all instruments were functioning faultlessly. During the period of manual guidance of the Vostok 2 by Titov, he reported the one hour test showed excellent maneuverability of the spaceship.

The Fifth Orbit: In seven flight hours around the Earth the Vostok 2 covered a distance of 200,400 km. During his fith orbit the cosmonaut reported three times to the Earth as follows: "3:07 PM. Everything is in order aboard the spaceship and I feel fine. 3:08 PM. I completed fully the program of the fourth orbit. 3:30 PM. I am passing the equator. I endure weightlessness in an excellent manner."

The Sixth Orbit: After eight and a half hours of flight, Titov had covered a distance of 238,400 km and at 5:42 PM the sixth orbit was completed. Major Titov confirmed the receipt of the telegram from Gagarin and transmitted a reply. At 5:00 PM he ate dinner. Then he again activated the manual control and the spaceship responded to the movements of Titov's control handle.

The Seventh Orbit: At 5:42 PM the Vostok 2 began the seventh orbit. At 6:15 PM Titov broadcasted the following message while flying over Moscow: "Dear Moscovites. Everything is in order in my cabin. The pressure is normal, humidity is 70%, temperature is 18°C. I am completely comfortable. I would like to wish everybody a peaceful night. I am getting ready to go to sleep myself right now."

In accordance with the flight program, the cosmonaut was to take time out for sleep from 6:30 PM Moscow time, August 6, until 2:00 AM August 7. For this reason the two-way radio communication was interrupted during that period of time. The radio telemetry control of the operation of all instruments aboard the spaceship as well as observation of the cosmonaut continued. His pulse was 58 beats per minute during his sleep.

The Tenth Orbit: At 11:45 PM Moscow time the Vostok 2 completed its tenth orbit around the Earth and covered a distance of 410,000 km which is more than the distance to the Moon. According to radio telemetry measurement data the instrumentation on board functioned normally. The cosmonaut's state of being was excellent. At 11:26 PM the pulse frequency of Titov was 58 beats per minute.

The Twelfth Orbit: Titov awakened from his sleep at 2:37 AM and began to carry out his duties in accordance with his schedule. He reported that he slept well, and that the equipment aboard the spaceship was operating normally with the desired hygienic conditions being maintained inside the cabin. He stated that he felt excellent. During his sleep the cosmonaut's pulse was within the limits of 53 to 67 beats per minute.

The Fifteenth Orbit: The Vostok 2 began the fifteenth orbit around the Earth at 6:00 AM. Titov stated he ate a hearty breakfast at 5:45 AM, and then resumed his duties as provided by the program for scientific investigation. He said his state of being was excellent.

The Sixteenth Orbit: At 8:20 AM the Vostok 2 completed its sixteenth trip about the Earth. The distance travelled was 654,800 km.

The Landing of Vostok 2: Herman Titov landed in the Saratov area not far from the place where Gagarin landed his spaceship April 12, 1961. The Chairman of the Regional Soviet who was an eye witness to Titov's landing described the event as follows.

"In the morning of August 7 we heard a thundering sound coming from the sky. After a little while we noticed on the clear sky the spaceship coming in for a landing. Nearby were working members of the collective farm brigade. These farmers noticed the spaceship, its landing, and the emerging cosmonaut. Three of the farmers grabbed their motorcycles and speeded over to greet the cosmonaut. When I arrived at the landing point in my Pobeda car, Herman Titov was conversing lively with the farmers. The farmers helped him take off his flight suit.

"I offered Titov a lift to town in my car. Titov told me that he will be with me in a minute. He went back to the spaceship, entered the cabin and came out after a while carrying a pile of papers and a book with a white cover. This was his log book. Before leaving the ship, Titov took a drink of water from the special container inside the ship. Several

hundred farmers gathered around the ship in a matter of minutes. In the car on the way over to our town, Titov was joking and he seemed to be very happy.

News spread quickly. When we arrived in town, the streets were lined with people who came to greet the hero. About an hour later an airplane arrived and Titov left for Moscow."

Titov's Statement: "...The spaceship is equipped with installations for automatic flight control and landing on Earth. In addition it is possible for the pilot to control the ship's flight manually and to maneuver it in orbit as required for scientific observations. The pilot has the capability of landing the spaceship at any given point on the Earth.

"Acceleration, noise, and vibrations during the sector of injection are endured very well and without any trouble. After the last stage motor was shut off weightlessness began. The first impression, the very first few seconds, was that I was flying with my feet up. After a few seconds, however, everything returned to normal.

The Sun shone through the illuminators and there was so much light inside the cabin that I could turn off the artificial illumination. At the moment when the Sun did not shine directly into the illuminators, it was possible for me to observe the Earth which was illuminated by the Sun and the stars above, which were sharp and bright little points on a very black sky.

"The instruments indicated that the spaceship entered its orbit. Soon the spaceship entered the Earth's shadow. Before the ship left the Earth's shadow it was possible to distinguish the Earth from the sky. Where not illuminated by the Sun, the Earth stands out on the sky with its light grayish shade. It was even possible to notice the direction of movement of the Earth by following the displacement of this gray shadow. The fact that the Earth did not appear to be black seems to be caused by the Moon which reflected solar rays towards the Earth.

"It is very interesting to observe the Earth from space. One can distinguis rivers, mountains, and cultivated fields (plowed fields and freshly harvest fields can be distinguished by their coloring). Clouds are very well visible. They can be easily distinguished from snow by the shadows which they cast on the surface of the Earth. Sometimes the horizon of the Earth appeared in the illuminator and this is a most interesting picture. The colors of the Earth's corona passed through all shades of a rainbow from the brightly illuminated Earth to the pitch black sky. In general it is a bluish halo. Sometimes the Earth was hanging over my head, and I was wondering what was holding it up there. Twice the Moon floated by in view

"of the illuminators. The Moon looks the same as from the Earth, nothing special about it.

"Inside the cabin normal climatic conditions were maintained during the flight. The pressure equalled atmospheric pressure, a normal temperature and a normal gas content of the air were maintained. I could not smell anything unusual.

"I ate lunch about 12:30 PM and during my sixth orbit I ate dinner. In order to be honest I must say that I did not have any special appetite. The reason for this might have been the extended condition of weightlessness and a certain amount of excitement. The flight program however must be carried out, and I ate. I also had to use the toilet installation aboard the spaceship a few times. This installation operated normally.

"In accordance with the flight program the automatic landing complex which secures the descent and landing of the spaceship at the predesignated region, was activated during the 17th orbit. The spaceship was oriented, the retro rocket was activated and the spaceship entered the descent trajectory. I did not cover up the blinds of the illuminator before the descent and therefore I was able to observe with great interest the bright illumination of the air which envelops the spaceship during its reentry into the dense layers of the atmosphere. The colors of the atmosphere changed with the changes in velocity and altitude. With the reappearance of gravitation, the state of weightlessness ended. There was no sharp transition from one state to the other. All I could feel is that I returned to a normal state.

"As was already reported, the structure of the cosmic ship and its systems for landing provided the following two landing methods: landing by remaining inside the spaceship or by means of ejection of the pilot's seat from the spaceship and descent by parachute. I was permitted to select my own way of landing...Contrary to Gagarin's method of landing with the ship I decided to try out the second method. At a very low altitude I ejected myself together with the pilot seat and descended to Earth by means of a parachute.* At a short distance from the place where I landed, the spaceship landed safely. This took place at 10:18 AM Moscow time on August 7, 1961.

"Thus the flight was completed successfully. I feel fine and my organism didn't suffer any ill effects after that flight."

(*Note: this contradicts with the statement of the eye witness, see page 14, who stated "the farmers noticed the spaceship, its landing, and the emerging cosmonaut.")

Results: (Speech by Prof. V. I. Yazvovsky). "The new stage in the conquest of cosmos was only possible thanks to the long years of planned efforts of Soviet scientists, designers, and engineers. The principal purpose of Gagarin's flight aboard Vostok 1 was to study the effects of weightlessness and other factors on the organism of a man during the period of time which is required to circle the Earth only one time. During the flight of Herman Titov was studied the possibility of a day long life cycle of a man in cosmic flight. During this flight was investigated the general condition of the organism and its separate physiological systems. The work ability of the cosmonaut was studied in regard to controlling the spaceship and its systems, which maintained conditions for life activity and also the individual means which secure flight safety. During the space flight of the Vostok 2 were first of all investigated the effects of weightlessness to which the men were subjected over a period somewhat longer than one day.

"It should be mentioned that the flight of Titov was conducted at a period when the radiation background in space was most favorable. This was possible due to the prognosed solar erruptions by means of optical observations of solar activities and radiation research, and by means of direct soundings of the stratosphere. All systems aboard the spaceship provided the possibility for a cosmic flight of a man over a period of ten days.

"Pressure inside the cabin of the Vostok 2 equalled one atmosphere, the temperature varied from 10 to 22°C, and was regulated in accordance with the heat discharge of the cosmonaut, the percent content of oxygen was 25 to 27%, carbon dioxide 0.25 to 0.4%, the respective humidity* of the air was within the limits 55% to 75%.

"The cosmonauts condition and activities during the flight were systematically observed by means of radio telemetry and television. The bio-electrical and mechanical activities of the heart were registered as well as the frequency and depth of breathing, and the temperature. The state of work ability was judged by the quality of radio communication with Earth, accuracy of completion of flight assignment and observation of the televsion images of the cosmonaut.

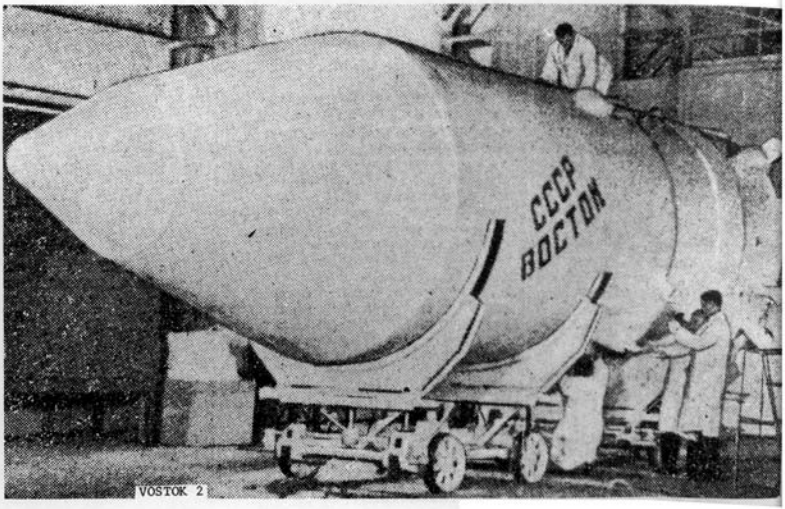
"Preliminary data of the analysis testify to the fact that basically all physiological functions of the organism did not have any pathological deviations during the flight. The pulse of Titov during flight varied within the limits of 80 to 100 beats per minute. The breathing frequency was between 18 and 22 per minute. The form and intervals of the elements in the electrocardiograms of Titov were not subjected to any essential changes. In spite of the great complexity of the flight and flight assignments, Titov remained on a sufficiently high level of stability during the entire flight. During the flight Titov carried out without any difficulties all necessary natural functions: he ate, slept, and also made use of the sanitary installations.

*relative humidity

"It is very important to mention that the extended stay of Herman Titov in conditions of weightlessness has caused certain changes on the part of the vestibular apparatus which was at times expressed by unpleasant sensations like vomiting, etc. However, when the cosmonaut returned to his original position and did not execute any sharp motions with his head, all these indicated sensations disappeared almost completely. It is possible that this was a result of the individual peculiarities in the organism of Titov. Therefore, the problem of the state of a man in conditions of weightlessness requires further study.

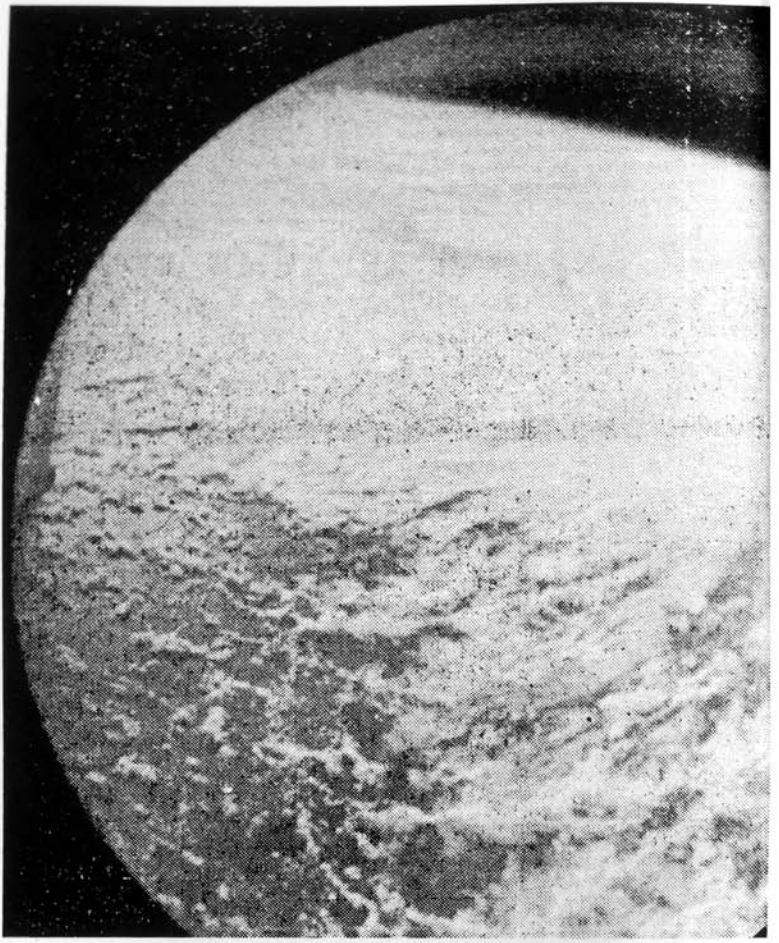
"After sleep these changes decreased considerably and after the activation of the braking system they disappeared completely. After completing his cosmic flight, Titov had no ill effects in the state of his health, all physiological functions are on the level of original data. Titov's work ability was preserved completely."

In the photograph below is shown the Vostok 2 in which Titov made his 25 hr flight about the Earth. The photographs shown on the following pages are views of Earth taken by Titov from the porthole of the Vostok 2 in flight. (Source: Excerpts from translation of Pravda by Joseph Zygielbaum)



VOSTOK 2

Closeup View of Earth Photographed from Vostok 2



Wide Angle Camera Photographs Earth's Curvature from Vostok 2

GAGARIN CLAIMS VOSTOKS NOT SUITABLE FOR MOON TRIP. Yuri Gagarin stated in Budapest that the Russians may put the first man on the Moon within five years. He said that Soviet scientists were working on a Moon project "which could take anything up to five years." He added that the spaceships used by Major Titov and himself for orbiting the Earth were not suitable for traveling to the Moon. (Source: Baltimore Sun, August 22, 1961)

SOME THOUGHTS ON VOSTOK I AND II. The photographic views released by the USSR showing Vostok 1 indicate that its overall design is strikingly similar to one of America's first guided missiles, the flying bomb. It is readily apparent that the Soviet space capsule does indeed have "wings" or lifting surfaces.

The annular ring or shroud on the aft section of Vostok undoubtedly was designed to provide the astronauts with the capability of selecting his landing point (within limits) after he had entered the atmosphere. By firing the retrorockets Titov could certainly have landed at "any point on the globe". The degree of flexibility of maneuver of Vostok in selecting its point of landing (the annular lifting ring serving the same function as a fin and stabilizer) is a straight forward engineering solution to reentry orientation of the spacecraft once it begins to enter the atmosphere.

Vostok appears to have a specially designed nosecone, only the most forward part of the cone is of special heat resistance material to combat the heat of reentry. The ejection position of the astronaut as well as the portholes on the Vostok are recessed just aft of the cone.

The only propulsion units evident in the photographs of Vostok are the four retrorockets on the aft annular shroud. It is therefore difficult to understand how Titov could alter the outline of his orbit without additional rocket power, however he stated that: "I could orientate it in any direction and send it anywhere at any moment." (Source: Space Business Daily, August 23, 1961)

INTERNATIONAL SATELLITE COMMUNICATIONS SYSTEM REVEALED. The Committee on Space Research (COSPAR) announces that the communications system established for the reporting of satellite data received from artificial Earth satellites during the IGY will be continued as a scientific information network. Now dubbed SPACEWARN the network will disseminate information concerning launching dates, orbital predictions, and approximate tracking observations.

The network consists of five Satellite Regional Warning Centers located in Japan, Russia, USA, England, and West Germany. Notification of launchings and other information are sent to these regional centers for immediate relay to interested organizations within their areas. Messages of various

types are coded to facilitate transmission. The network was used by the US to notify scientific organizations of the launching of Explores 1, 3, 4, 6, 7, 8, 9, 10, 11, and 12, as well as Vanguard 1, 2, and 3; Pioneer 4, and 5; Tiros 1, 2, and 3; and Echo 1. The Soviet Union used the system to announce the launching of Sputnik 3 and Lunik 2 and 3. (Source: IGY Bulletin, No. 50, August 1961)

RUSSIA STUDIES ANABIOSIS FOR POSSIBLE USE IN SPACE FLIGHT. With a view toward possible application in space flight, Soviet scientists are working on the problem of slowing down vital processes temporarily by lowering body temperature. They have succeeded in reviving simple plant and animal organisms (fungi, algae spores, etc.) which had been in an anabiotic state in permafrost for centuries. Hamsters kept for over an hour with body temperature below freezing (half the body water turned into ice) have also been revived successfully.

In the case of humans, A. A. Vishnevskiy has reduced body temperature to 8°C and heartbeat to 15 per minute for certain chest operations. It is felt that anabiosis may be of importance for long space flights by cutting down on the requirements for food, water, and oxygen. Astronauts would be revived shortly before reaching their destination. (Source: Office of Technical Services)

RETARDATION OF EARTH'S ROTATION. The atomic clock helped determine the retardation of the Earth's rotation caused by solar flares on February 23, 1956, and July 15, 1959. Two possible mechanisms are advanced to account for the retardation.

The first is based on the upper air density increase and the attendant increase of the Earth's moment of inertia. According to US data, upper air density varies by a factor of 3-10 due to solar activity. At the upper limit, this would lead to a relative increase of 10^{-13} of the moment of inertia which is not enough to account for the observed effect, states Vaysberg of the USSR.

The Soviet adds that the second, and more realistic, mechanism would consist of the generation of magnetohydrodynamic waves in interplanetary plasma by the rotating Earth whose magnetic dipole axis is inclined $11^{0}5$ to the axis of rotation. According to Japanese calculations, the rotational distortion of the dipole field would result in a radiated power of the order of 10^{18} erg/sec, accounting for a retardation by 10 per cent for the entire period of the Earth's existence.

Assuming that during the flares the corpuscular stream took 1 day to pass by the Earth, the radiated power would be 5.5×10^{21} erg/sec for the first flare, and 5×10^{23} erg/sec for the second. Considering magnetic field intensity data obtained by Pioneer 5, and the density and speed of the corpuscular stream, it is concluded that the stream can distort the geomagnetic field to a distance of 2/5 Earth radii. To counteract the

continuous retarding tendency, another mechanism, such as compression, is postulated as continuously increasing the rotational speed of the Earth. (Source: Office of Technical Services)

RUSSIA DISCUSSES FUTURE TRENDS IN PHYSICS. Discussing trends in modern physics in connection with the newly proclaimed program of the Communist Party, Academician M. Pasechnik, Director of the Institute of Physics, Ukrainian Academy of Sciences, sees the most important problem to be solved by Soviet scientists during the next ten years in the development of new nuclear-energy power sources.

He states that "in spite of difficulties inherent in the synthesis of nuclear fuel from sea and ocean water it is our firm belief that such synthesis has great potentiality and will become a reality." He also notes that hundreds and thousands of billions of electron volts necessary for penetration in the submicroworld cannot be expected to be produced on Earth. "Exploration of space, however, presents a possibility of creating suitable laboratories on satellites or on the Moon." (Source: Office of Technical Services)

ELECTROMAGNETIC FLOWMETER DEVELOPED BY RUSSIANS. The Khar'kov State Institute of Measures and Measuring Instruments has developed an experimental model of an electromagnetic flowmeter capable of measuring 500 m^3/hr of liquid with an error not exceeding 0.5 per cent.

The flowmeter consists of a pickup and an auxiliary circuit. The pickup generates emf as a result of motion of the liquid in a magnetic field and consists of a plexiglas chamber which carries two copper electrodes. The chamber, which is connected to a pipeline, is placed between the poles of an electromagnet. To avoid interferences from external electromagnetic fields the chamber is carefully shielded; the interference level does not exceed 5 μv. The output voltage of the pickup at the maximum flow of 500 m^3/hr is 12 mv. The flowmeter may be used for measuring the flow of liquids whose resistivity does not exceed 10^5 - 10^8 ohm·cm. (Source: Office of Technical Services)

SOVIETS CONVERT GLASS INTO MICROCRYSTALLINE MATERIALS. Russian experiments conducted by the All-Union Scientific Research Institute of Glass together with other scientific research institutes on obtaining new types of construction glass have resulted in a method of converting ordinary glass into materials with microcrystalline structures.

The new materials, called "Sitalls", are harder than high-carbon steel, lighter than aluminum, and approximately five times stronger than regular glass. Some varieties are heat resistant up to 1400°C; heating to this limit and dipping into water does not deform the materials or destroy their properties. (Source: Office of Technical Services)

RUSSIANS STUDY LUNAR RADIO EMISSION IN THE 10-CM BAND. In April-May 1960 the Physics Institute imeni P. M. Lebedev, Academy of Sciences USSR, conducted observations to determine lunar thermal radio emission in the 10 cm band. The observations were carried out with the aid of a 22-m radio telescope.

The antenna temperature was determined through the use of a gas-discharge noise generator; it varied from day to day within 132-152°K. The results showed the average brightness temperature on the 9.6-cm wavelength to be 230°K, the systematic error being 15 percent as a result of inaccurate determination of the antenna parameters. It was further found that the amplitude of the variable temperature component does not exceed 1.5 per cent of the lunar brightness temperature. The results agree closely with those obtained in observations in the 20-cm band. (Source: Office of Technical Services)

GLIDING RANGE OF A WINGED VEHICLE AT COSMIC SPEEDS. The Russians are studying the possibility of using the high kinetic energy of a cosmic-speed vehicle for glide flight.

Gliding is considered a quasi-steady-state immersion in the atmosphere at altitudes of 70-75 km of a vehicle moving in unpowered flight at orbital velocity with axial overloads of 4-5 G's. Soviet scientists have derived equations for calculating the glide path under the following assumptions: (1) the lift-drag curve is $C_x = C_{xo} + AC_y^2$, where C_x is the drag coefficient, C_{xo} is the drag coefficient at the zero lift angle of attack, C_y is the lift coefficient, and A is a constant; (2) the atmosphere is isothermic with a density $p = p_o e^{-BH}$, where B = 1/6700 and H is the altitude; and (3) the change in terrestrial gravitation with altitude is neglected. Various types of gliding are analyzed, e.g., at constant p and zero path angle, constant C_y, and constant path angle, and the flight parameters for each case are determined in order to establish the optimum path. (Source: Office of Technical Services.)

MORE LUNAR AND SOLAR RADIO EMISSION STUDIES BY SOVIETS. Additional data has been obtained by the Russians on observations of lunar and solar radio emission in the 4-mm wavelength range.

The observations, conducted on Mount El'brust in the summer of 1960, showed the solar radio temperature to be 8000 $\pm$ 700°K. The Russians stated that comparison of the results with those obtained on other wavelengths showed good agreement. The results also agreed with those arrived at analytically on the basis of the theory of a homogeneous model of the lunar surface. (Source: Office of Technical Services)

TWO-PHASE-STREAM HEAT TRANSFER. The USSR has preliminary experimental data on a method of intensifying the convective heat transfer from a gas to a heated surface by introducing a finely dispersed liquid heat carrier into the gaseous medium.

Analysis by the Soviet scientists shows that a highly effective method of heat-transfer intensification can be achieved by using a two-phase heat-transfer agent consisting of a gaseous carrier medium with fine droplets of a nonvolatile fluid suspended in it.

The experiments, using one- and two-phase media at temperatures between 30 and 70°C, were conducted in order to determine aerodynamic resistances in the heat exchanger, the mean heat-transfer coefficient of the heated surface, and the total effectiveness of the method. In the change-over from a one- to a two-phase stream an insignificant increase in the aerodynamic resistance of the system was accompanied by an appreciable increase in the heat transfer.

The Russians are currently conducting research on liquid intermediate heat carriers capable of operating in higher temperature ranges. Organoscilicon compounds, e.g., tetracresyl silicate, are the most promising heat carriers at temperatures up to 300-350°C. (Source: Office of Technical Services)

SOVIETS ANNOUNCE TITOV SUFFERED INSTABILITY OF NERVOUS SYSTEM. Russian scientists attending the recent XII International Astronautical Congress stated that cosmonaut Titov suffered instability of the central nervous system, due to the affects of weightlessness.

Gagarin and Titov's orbits were parts one and two of a three part initial phase in the USSR chelovek program. The Russian scientists state that Gagarin was either not in orbit long enough for the ill effects of weightlessness to be induced or else he is one of those persons that would not be affected regardless of the duration.

The Soviets have stated that part three of their program will be a multi-manned long-duration orbit experiment. One of USSR's most publicized space spokesman, V. V. Dobronravov links the rocket tests in the Pacific with the forthcoming space experiment. Because the tests "are going very successfully, it may be supposed that in the near future, the whole world will see new and most interesting achievements by the Soviet people in the conquest of interplanetary space," states the Soviet scientist. Alexander Mikhailov of the Leningrad Observatory stated that "although a Moon flight presents tremendous difficulties, the required precision is possible, with the present standard of rocketry."