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FEATURED ARTICLES

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NASA TRANSLATION LIST NO. 1
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Part I: Translations Completed

NASA translations are listed in Section A. Translations in the TT F-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

INDEX No.

1. Academy of Sciences, USSR, Committee on Geology and Geophysics
COMMUNICATION CONCERNING SCIENTIFIC WORKS IN THE FIELD OF GEOMAGNETISM AND AERONOMY. (Soobshcheniye o Nauchnikh Rabotakh po Geomagnetizmu i Aeronomii.)
Moscow, 1960. 91 p. $2.25 (OTS) NASA TT F-60

2. Academy of Sciences, USSR, Committee on Meteorites
METEORITICS. (Meteoritika.) No. 19.
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4. Antsilevich, M. G. and Shevnin, A. D.
ON GEOMAGNETIC OBSERVATIONS WITH THE AID OF THE FIRST SOVIET SPACE ROCKET. (K Voprosu o Geomagnitnykh Nablyudeniyakh na Pervoy Sovetskoy Rakete).
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ON THE ABSORPTION OF COSMIC RADIO EMISSION IN THE IONOSPHERE. (O Poloshchenii Kosmicheskogo Radioizlucheniya v Ionosfere). Izvest. Vysshikh Ucheb. Zavedeniy, Radiofizika 4,No.1, 44-8(1961). NASA TT F-8035

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MOLECULAR IONS IN THE UPPER ATMOSPHERE. (Molekularnyye Iony v Verkhney Atmosfere).
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9. Denisse, J. F. and Rocard, Y.
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16. Gershman, B. N.
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19. Gontkovskaya, V. T. and Chebotarev, G. A.
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20. Gopasyuk, S. I.
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21. Gordon, I. M.
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23. Gringauz, K. I. and Rytov, S. M.
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SOME EXACT SOLUTIONS OF EQUATIONS OF UNSTEADY FLOWS IN MAGNETIC HYDRODYNAMICS. (Nekotoryye Tochnyye Resheniya Uravneniy Neustanovivshikhysya Dvizheniy v Magnitnoy Gidrodinamike).
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Part II. Translations 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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63. Cichowicz, L. and Zielinski, J.
PROBLEM RELATED TO OBSERVATIONS OF THE POSITION OF ARTIFICIAL EARTH SATELLITES AND SIMULTANEOUS DETERMINATION OF THEIR GEOGRAPHICAL COORDINATES.
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67. Gringauz, K. I., Bezrukikh, V. V., Ozerov, V. D. and Rybchinskiy, R. E.
STUDY OF THE INTERPLANETARY IONIZED GAS, ENERGETIC ELECTRONS, AND SOLAR CORPUSCULAR RADIATION BY MEANS OF A 3-ELECTRODE TRAP FOR CHARGED PARTICLES ON THE SECOND SOVIET COSMIC ROCKET. Pages 101-7 of ARTIFICIAL EARTH SATELLITES, No. 6, 1961.

68. Grishin, N. I.
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66. Gringauz, K. I., Bezrukikh, V. V., and Ozerov, V. D.
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VOSTOK 2. In a more complex orbital flight than that recently performed by Maj. Yuri Gagarin, Maj. Gherman Stephanovich Titov manually controlled the five ton satellite, Vostok 2, for an hour during its fourth revolution around the Earth. Maj. Titov reported "good manual controllability of the spaceship".

Tass announced that the ship weighed about 10,400 lbs after it had dropped the last stage of the rocket carrier. Vostok 2 had an apogee of 257 km and a perigee of 178 km with an initial period of 88.6 minutes. The temperature in the cabin ranged from 20 to 22°C (68 - 72°F) with relative humidity about 70%.

The Vostok 2 was launched from a Soviet missile center called Cosmoport in Kazakhstan, northeast of the Aral Sea. The huge six-engine rocket is estimated to have at least 800,000 lbs of thrust and possibly as much as 1,500,000 lbs.

The main scientific question about Maj. Titov's flight was how he withstood the 25 hrs or so of weightlessness. One of the main worries of doctors has been that a prolonged period of weightlessness would disrupt the body and cause the muscles to atrophy or weaken.

Maj. Titov said the most important impression he had brought back from his trip was the confidence that weightlessness did not interfere with life and work. He stated, "I was in the weightless state for a long time but successfully carried out all the slight assignments and I could draw only one conclusion: weightlessness does not interfere with a cosmonaut's work. It did not cause any incidents in the space ship and, generally speaking, there are no sharp changes in space". He added that the stage of weightlessness causes some peculiarities, but they cannot be considered a hindrance.

Izvestia said Titov jokingly thanked the collective farmers who were at the landing scene, saying: "The land was excellently cultivated and my landing was very soft." Observers stated that on landing Maj. Titov had a red face "as though he had space sunburn".

Details of the landing were not immediately disclosed but it was believed the spaceship came down suspended from parachutes. Information has been released which indicates that there is an alternative landing procedure in which the cosmonaut ejects himself from the primary reentry body in a manner similar to that employed in conventional fighter aircraft. Major Titov claims to have landed by using this ejection method.

The total flight lasted 25 hrs 18 min and the distance travelled was more than 700,000 kilometers.

Scientists studying the few photographs released of Maj. Gagarin's spacecraft estimate it to be 12 to 14 ft in diameter and 20 ft long, and capable of keeping a man alive in space up to 10 days.

Major Gagarin, on being advised of Titov's flight, stated that Major Titov had complete control of his craft and "could land it anywhere" This suggested advance knowledge that the space flight was imminent. Maj. Gagarin also stated that the craft was a "multiplication" of the vehicle in which he travelled and that Maj. Titov was scheduled to sleep during the seventh and fourteenth orbits. He also stated that there might be as many as five men sent aloft in future Soviet spaceships. (Source: New York Times, August 9, 1961)

U. S. POSTS "HEARD" SPACE LAUNCHING. The United States listening stations were reportedly able to follow the preparations for the launching of the Soviet spacecraft and President Kennedy was kept informed of the countdown.

Officials declined to discuss this electronic eavesdropping because it involved some of the most secret intelligence operations of the United States.

The global United States space-tracking network followed the progress of the new five-ton Russian spaceship. Clear signals were reported to have been received by U. S. Minitrack stations on the 19-megacycle tracking frequency being used from the Soviet capsule.

Bild Zeitung, a mass-circulation West German daily newspaper reported the United States knew in advance of Maj. Titov's space flight, and "has revealed an American state secret. Preparations for the launch were observed up to the last minute. The launching was known in the same moment as the engine of the huge rocket roared to life and spat fire."

The newspaper stated that the U. S. possessed a device called 'maser' that was "just as fantastic as space flight". Bild Zeitung stated that with maser a person's temperature could be measured several miles away and that with it every rocket launching on Earth could be registered at once. The newspaper added that preparations for the launching probably were observed by American satellites. (Source: New York Times, August 9, 1961)

LUMINESCENT IONOSPHERE AROUND VENUS. Soviet astronomer Nikolai A. Kozyrev has announced a new fact about Venus. He reports "a constant luminescence of the lower strata of its atmosphere which occurs within the clouds of the planet or lower down." Adding that this luminescent ionosphere is caused by chemical processes, he feels it must be assumed that it is a "retarded burning of certain primary gases which produce the luminescent gas formaldehyde, which can form in the atmosphere of Venus from carbon dioxide, given the presence of water vapor."

Prof. Kozyrev is noted for his theory that the Moon's craters are of volcanic origin. In November 1958 he claimed to have observed and photographed a gaseous emission from the center peak of the crater Alphonsus which led to the development of this theory. (Source: Aviation Week, July 31, 1961)

RUSSIANS PLAN MANNED SPACE STATION. A top Soviet space scientist has announced that Russia will launch a manned astronomical observatory into orbit in the near future. This will be one of the next stages in Russia"s man-in-space program, said Dr. M. S. Bobrov, senior scientist of the Astronomical Council of the Soviet Academy of Sciences.

He told a London scientific meeting that the flying observatory will allow telescopic sightings unaffected by the Earth's atmosphere. He declined to specify when the observatory would go up, saying only that it would be in the near future.

"Manned flights in the neighborhood of the Moon, without landing, will take place a little later," Bobrov told the audience. "I believe everyone of you will see them very soon." (Source: New York Times, July 26, 1961)

MOON SHOTS NEXT? A leading Soviet astronomer has indicated that the Russians would now concentrate on rocket shots at the Moon. The hint, coming after Maj. Gherman Titov's day in orbit, originated with Prof. A. A. Mikhailov, president of the Astronomical Council of the Soviet Union's Academy of Sciences. He predicted somewhat dryly that the Soviet would land an automatic space station on the Moon "in my lifetime". Professor Mikhailov is 74 years old.

He hinted broadly that a manned station would not be far behind such a preliminary "observatory platform".

"We have the competence for the first interplanetary rocket," he said. "That can't be denied."

The scientist said that he had expected Maj. Titov's flight to be successful. He said he felt sure that the Soviet Union would share with the rest of the world information on aspects of space flight brought back by Major Titov and Maj. Yuri A. Gagarin, the first astronauts. (Source: New York Times, August 7, 1961)

WITNESS SAYS TAKEOFF RIVALED LIGHT OF SUN. A Soviet eyewitness reported that Maj. Titov was fired into orbit in a silver spaceship that looked like a "roaring fiery globe" as it shot upward from the barren plain. Aleksandr Romanov, special correspondent of Tass, said he drove to the launching site "along a macadam road past villages, towns and pylons of high-tension power lines. Coming nearer we begin to discern then through the maze of steel construction the slender, cigar-shaped body of a multi-stage rocket. Tremendous girders carefully but firmly cradle it."

Witnessing the launching from about a mile away, the correspondent reported that "from a distance we can see the silvery rocket, already completely free from the supporting gantry. Another second, exactly 0900 and the rocket, propelled by some unbelievable, miraculous force, slowly leaves the Earth. Gathering force, it streaks more and more quickly upward, like a roaring fiery globe. At this moment, it seems that two suns are shining on the Earth." (Source: Washington Post, August 8, 1961)

"BALL LIGHTNING" DISCUSSED. Consultants Bureau, Inc. has announced the forthcoming publication of seven Soviet scientific papers in a book, Ball Lightning edited by Donald J. Ritchie. The collection of these papers under one cover is to be released in December of this year and will provide researchers and laymen with information on the progress of Soviet research on the subject of ball lightning. The most interesting application of the physical principles underlying the phenomenon of ball lightning may lie in its potential value as a means of producing thermonuclear power. (Source: Consultants Bureau, Inc. release)

"ARTIFICIAL EARTH SATELLITES" - Volumes 3, 4 and 5 Published. Plenum Press, Inc. has announced publication of Artificial Earth Satellites, Volumes 3, 4 and 5 edited by L. V. Kurnosova. This book, which has been translated from Russian, contains reports of the Soviet research in satellite orbit mechanics and satellite-born experiments on the outer space environment which led to Gagarin's successful flight. Thirty-seven scientific and technical papers by such leading Soviet space scientists as Academician L. I. Sedov are included. Subsequent volumes in this series will be published in complete English translation soon after they appear in Russia.

RADIO BRIDGE INTO THE UNIVERSE (USSR). At a press conference held for astronaut G. S. Titov on August 11 at Moscow State University, Academician V. A. Kotel'nikov reported on the system used for communication between Vostok 2 and the Earth. Transmission from the ship was carried out with two AM short-wave telegraph-telephone transmitters operating in parallel at 15.765 mc and 20.006 mc through special separation filters with a common antenna. A third, 143.625 mc, FM transmitter operating within a $\pm$30 kc bandwidth with a special antenna was used during the ship's flight over the territory of the USSR. Transmission from the ground to the ship was also carried out on two short wavelengths and one very short wavelength, the latter used during flight over the USSR.

All receivers on board the ship employed semiconductor devices with sensitivities of the order of a few microvolts. The low-frequency characteristics of all the radio links were optimized in order to obtain maximum intelligibility. This was achieved by symmetrical limiting of the input signal.

Titov could carry on transmission either from microphones mounted in his helmet or from microphones placed in the cabin; he could receive communication through earphones or from three dynamic loudspeakers. In case of poor audibility a telegraph key was provided on board; there was, however, no need for its use. The cabin was also equipped with a magnetic tape recorder which switched on automatically at the moment the pilot began to speak. During flight above the USSR the recorded speech was transmitted through a VHF transmitter with a speed seven times greater than the recording speed. Two TV systems on board the ship could transmit the pilot's picture to the ground: a narrow-band system, already used on spaceships, with a definition of 100 lines and a new wide-band system, under study in this flight, with a 400-line definition. Both systems transmitted ten frames per sec through two separate very short wave transmitters. Reception on the ground was carried out with special TV receivers and was filmed synchronously with the registration of physiological functions of the pilot's orgamism. (Kotel'nikov, V. A. Izvestiya, 12 Aug 1961, 3, cols. 3-5) (Source: Office of Technical Services)

HIGH-SPEED PHOTOELECTRIC SPECTROPHOTOMETER (USSR). A photoelectric solar spectrophotometer for rapid registration of the intensities of the solar spectrum incorporates an autocollimation spectrograph with double reflection of the light beam from the diffraction grating. The spectrograph was developed by V. Ye. Stepanov and A. A. Kopystyanskin in 1952 at the L'vov Astronomical Observatory.

This small, powerful spectrograph has a second order dispersion of 2 A/mm for the green region of the spectrum; the plane diffraction grating, 8 x 10 cm, has 601 lines/mm. To test the performance of the spectrophotometer the spectrum of the solar disk center was recorded at the rate of 40 A/sec. The data show good agreement with those obtained by C. W. Allen. A schematic diagram and some design data are included in the article. (Kozak, P. P. Astronomicheskiy Zhurnal, v. 38, no. 3, May-June 1961, 549-552. S/529/61/038/003) (Source: Office of Technical Services)

INFRARED RADIATION OF THE GALACTIC CORE (USSR). In June 1960, at the Crimean Astrophysical Observatory, an attempt was made to detect the infrared radiation of the galactic core, assuming that the position of the core coincides with that of the brightest region of the radio emission source Sagittarius A, as determined previously on the 3.15 cm wavelength. An infrared photometer, sensitive in the 1 to 2.5 μ range, was installed on the 50-inch reflector for use in the measurements. No brightness increase in the infrared was observed in the zone investigated (upper limit $8^m.5$ stellar magnitude). The presence of neutral interstellar absorption, which in the direction of the center is not less than $1\text{-}2^m$, is suggested as the probable cause of the absence of brightness increase. (Moroz, V.I. Astronomicheskiy Zhurnal, v. 38, no.3, May-June 1961, 487-490) S/529/61/038/003.) (Source: Office of Technical Services)

FUTURE SPACE COMMUNICATION TECHNIQUES (USSR). Improvement of the present principles of high-frequency generation and amplification combined with the use of electrovacuum and semiconductor devices and the development of devices which use the natural vacuum in space constitute the two trends in the development of high-frequency techniques to be used in spaceships. Although the latter trend is only in its initial stages an "unprecedented qualitative breakthrough may be anticipated".

It is possible that during space flight low-power electronic oscillators without envelopes will be exposed to the natural vacuum of cosmic space and that their electrodes will be cooled by the environment. These considerations are valid for comparatively low-speed space vehicles; however, in the case of photon rockets the flow of particles against the rocket will be large and flight will be similar to that in a dense medium. There is a possibility, however, that by modulation of its intensity the photon jet of the rocket may itself be used for ship-to-Earth communication, a technique which could establish completely new principles in radio engineering. Coldness in space will probably be utilized also in the development of new devices of superb efficiency operating on the principles of superconductivity.

In the planning of space communications it is stressed that ground transmitters must be designed for maximum power in order to minimize the demands on airborne receiving equipment. Since present power-supply sources are not adequate to fulfill the requirement for prolonged and reliable operation in space, considerable progress in the development of new nuclear power-supply sources for spaceships is anticipated during the next few years. (Zin'kovskiy, A. I. Radiotekhnika i kosmicheskiye polety-Radio Engineering and Space Flights. Moskva, Gosenergoizdat, 1960, 23-25, 33) (Source: Office of Technical Services)

EFFECT OF A MAGNETIC FIELD ON A GAS FLOW AROUND A BODY (USSR). It is noted that if a body is located in a high-velocity gas flow the temperature in the boundary gas layer may become very high, resulting in ionization of the gas, and that under such conditions application of electric and magnetic fields may substantially affect the gas flow around the body. The effect of an external magnetic field on the laminar boundary layer in a plasma was studied theoretically under the assumption that the difference in temperature between the gas and the body is small.

Solution of the hydrodynamic equations shows that a condition may exist under which friction at the surface of the body increases steadily with an increase in H, the component of the magnetic field which is perpendicular to the flow velocity. It is further shown that with large values of H the increase in friction becomes linear. (Andriankin, E. I., and Yu. S. Sayasov. Zhurnal tekhnicheskoy fiziki, v. 31, no. 7, July, 1961, 775-780. S/057/61/031/007.) (Source: Office of Technical Services)

RADAR BEAM USED FOR STUDYING SEMICONDUCTORS (USSR). Yu. Pozhela, of the Semiconductor Electronics Laboratory of the Institute of Physics and Mathematics, Lithuanian Academy of Sciences, has invented a method for exciting semiconductor electrons to high energy levels by placing the specimens in the field of a radar beam. As a result, the electrons acquire a temperature of several thousand degrees while the crystal remains cool. The method is free of the disadvantages of d-c pulse heating, which has been used until now. (Vasardamas, E. Komsomolets, 7 July 1961, 4, cols. 1-2) (Source: Office of Technical Services)

NEW EJECTION SEATS AND EMERGENCY CAPSULES (USSR). New models of ejection seats have been developed in which the explosive charge is replaced by a rocket engine. Most recent models which make ejection at 24,000 km/hr possible consist of capsules which close hermetically before ejection, protecting the pilot from the impact of the flow of air. The capsule is provided with a parachute and contains emergency provisions, oxygen equipment, and a raft.

During the descent four telescopic arms provided with floats emerge from the capsule in order to stabilize the landing. Systems are being developed in which the whole front part of the fuselage is detachable and provided with a parachute, thus forming the emergency capsule.

Rocket devices have also been developed for emergency even at take-off of space rockets. The capsule separates from the rocket, shoots high in the air, and lands with a parachute. (Sovetskaya Litva, 20 July 1961, 3, cols. 2-4) (Source: Office of Technical Services)

CHARACTER-RECOGNIZING COMPUTERS (USSR). At the meeting of the Presidium of the Academy of Sciences USSR on July 28, A. A. Kharkevich, Corresponding Member, Academy of Sciences USSR, reported on studies being carried out by the Laboratory for Information-Transmitting Systems.

The Laboratory has developed a computer which recognizes the sound of three words: "zero", "one", and "stop". It is capable of receiving commands given by any human voice at any volume. The Laboratory is also working on the development of a computer "stenographer" capable both of receiving speech and delivering it in printed form and of making translations. (Pravda, 31 July 1961, 6, cols. 2-5) (Source: Office of Technical Services)

NEW COMET (USSR). K. A. Nikitin, Head of the Khodzhi-Obigarm Astroclimatic Station of the Astrophysics Institute of the Tadzhik Academy of Sciences observed a new comet in the constellation of Auriga on the night of July 24-25, 1961. The comet, resembling one detected in 1908, had a brightness of the second stellar magnitude and its tail covered the whole constellation. The International Astronomical Center in Copenhagen reports that the comet is also being observed by American astronomers. (Sovetskaya Rossiya, 28 July 1961, 4, cols. 1-2) (Source: Office of Technical Services)

PROBLEMS OF BIONICS (USSR). L. Zotova and A. Voskresenskiy, the latter a member of the Scientific Council on Cybernetics, Academy of Sciences USSR, define the new field of bionics as "the science devoted to studying biological systems and processes for applying the knowledge gained to the solution of engineering problems for the improvement of old devices and, principally, for the development of new ones."

Understanding of the physico-chemical processes responsible for the action and interaction of nerve cells for the purpose of developing devices which simulate the behavior of living beings is considered the most important and interesting problem of bionics because circuits and networks composed o artificial nerve cells would be capable of imitating certain brain function The second important problem of bionics is the development of highly reliab technical systems composed of elements capable of performing logical operations. Such systems would be able to insure operation even if one third of the circuit components were to fail.

Other problems in bionic studies include the electrical characteristics of living tissues, regularity of repetition of certain processes in living organisms ("biological clock"), orientation of animals living under water and communication between them, analysis of the reception of sound by animals, and principles of composition of cybernetic systems with high memory capabilities. (Zotova, L., and A. Voskresenskiy. Izvestiya, 16 July 1961, 2, cols. 1-3) (Source: Office of Technical Services)

SPACE MEDICINE AND BIOTELEMETRY (USSR). Problems related to various techniques of transmitting data on the functioning of living organisms in space are discussed and a program of biotelemetric measurements carried out during space flights is described.

This program includes the following physiological investigations: (1) electrocardiography - registering of biocurrents generated by the heart muscles; (2) phonocardiography - detection of heart sounds with miniature microphones used as sensors; (3) arterial oscillography - measurement of blood pressure by applying a pneumatic cuff to the periphery of the blood vessel, employing a measuring system which operates on the principle of achieving a balance between the blood pressure and the reference pressure maintained in the cuff; (4) pneumography - registering of frequency and depth of breathing with the use of a simple sensor reacting to changes in the chest perimeter or more complicated systems requiring a special mask for measuring quantity of exhaled and inhaled air; (5) electromiography - recording of muscle-generated biocurrents to obtain curves showing muscle tension and coordination of movements; and (6) actography - recording of motion activity with the use of contact-type, tensometric, and piezoelectric sensors.

The ultimate goal of such a program of space medicine is the creation of automatic systems to control the condition of man in space. It is noted that modern science is capable of manufacturing a multichannel telemetry transmitter the size of a cigarette box and that successful work has been done in the USSR toward development of small transmitters similar to those already available in the United States for biotelemetry purposes. The soundness of the program was proved during Gagarin's flight. (Bayevskiy, R. Ekonomicheskaya gazeta, 16 July 1961, 3, cols. 6-8) (Source: Office of Technical Services)