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16 January 1967

SPACE EVENT REPORT

LUNA-9 -- 31 JANUARY 1966

CENTRAL INTELLIGENCE AGENCY
DIRECTORATE OF SCIENCE AND TECHNOLOGY

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SPACE EVENT REPORT

LUNA-9 -- 31 JANUARY 1966

SUMMARY

Luna-9, the first successful lunar lander, was launched from the Tyuratam Missile Test Range [redacted] on 31 January 1966. [redacted] The Soviet-announced landing point was 7.13°N 64.37°W, about four degrees east of the terminator in the daylit portion of the moon. After landing, the probe transmitted photofacsimile pictures of the lunar landscape and radiation background measurements.

Luna-9 was launched with the normal space vehicle--an SS-6 booster/sustainer, a Venik third stage and an interplanetary fourth stage. According to Soviet announcements, the payload consisted of a "lunar station" weighing about 220 pounds, a propulsion system for midcourse and soft landing, and compartments carrying attitude-control and guidance systems. The lunar station separated from the retrovehicle just prior to touchdown.

Luna-9 was the first successful lunar attempt of the twelve which used the parking orbit technique. In the overall Soviet lunar program, there have been only 3 successes out of 21 attempts.

[redacted]

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DATA

Soviet Press

The initial Soviet announcement of the launch of Luna-9 and one of the flight progress reports are presented below. Select press releases are presented in the Appendix together with photographs of the spacecraft and the lunar panorama transmitted by the probe.

[redacted]
Luna-9 Launching
Moscow TASS Internal Service in English 1521Z 31 Jan 66

(Text) Moscow--The Soviet Union has launched a Luna-9 automatic station.

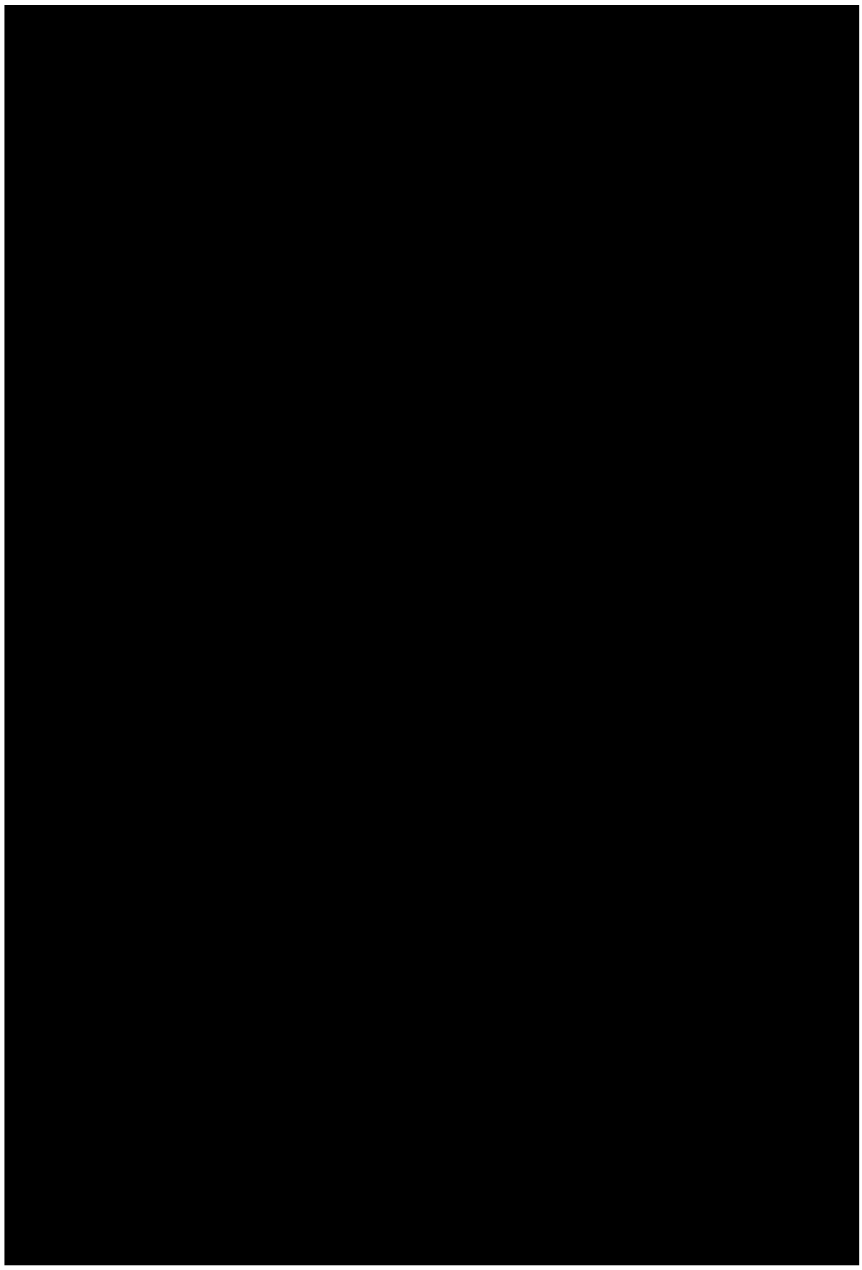
The station is streaking toward the moon along a trajectory close to the calculated one. All the equipment on board is functioning normally.

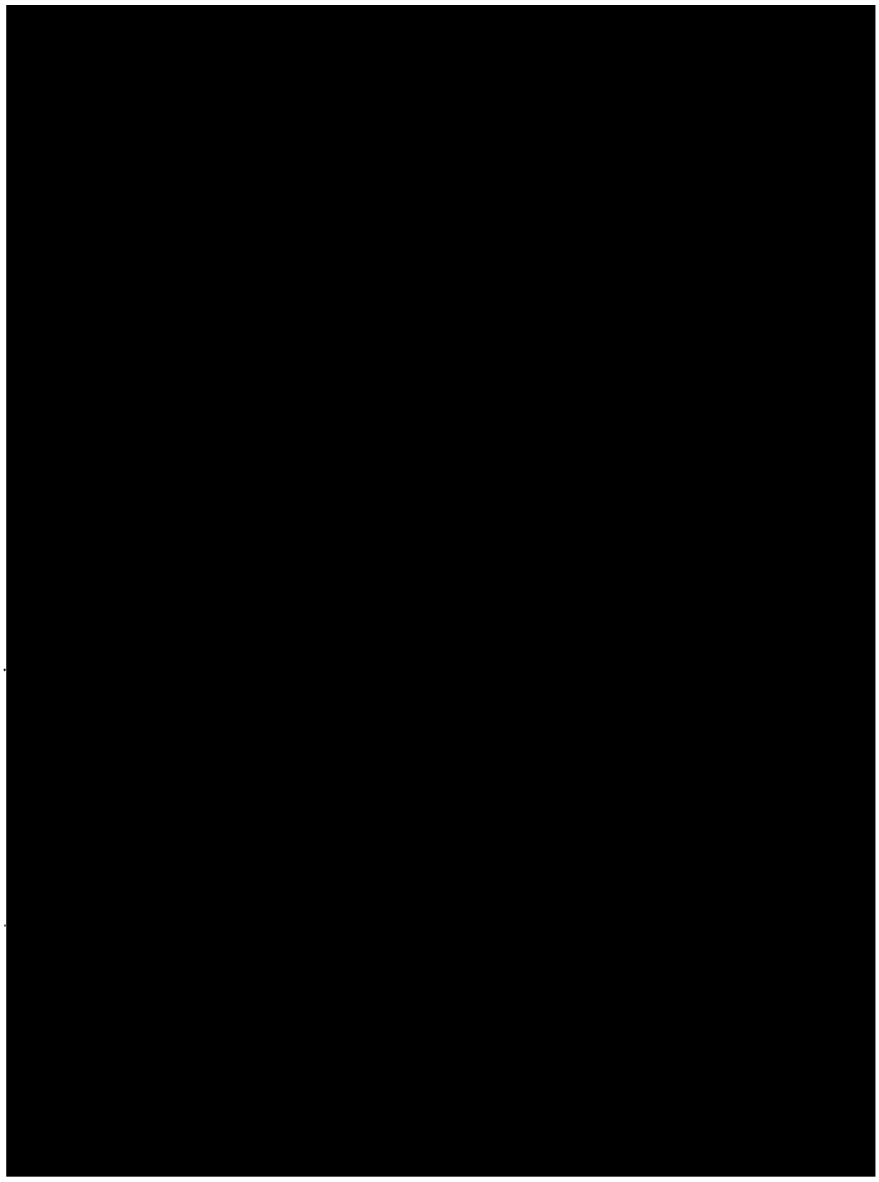
On board the station is scientific, telemetric, and other measuring apparatus, which is switched on automatically in accordance with the flight program as well as on orders from earth.

According to data of the coordination and calculating center, the Luna-9 station was 34,130 kilometers from the earth today at 1800 Moscow time and over a point on the earth 49 degrees 30 minutes north and 74 degrees east.

[redacted]
Moscow in English to Eastern North America 2200Z 1 Feb 66

(Text) The latest Soviet automatic moon probe, Luna-9, is continuing its flight. The Soviet news agency reported that its trajectory is close to estimated and that the apparatus is operating normally. The previous Soviet moon probe for perfecting a soft landing on the moon was made in December. Earlier, three similar launchings were made, during which a lot of valuable data was collected. A soft landing is an extremely complicated operation which cannot be rehearsed on earth. That is why repeated launchings are needed.





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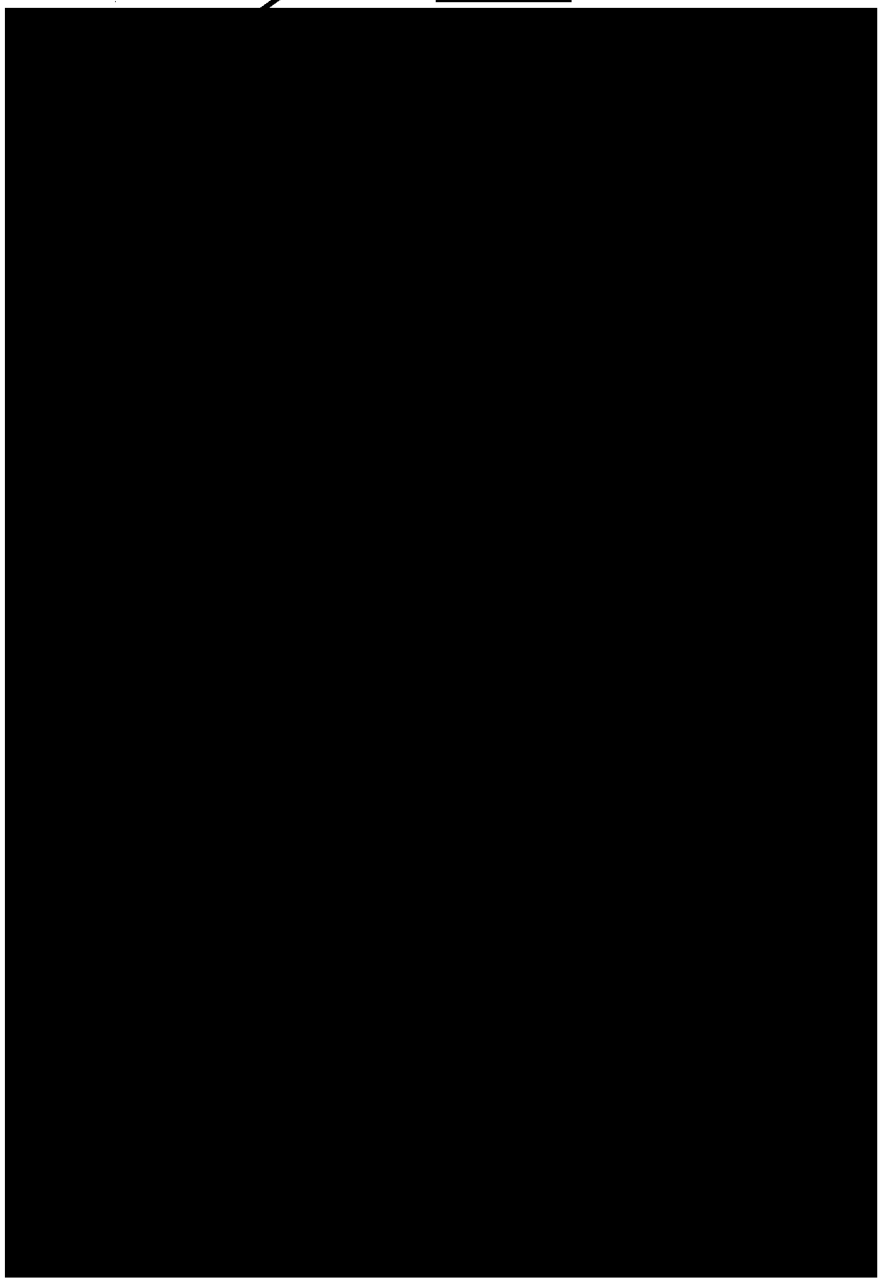

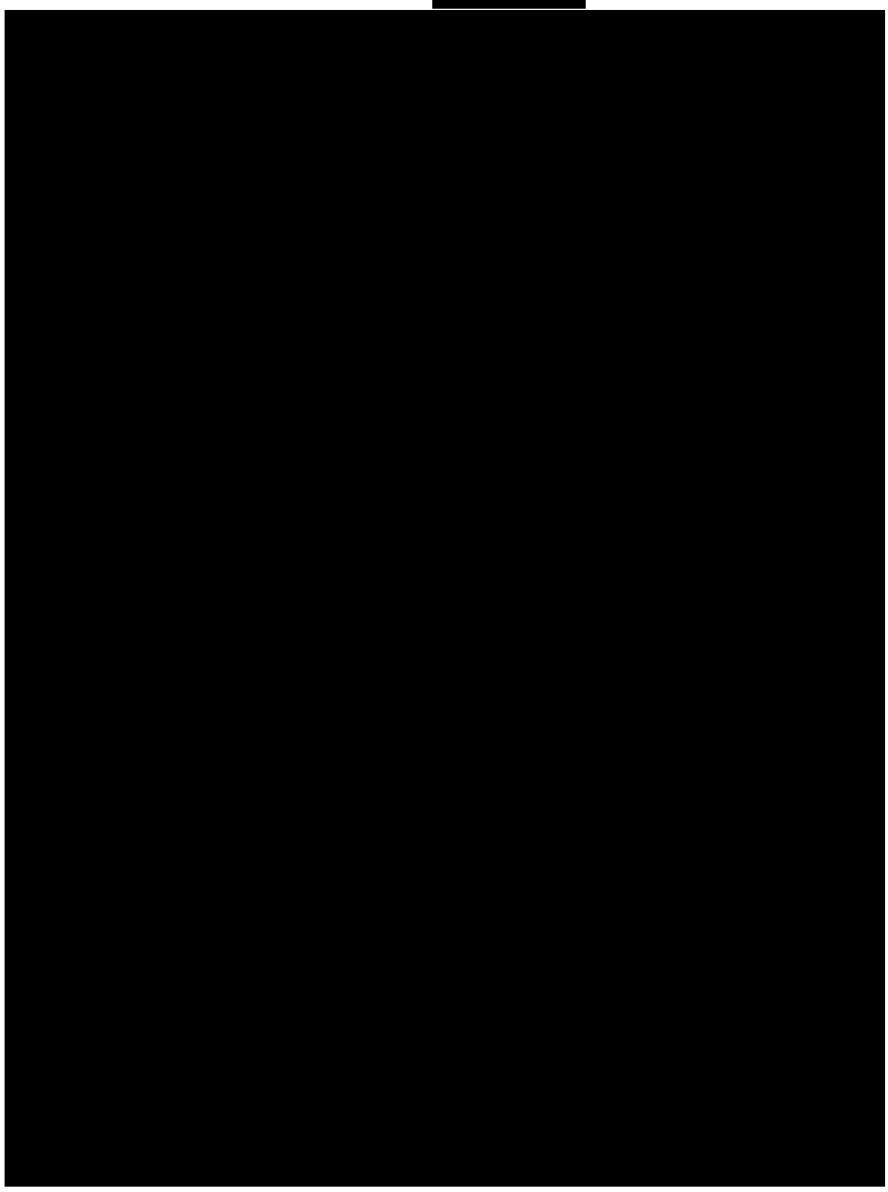

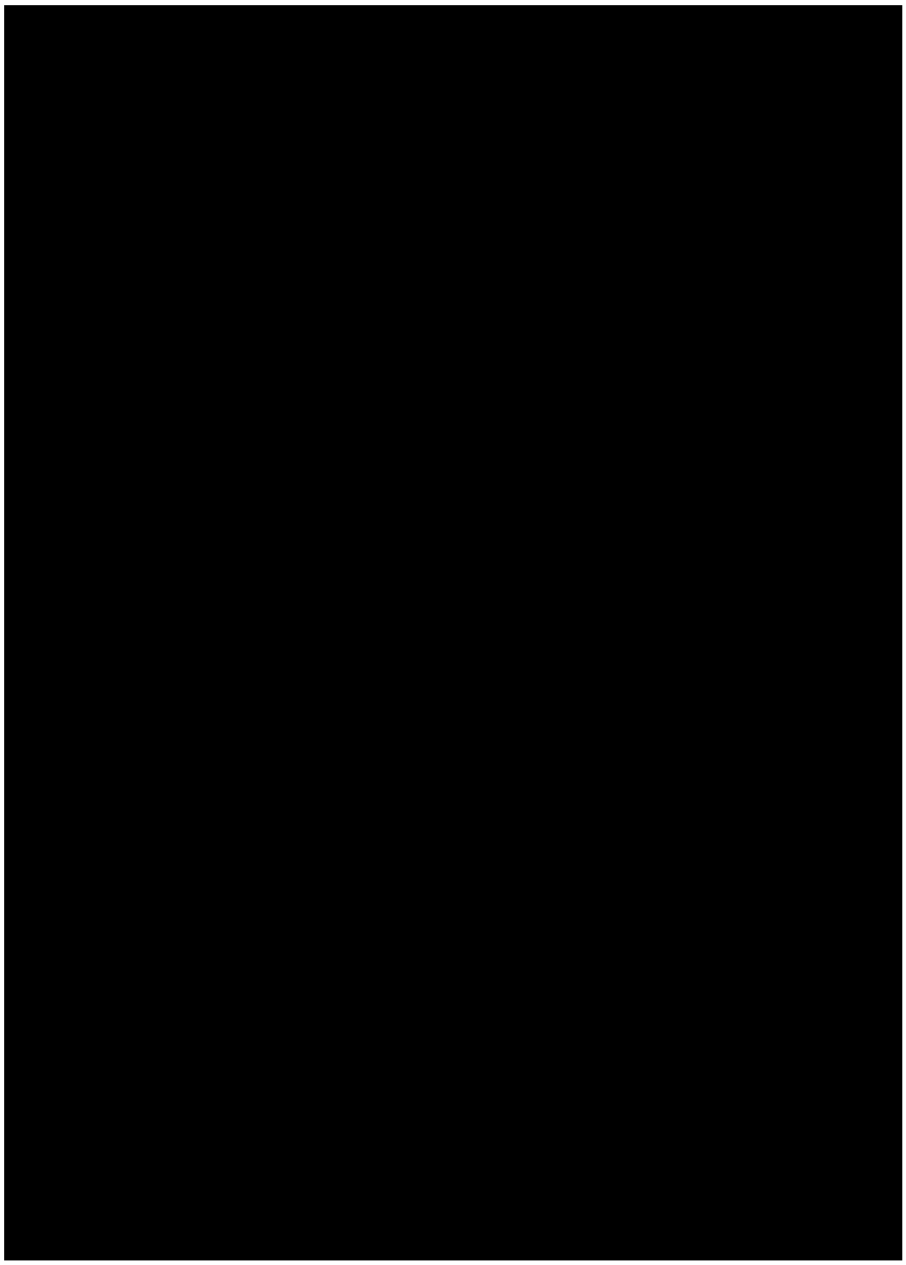

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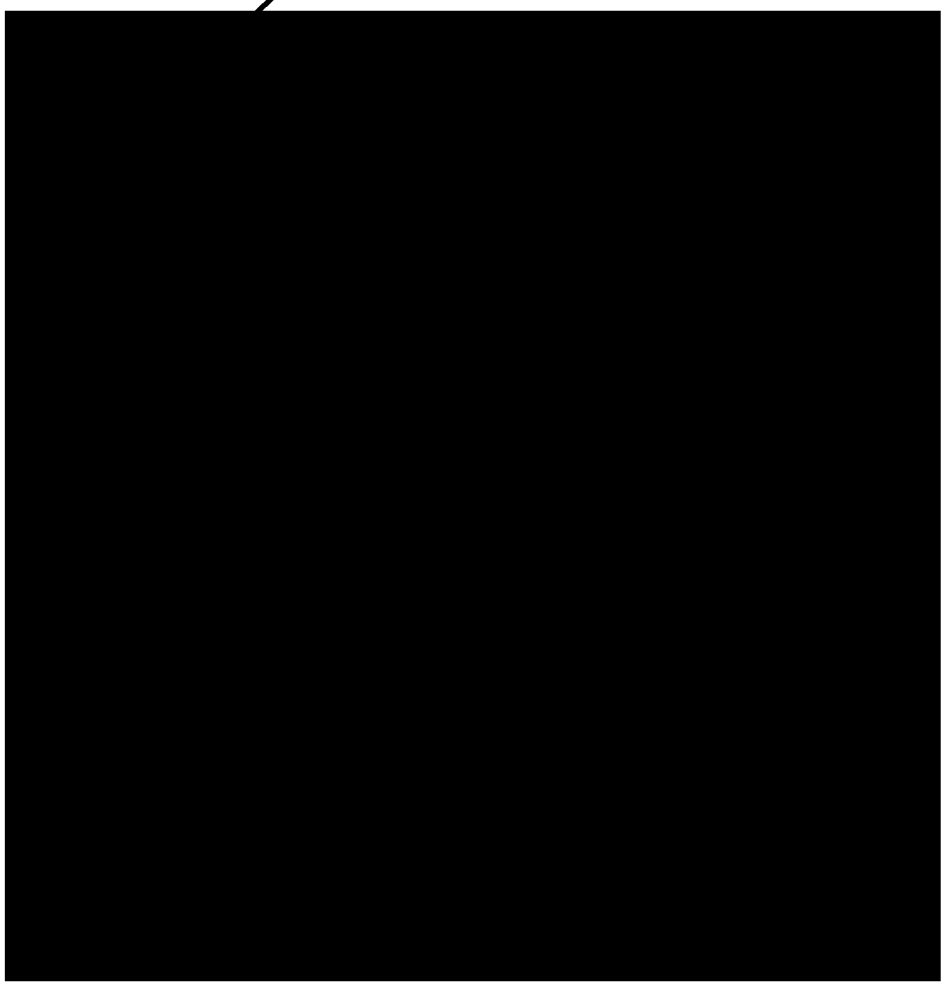
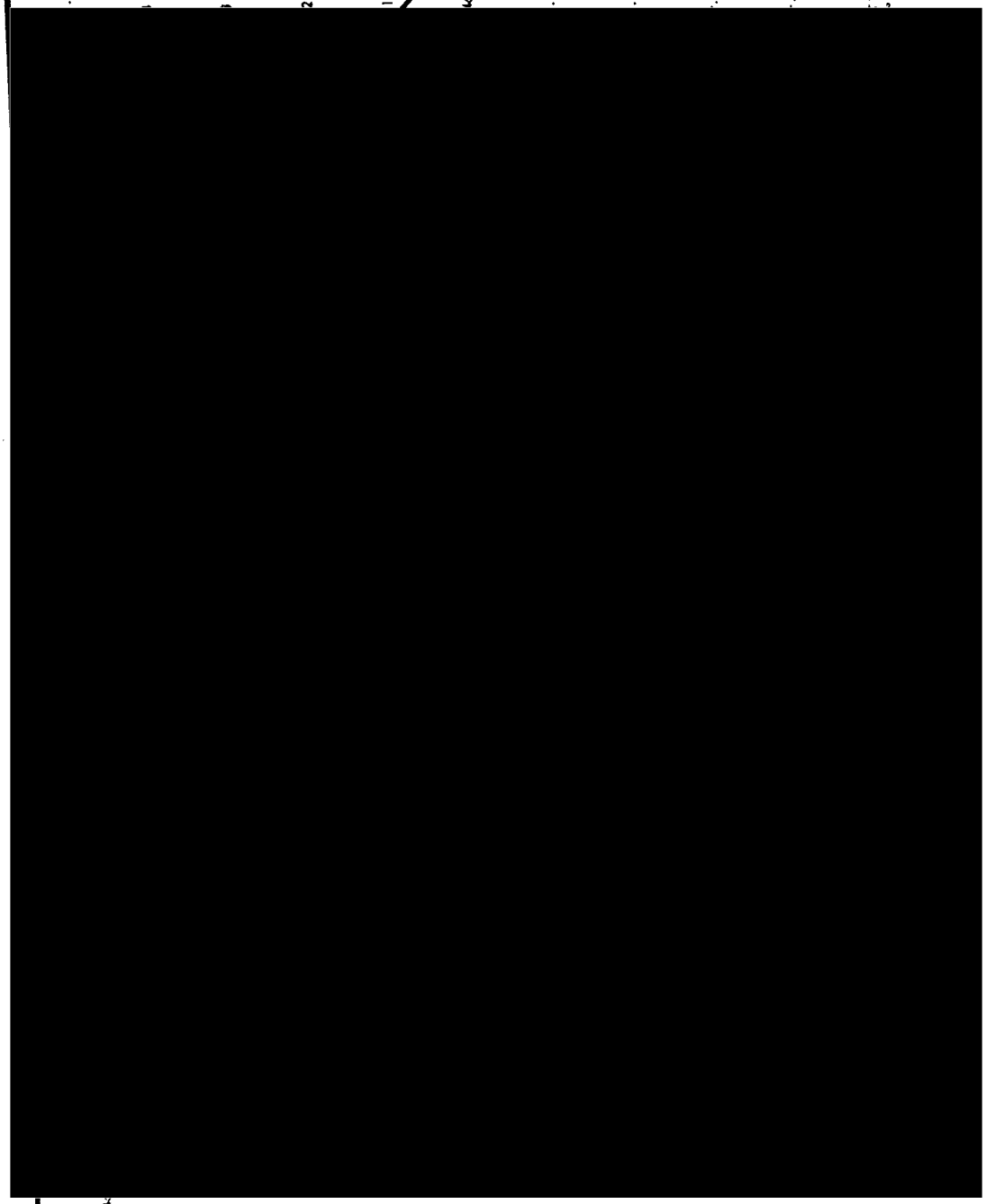
Post-Midcourse

The Soviets reported that the midcourse maneuver was performed at 1929Z on 1 February 1966 and that the magnitude of the velocity change was 71.2 m/sec. It was also reported that the midcourse thrust was applied in a plane perpendicular to the probe-moon line (lunar-horizon plane). This resulted in a trajectory which permitted deboost of the spacecraft near the lunar surface and ejection of the payload for a semi-soft landing at 1845:30Z on 3 February. [redacted]

[redacted]





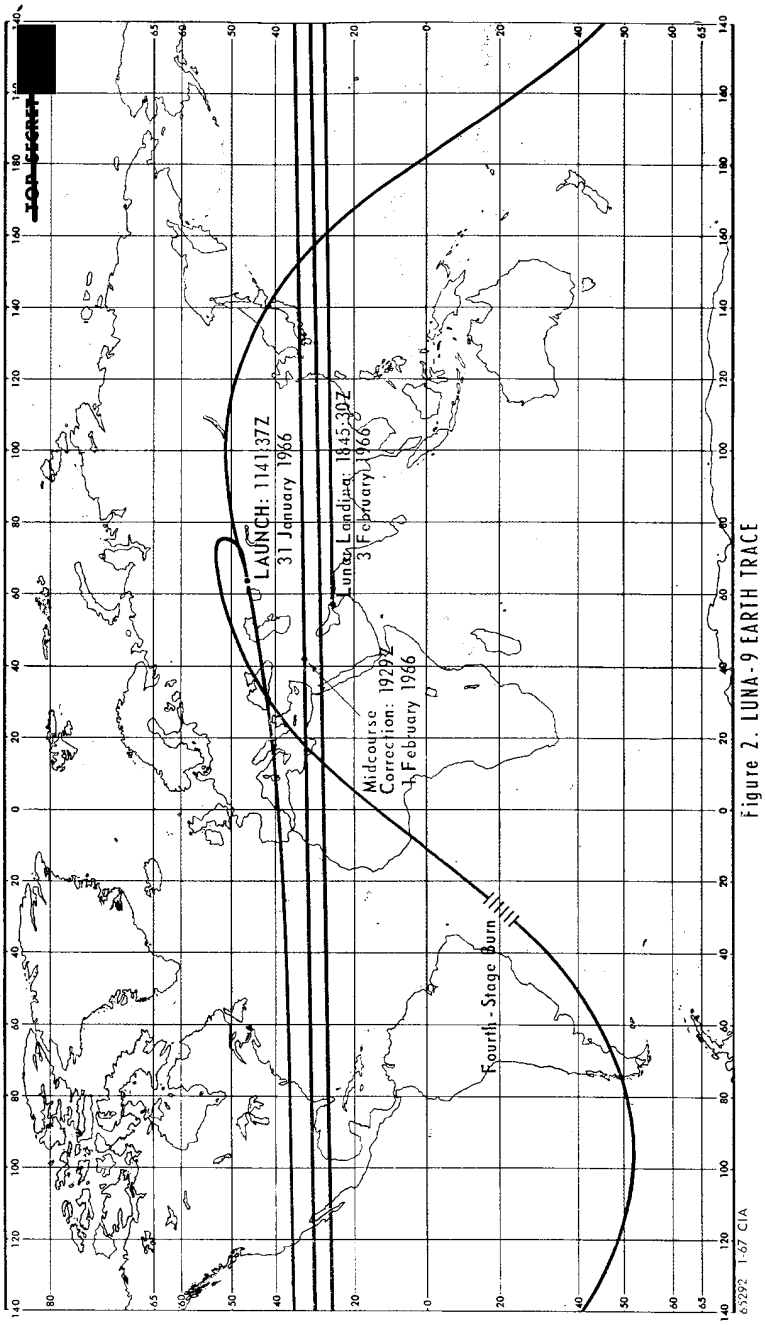
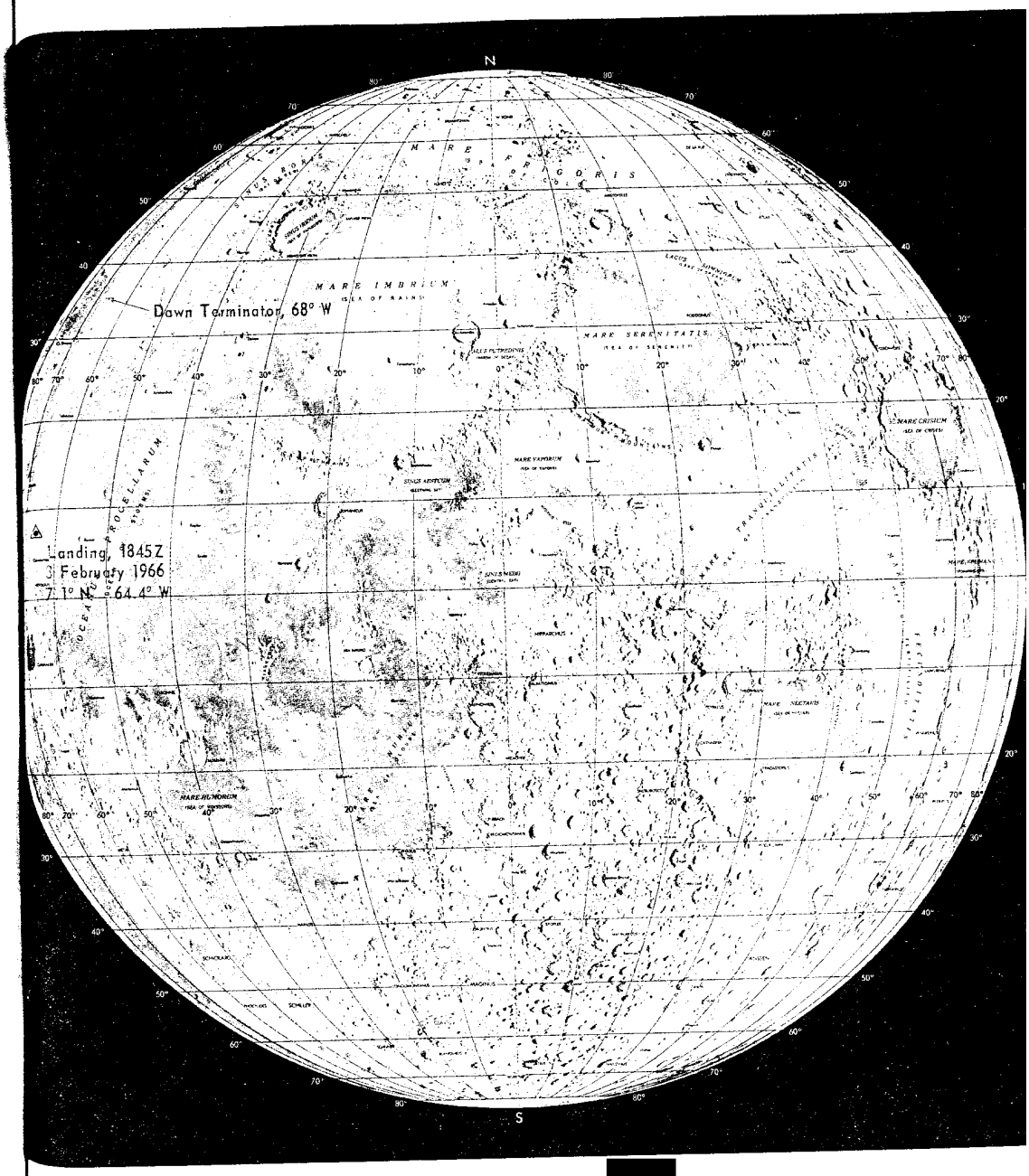


Figure 2. LUNA-9 EARTH TRACE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MARE IMBRIUM
SEA OF RAINS
MARE SERENITATIS
SEA OF SERENITY
MARE CRISIUM
SEA OF CRISES
MARE HUMORUM
SEA OF MOISTURE
OCEANUS PROCELLARUM
Dawn Terminator, 68° W
Landing, 1845Z
3 February 1966
7.1° N, 64.4° W

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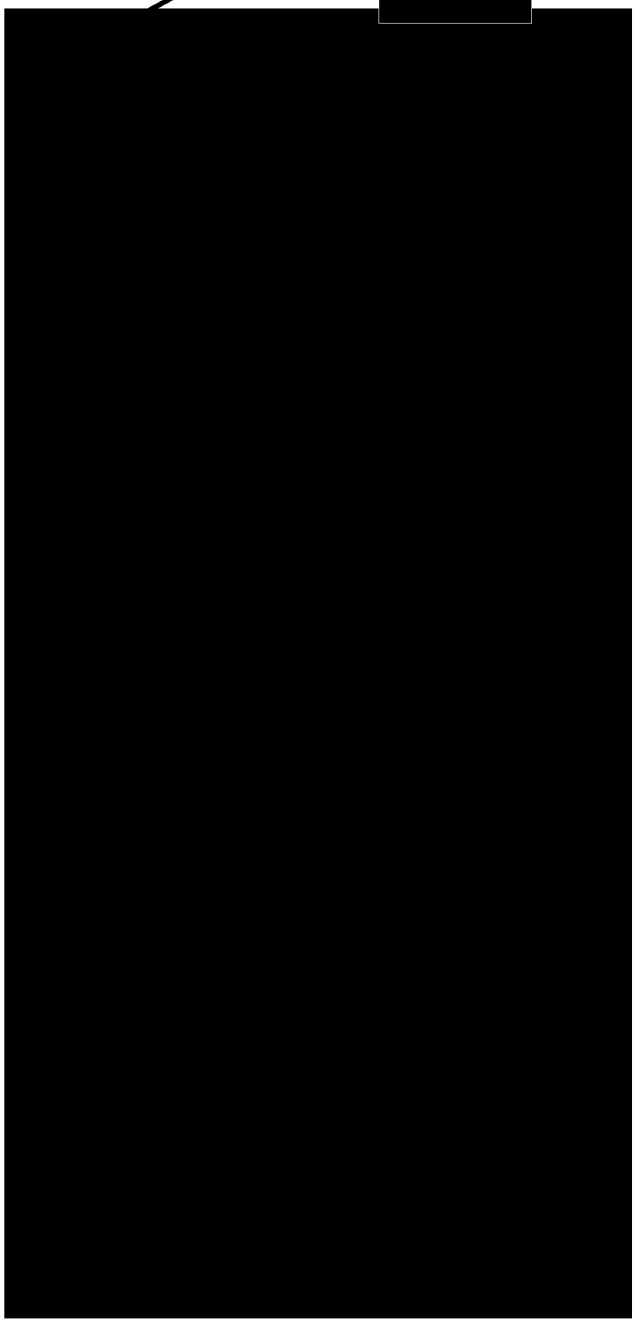


APPENDIX

[redacted]
Luna-9 Landing
Moscow TASS International Service in English 2116Z 5 Feb 66

(Text) The soft landing on the moon accomplished on Thursday evening by the Soviet station Luna-9 is one of the most difficult technical problems of cosmonautics. The development of soft landing automatic stations will allow data to be obtained about physical conditions on the moon and the properties of its surface and relief. Only such stations can furnish reliable information on the nature of the soil and its peculiarities.

The soft landing on the moon is a necessary stage for the further development of cosmonautics and man's winning of the moon.

Luna-9--weight 1,583 kilograms--consists of the automatic station itself, which has to be landed on the surface softly enough for the apparatuses to fully preserve their ability to function, an engine system, and compartments containing the apparatuses directing the flight. Luna-9 is an airtight container holding a radio system, a program timer, a system of thermoregulation, scientific apparatuses, and energy supply sources. The station has a television system insuring a 360-degree view and transmission of pictures of the landscape to earth.

Mounted on the station's body are antennas which open automatically after the station settles on the ground, a shock-absorbing system, and metal petal-like screens protecting the television unit from possible damage during landing.

Just before touching down the station detaches itself and lands at a distance from the engine installation. At the first stage of the flight, the Luna-9, with an engine block designed for subsequent acceleration, was launched on an orbit of an earth satellite. On the second stage it was put on a trajectory to the moon. The third stage was the correction of the flight trajectory, insuring the station's contact with the surface of the moon in a preplanned area of the Ocean of Storms; the fourth stage--braking and soft landing.

The date of the station's launching, 31 January, was timed to coincide with the beginning in the target area of the lunar morning when the temperature conditions are most favorable for the operation of radio-technical and television equipment.

It has been estimated that the station can carry a maximum payload if the flight lasts for about three to four days. When the duration of the flight was finally chosen--three and a half days--due consideration was made for the demand that during landing and for some time after the station should be near the culmination point over the horizon of the control point on earth.

During the station's flight its trajectory was corrected on 1 February. The correction was started on radio command from earth, while the further operation of all systems went on automatically. As a result of the correction the speed of Luna-9 changed in the required direction by 71.2 meters per second, and its trajectory, which passed at a distance of about 10,000 kilometers from the center of the moon, began to pass practically through the planned point of landing in the area of the Ocean of Storms.

The initial data for the landing was calculated from the results of trajectory measurements in the coordinating and computing center. By 1600 hours 3 February this data was transmitted to the station.

At an altitude of 8,300 kilometers the station, together with the engine installation, was oriented strictly along the lunar vertical. This direction was kept for an hour with the help of optical aspects fixed on the sun and the earth--til switching on the braking system. The braking system was ignited on radio command--altimeter at an altitude of about 75 kilometers from the surface of the moon, 48 seconds before landing.

During the operation of the retrorocket the shock-absorbing system was readied for landing. The landing directing system insured a deacceleration of the speed from 2,600 meters per second to several meters per second at a low altitude over the surface.

During landings the station with the shock-absorbing system was detached from the engine installation and landed nearby. The station landed on the moon on 3 February at 21 hours 45 minutes 30 seconds, and the antennas unfolded four minutes 10 seconds later, beginning the first communications link. On orders from earth Luna-9 began its first scanning of the landscape and transmissions of its pictures to earth at four hours 50 minutes on 4 February.

The communications sessions showed that all the systems of the station were operating normally, the capsule remained airtight after landing, and the system of thermoregulation insured the planned temperature regime. The apparatuses were reliably controlled by commands from the earth.

The area chosen for the landing is typical in many respects and is of obvious interest for detailed studies, the results of which can be extensively used in future space experiments.

The landing of the Soviet automatic station brings closer the day when man will step down on the surface of the moon and when scientific stations and observatories will be set up there. Astronomical studies can be conducted with the help of stations similar to Luna-9 and studies of the moon itself will occupy a special place. A service insuring the safety of distant manned space flights will be established on the surface of the moon.

It is now difficult to foresee the tremendous impact of the development of science of the new knowledge to be obtained at the scientific stations of the moon. One thing is definite--this will be a new stage in the development of many branches of science and engineering.

[redacted]

Luna-9 Pictures
London Reuters in English 2010Z 5 Feb 66

(Excerpts) Moscow--Russia tonight unveiled high-quality television photos of the moon and said they yielded rich material on the mysteries of the lunar surface.

Two photographs--one relayed yesterday, one today--were shown on Moscow television screens late tonight, 48 hours after Luna-9 soft-landed on the moon.

The pictures, showing remarkably clear stretches of pebble-covered surface, small craters, and even part of the Russian spacecraft, were similar to photos intercepted by Britain's Jodrell Bank radio telescope station yesterday.

Tonight's television show was the first glimpse Russians were given of the spectacular pictures relayed over a distance of about 250,000 miles by their own historic mooncraft.

The second photo displayed showed a vertical stripe, described as the spacecraft's antennae, and an object said to be a two-sided mirror reflecting part of the lunar surface.

Three scientists who discussed the pictures said they showed that the sponge-like but firm ground of the moon would hold even bigger spacecraft than Luna-9.

The pictures were shown in a special bulletin without warning during the peak evening viewing period. They were repeated several times, about three hours after Luna-9 was due to start its last contact with ground control.

The scientists who spoke afterward said the relay showed a more or less level surface, like volcanic rock, with a sponge-like structure resembling lava which had cooled quickly.

The photos dispelled theories that the moon was covered with thick dust, but the presence of stones and pebbles made it possible to speculate about the exact nature of the mysterious lunar surface.

Luna-9 cameras were focused on nearby sections of the moon's panorama lying southeast of the point where the moonship glided down to a soft landing Thursday night, in the area of the Ocean of Storms.

The pictures showed details between one and two twenty-fifths of an inch in size, TASS said.

The first photograph featured a stone throwing a long black shadow, about six inches in size and lying about six feet from the spacecraft. Bigger stones could be seen in the distance, with a group of large depressions and hills at the far left.

TASS said the moon-ship was perched on the eastern edge of the Ocean of Storms, near the lunar equator, where the surface was comparatively smooth.

The sun was about seven degrees over the moon's horizon, and the TV camera on board the capsule was inclined toward the horizon.

Later pictures, with the sun at various heights over the horizon, provided rich material for studies of the structure of the lunar surface, it said. TASS said they were of "extreme scientific value."

The photos, screened at 2200 hours local time, showed an almost uncanny panorama of pebbles, strange cavities, pinnacles, and deep contrasts of shading, sometimes brightly illuminated, often in shadow, the scene topped by jet-black lunar sky.

"On the Earth-Moon Route," by Am. Trifonov and Yu. Vasil'yev, Pravda, 20-31 March 1966.

(Translation) On 31 January 1966 the Soviet automatic station Luna-9 was launched. On 3 February at 21 hrs 45 min 30 sec Moscow time it made a soft landing on the moon. On the same day at 21 hrs 49 min 40 sec the first moon-earth radio communications session in the history of mankind was held, and on 4 February at 4 hrs 50 min television transmission of the first pictures of the lunar landscape to the earth was begun.

The flight of Luna-9 aroused enormous interest in the Soviet people. In reply to the requests of readers, Pravda publishes the report of Am. Trifonov and Yu. Vasil'yeva as to how this historic flight was accomplished.

Preparation

Placement in Orbit

It is the evening of 31 January. We proceed to our habitual "observation point"--in the coordinating-computer center (CCC). At the cosmodrome the last stage in the preparation and launch of automatic station Luna-9 is in progress. The launch rocket with the station is on the launch pad.

It is pre-launch time in the CCC... Despite all outer appearances of calmness, tension is growing in the operation of all subdivisions. Continuous communications are maintained with the cosmodrome. From it arrives information concerning the results of pre-launch tests, refined data as to the state of onboard systems, and the adjustment (setting) of instruments. A check is being conducted of the readiness of command-measuring points, and the state of all equipment of measuring, tracking and observation.

Communications are being maintained with the large observatories of the nation which are taking an active part in this experiment. A check is being conducted of the readiness of the special ships located far from native shores. These ships will receive information concerning the operation of the launch rocket and the lunar station during those stages of orbiting when ground-based coordinating-measurement points located on the territory of our nation will no longer be able to "see" them.

All services of the CCC verify their preparedness.

Liftoff!! On the illuminated control panel appears the exact time of the liftoff. Count-off of the seconds of flight beings. Numerous media for control of the trajectory and the telemetry stations uninterruptedly follow the launch rocket from the moment it breaks free of the earth. Data flow in continuously on the progress of the flight, on the parameters and times of operation of the engines of all stages of the launch rocket, and on the operation of all systems of control and stabilization.

The data from trajectory measurements are "real-time", i.e. they are sent directly in the process of measurement to the computers. Operators at the computer centers quickly set about processing the first orbital measurements. The initial parameters of the earth satellite are determined. Yes, it is definitely an earth satellite. As it is already known to our readers, in the first stage of flight the Luna-9 station, together with its rocket unit which is designed for subsequent acceleration of the station, is placed in the orbit of an artificial satellite.

Specialists evaluate the factual intermediate orbit. Its deviation from the computed is comparatively small.

And now the next and extremely important stage of the flight approaches--the second launch--the launch of the cosmic rocket from the orbit of an artificial earth satellite. Although similar launches have already been made in the Soviet Union repeatedly, the requirements for reliability and precise operation of all systems and units of the rocket are high and the significance of each deviation in the outcome of the entire launch makes this stage of flight extremely critical. Ignition failure or even a decrease in the time of operation of the engine of the ejection rocket unit or inaccurate stabilization of the object - and...the lunar station will remain "nothing but" a satellite of the earth.

...The time to the ignition of the ejection rocket unit is measured in seconds. Now it has come... The second launch occurs! Quickly the measuring points report: all systems of the ejection unit operated normally, commands for ignition and shutdown of the engine occurred at the computed times, the orientation system is in order, the flight trajectory is in complete agreement with the computed. Station Luna-9 has left the temporary orbit of a satellite and is headed toward the moon. Testimony to this effect was given by signals generated in the ether by the shortwave transmitters.

The Station Flies Toward the Moon

In the control room of the CCC data characterizing the operation of the station light up on the control panel.

The control group generalizes all the data obtained during the ejection and presents the first official conclusion: all stages of the rocket functioned normally, reignition proceeded successfully, the station is flying toward the moon, all aggregates and systems are normal and ready for future stages of the flight.

However, the conclusion that the flight is progressing normally and that the Luna-9 station is flying toward the moon is now no longer sufficient. According to the flight scheme, the Luna-9 station is at first placed in a "rough" trajectory to the moon. When a correction of the flight is made it will be directed to the assigned region of the moon with an accuracy of several tens of kilometers.

Hence, the next tasks of all the services, especially the CCC which controls the flight of station Luna-9, will be as follows in the next immediate communication sessions: maximal precise determination of the flight trajectory, computation of the magnitude of the correction impulse and initial data for orientation of the axis

of the engine unit in space, establishment of the time for making the correction. And of course as always, uninterrupted systematic monitoring of the condition of all systems and aggregates of the station, and the accuracy and precision of operation of onboard automatic equipment.

Now the burden of the operation is transferred to the specialized points of the command-measuring complex which are equipped with powerful antennas and a special "long-range" apparatus designated for controlling distant cosmic objects. One of these points, which is located in the South of the nation, becomes the basic, main point. Specifically, here will be conducted all the basic operations in the control of the station in flight, and after its landing "Earth-moon and reverse" communications will be established.

In accordance with the situation, we shall make an "operational decision." One of us will remain in the CCC and the other will fly to the South--to the basic control point of the Luna-9 station.

At the Main Control Point

Upon arrival in the territory of the point, attention is drawn to a multi-ton and yet an amazingly light and intricate construction with a height of several tens of meters. This is in fact the "main" antenna with which the earth will hold communications with the Luna-9 station. Still staring unconsciously at it, we enter a building which stands in line with it and in which the apparatus for controlling Luna-9 is located.

Together with one of the directors of the flight we walk about the equipment rooms. The first one is the command point from which commands will be sent to the station and which will monitor their execution. Here on the screens of oscilloscopes is displayed the receipt of a signal from the station. And now here is the room where television images from the surface of the moon will be received for the first time.

"As you can see, the image being received is being recorded on a special tape," says the director of the television point. "We can evaluate the quality of the image directly in the process of reception, and make the required adjustment of the incoming signal. These images are simultaneously recorded on a film, and in the process of duplication are recorded on special tape recorders. Every detail of the image is very valuable and, of course, we strive to take all measures here so that not a bit of the lunar landscape would be

lost due to 'earth' causes. The television images which will be obtained should form a circular panorama of the portion of the moon at the landing location of the station. Before you is one of the control panoramas with an image of the portion near the ground-based station."

After passing about the equipment we observed the process of checking all of the instruments prior to the beginning of the next session. The checks are accompanied by sequential reports over loudspeakers as to the readiness of the large antenna, and the transmitting, receiving, measuring, command, television, and other equipment.

We return to the command point. Arriving there at this time are reports from all the organizations and services participating in the session. Into the control point flows information as to the readiness of the services of the CCC, of the facilities for automatic transmission of trajectory information to the computer centers, and of the computing machines and lines of communication.

As at the cosmodrome the participants in the operation of the service are informed as to the time remaining before the beginning of the next communications session. Readiness five minutes! Over the loudspeaker system is heard the command of the director: "Everyone to their posts. Report when ready for operation." Silence falls, and then concisely and briefly, as if military commands, come the following reports: "the fifteenth is ready," "the third is ready," "the seventh is ready"...

The director gives the following order: "Command point prepare to transmit commands." The reply comes: "Command point ready." And again there is silence. The only sounds are the low noises of operating equipment and the rustling of automatic recorders. The large antenna lightly and smoothly starts to move and, at a previously assigned target designation which had been fed into its program mechanisms, begins to slowly follow the movement of Luna-9.

At the exact planned time we hear the following: "At 18 hrs 30 sec give the command number... duration of transmission... second." On the screen of the oscilloscope appears a trace which tells of the positive receipt of the reply signal from Luna-9. And almost at the same time is heard the report: "We have a signal." Later, in strict agreement with the graph lying before the directory, the scheduled communications session is executed. Usually it begins with the receipt of telemetry.

Above all it must be determined what the "state of health" of the station is. Within 3-5 min, in the course of receiving telemetric information, the director of the telemetry group reports over the loudspeaker on the values of the most important parameters determining the condition of the station. At the end of the report we hear the following: "All station parameters are normal."

Afterward the trajectory measurements are performed. The computer centers receive the next portion of information which makes it possible to refine the flight trajectory. The short session is completed. The director of the session gives the command to switch off the equipment and then gives orders for preparing for the next session.

Taking advantage of the break between sessions, we switch to the CCC where the second author of this report is located. Everything is already known at the CCC. Its operational-engineering groups had been switched in to the communications system over which the entire session had been carried. The results of telemetry measurements had also been transmitted. They are illuminated on the large signal panel in the CCC and are being analyzed by specialists.

Data obtained from the trajectory measurements had been transmitted to the computer centers and were already being processed. At the CCC are arriving reports from measuring points on the execution of the session and information concerning the operation of ground-based stations.

Correction of the Flight Trajectory

To ensure a landing in the assigned region of the moon, the correction session was designated for the evening of 1 February.

A correction of the trajectory consists of the following: first, maximal precise computation of the magnitude, direction, and moment of applying the correction impulse; second, "laying the foundation", i.e. sending to the station by the appropriate means the coded message which stipulates operation of the engine installation at the required regime, and ensuring the required orientation of the station in space; third, ignition, and shutdown of the engine installation at the exact designated moment of time, imparting to the station the required correcting velocity; fourth, computation of the parameters of the new corrected trajectory and determination of the time and location of landing of the station on the moon.

After the computer centers had determined the magnitude and direction of the correction impulse and the time for switching on the engine, the session for transmitting data for the correction was begun.

A check was made of the accuracy with which the lunar station "understood" the transmitted program. The check confirmed that onboard instruments had "understood" and "remembered" everything properly and that the engine installation and the station as a whole were prepared for the correction session.

...The correction session began on 1 February at 21 hrs and 16 min at radio command from the earth. Subsequent preparation and switching-on of all systems was conducted autonomously by onboard automatic programming-timing devices in accordance with the program provided earlier. The execution of these commands was monitored on telemetry channels directly in the course of the session.

In the beginning of the session the station was oriented on the sun by means of the astroorientation system. Before long the voice of the telemetry director was heard: "The station is oriented on the sun." Then, while maintaining its orientation on the sun, the station began an optical search for the moon. After a certain time a second report followed: "The station is oriented on the sun and the moon."

After orientation and switching-on of onboard systems involved in the given session the following was reported: "The station has been oriented, the control system has been switched on, the engine is ready for operation."

The tension grows. The time approaches for switching on the correction engine. Even whispering has ceased. The director of operations checks the accuracy with which all processes occur with the graph lying before him.

At 22 hrs 29 min the following report came: "The engine has been switched on." Following came a new report: "The engine has been switched off." Within several minutes we heard the report of the director of the ballistic group: "The correction was performed accurately, the correction impulse and the time of operation of the engine correspond to the computed."

Tensions have eased somewhat.

Now the computers go into action. Based on the data from trajectory measurements from several communications sessions they will precisely tell us what the new, corrected trajectory is.

Again the giant paraboloid antenna turns, again new data from trajectory measurements race to the computer centers. The

maximum work load again moves to the CCC to the computer machines. Soon independent computations by several machines confirm that the correction was executed with high precision. The conclusion: the station should set down on the moon at the computed point of landing in the region of the Ocean of Storms. Information to this effect is sent by telephone, telegraph and flows along channels of measuring information.

After a brief break at the flight control point and in the CCC a study is begun of the results of past stages of the flight and preparations are made for the final, most critical stage--braking and soft landing on the surface of the moon.

The Landing

Accomplishing a landing consists of the following: precise calculation of the operating regime of the braking engine installation and data on the setting of the astroorientation system; checking the readiness of all systems and aggregates of the station for the landing; subsequent search for the sun and moon and orientation of the station on them; construction of the lunar vertical and orientation of the braking engine; switching-on the radioaltimeter which determines with a high degree of accuracy the distance of the station from the lunar surface and which participates in accomplishing the soft landing; switching-on the braking engine installation and dropping the landing speed; soft landing of the station on the surface of the moon.

Towards 16 hrs on 3 February the transmission of all data for conducting the braking session was completed. Telemetry again confirmed normal functioning of all onboard systems and the readiness of the station for operation. Within a few hours the concluding stage of the flight was begun on command from the earth.

How will the station perform in the last, decisive stage? Have all the phenomena which the predecessors of this station encountered been correctly understood and taken into account? Will the changes and improvements which have been made be effective? These questions greatly disturb the scientists, designers and experimenters present for the session.

Suddenly the first reports: "The control system has been switched on, the lunar vertical has been established...," "the radioaltimeter is on..." And, finally, "the braking engine has ignited."

Tension mounts to the limit. How will Luna-9 descend? Will it be received sufficiently carefully by the moon? The remaining four minutes seem infinitely long. Everyone's eyes are glued to the oscilloscope where so many times so accurately and faultlessly have flashed the replying rhombics, the indicators of stable reception of a signal from the station. Will they flash this time when Luna-9 is supposed to be on the moon?

Moscow time is 21 hrs 49 minutes. "Now!", said the technical director of the flight as he glanced at the clock. And at the same moment, as if in reply to the command, on the screens of the oscilloscopes appeared stable rhombics of the reply signal. "We have a signal", said the operator surpressing his excitement.

It must be admitted that among us there was no one with the artistic talent who could describe in due fashion the reaction which followed....

...Attention! The Moon Transmits and Shows!

Preparations are being made for the first television transmission session from the surface of the moon... How will the miniature television cameras of the Luna-9 station operate? How will the first moon-earth television transmission turn out?

...The equipment is ready to receive the pictures. From the command point comes a series of commands to switch on the moon-earth television transmission....

....On 4 February at 4 hrs 50 min Moscow time Luna-9 began scanning the surface of the moon in the vicinity of its landing point. On a wide special tape which creeps off a drum appear the first lines of a picture of the surface of the moon as seen by the eyes of the "electronic cosmonaut." One by one these lines are recorded on the strip, and soon there appears the first image of the lunar landscape... A clearly-defined undulating line of the horizon appears. Gradually stones, rises, depressions and other details of the landscape are recognized. Parts of the station which appeared in the field of view are quickly recognized.

The engineers become adjusted to the transmission conditions, improve the clarity of the reception and the image becomes all the more clear and detailed. The circular panorama is but at the half-way point, but already the flow of telephone calls and telegrams of congratulation has grown....

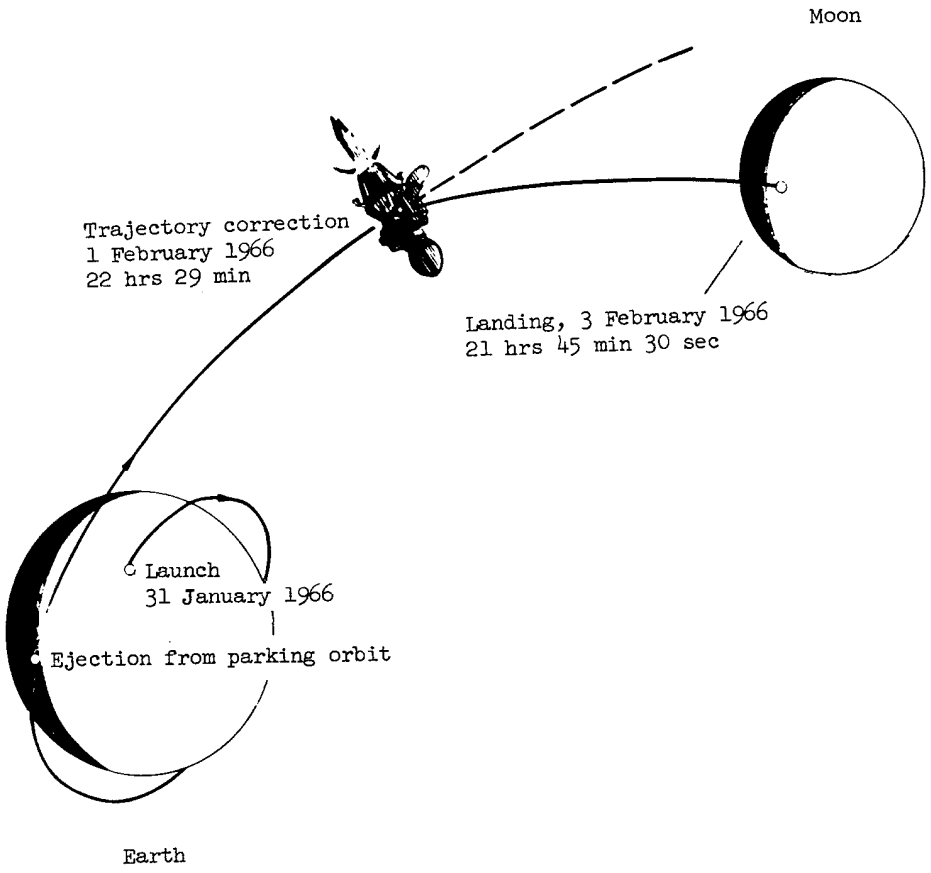


DIAGRAM OF THE FLIGHT OF AUTOMATIC STATION LUNA-9

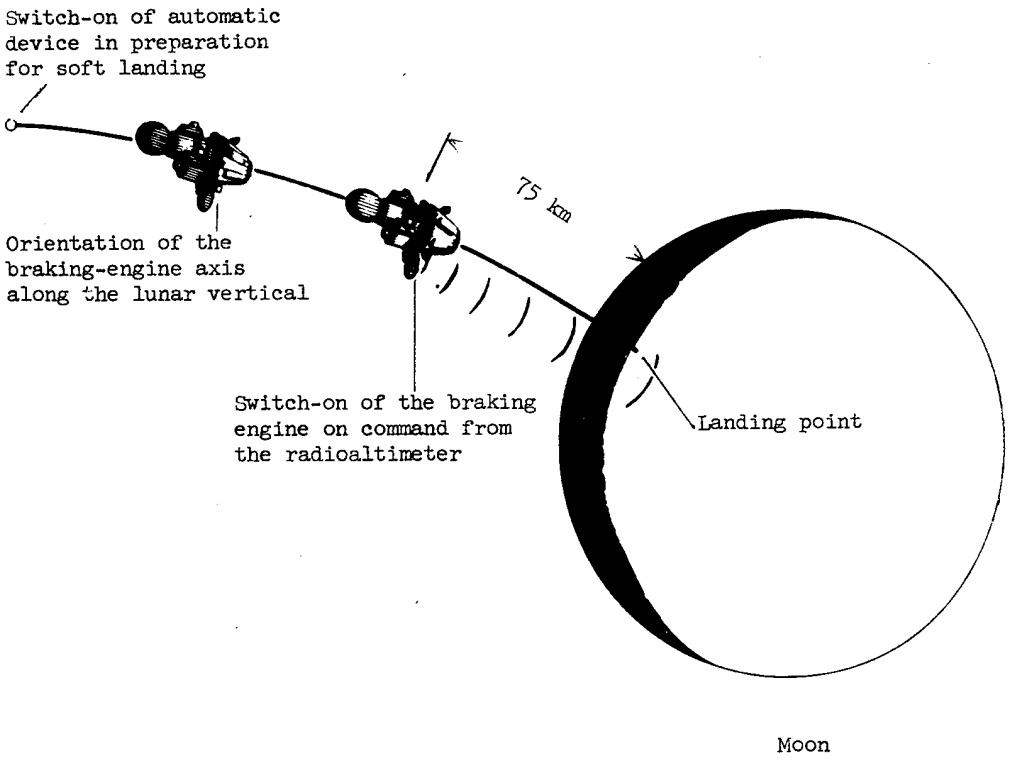
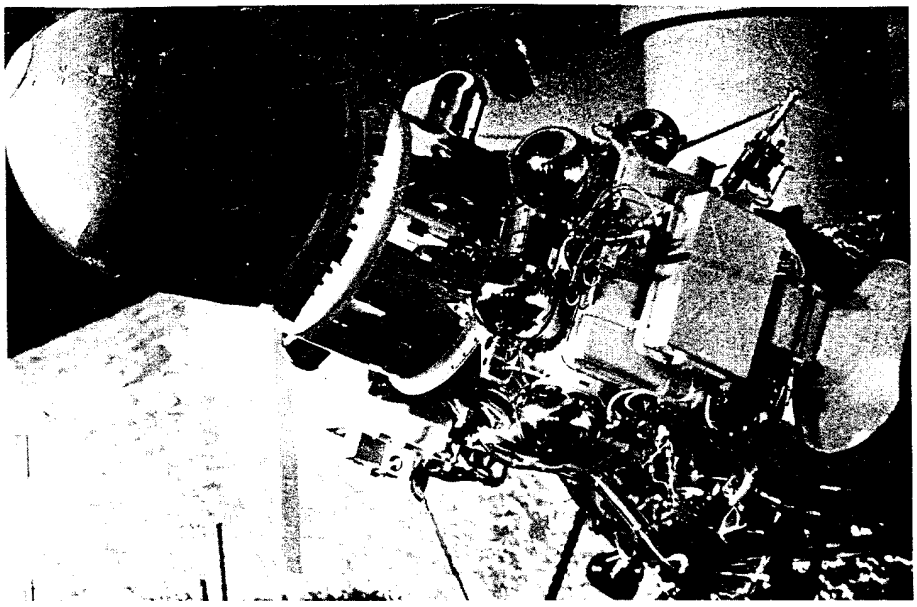
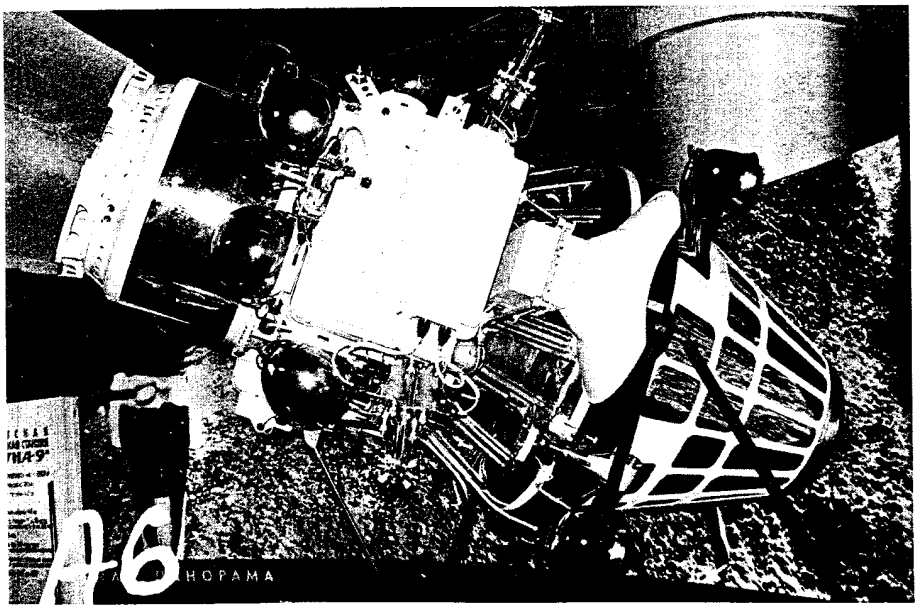
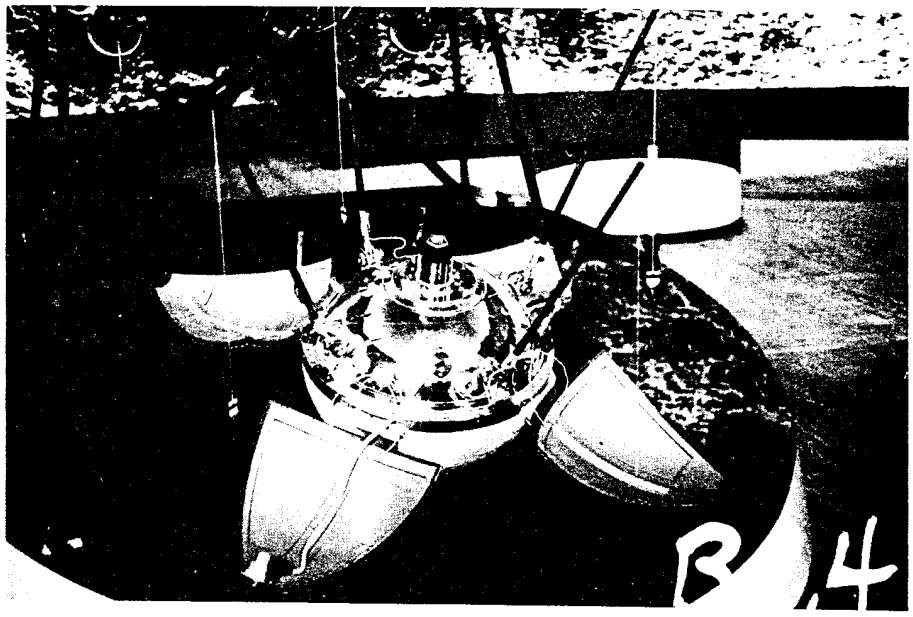


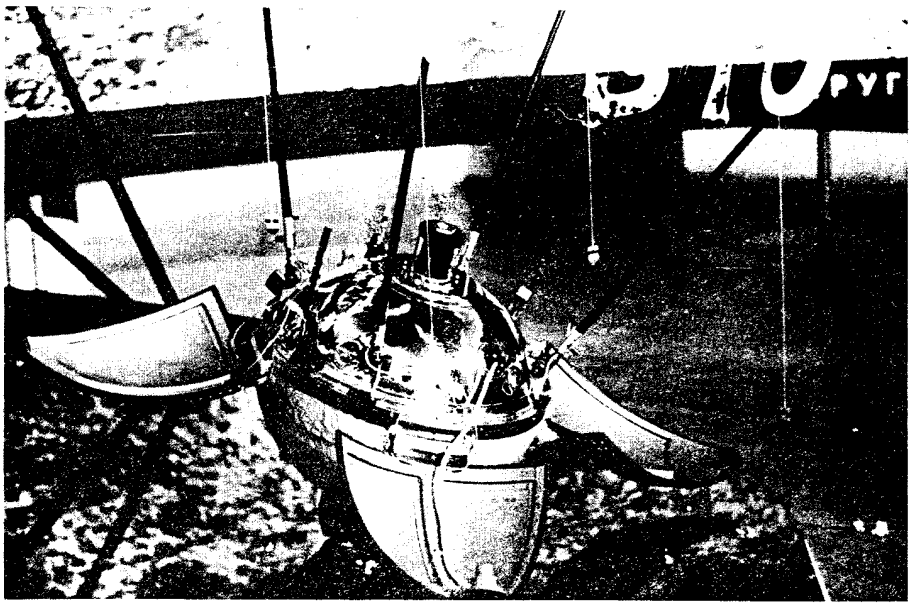
DIAGRAM OF THE FLIGHT OF AUTOMATIC STATION LUNA-9 DURING THE BRAKING PORTION ON 3 FEBRUARY 1966



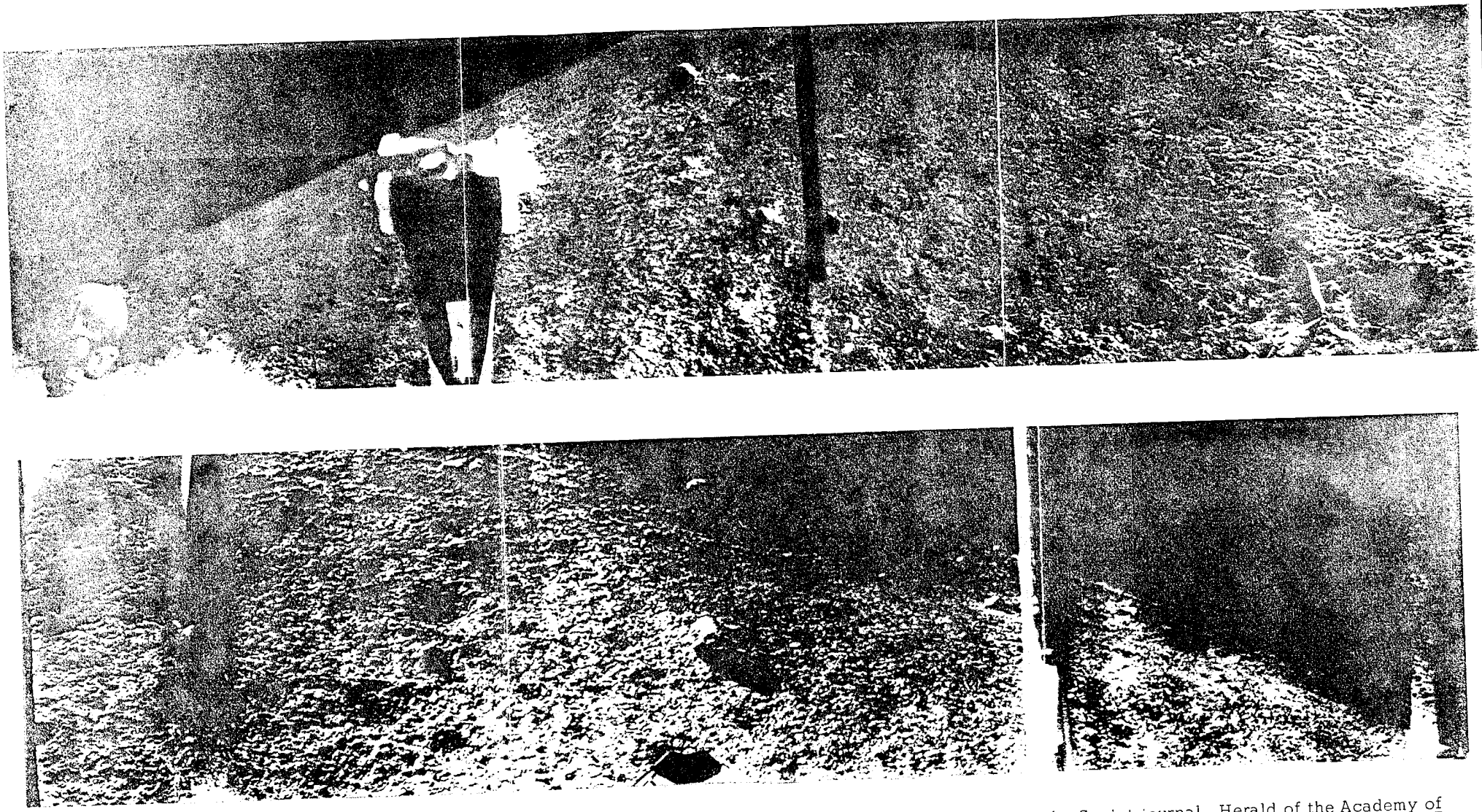


TWO VIEWS OF THE LUNA-9 SPACECRAFT EXHIBITED IN MOSCOW





TWO VIEWS OF THE LUNA-9 LANDER EXHIBITED IN MOSCOW



LUNAR PANORAMA (left half in upper photo and right half in lower) TRANSMITTED BY LUNA-9. Published in the Soviet journal, Herald of the Academy of Sciences USSR, August 1966.