Nagutney USR

National Aeronautics and Space Administration
Goddard Space Flight Center
Contract No.NAS-5-12487

ST - PD - LPS - 10536

L U N A — 1 2 T R A N S M I T S !

(TASS COMMUNIQUE)

(USSR)

9 NOVEMBER 1966

ST - PR - LPS - 10536

L U N A - 12 T R A N S M I T S

From Newspaper PRAVDA
No. 310 (17627)
MOSCOW, 6 November 1966

COMMUNIQUE TASS

The launching of the automatic station "LUNA-12" was achieved in the Soviet Union on 22 October 1966. On 25 October at 2347 hrs Moscow time it was placed into a selenocentrical orbit and it thus became the third artificial satellite of the Moon.

The program for the study of the Moon and of the near-lunar space anticipates a series of scientific investigations allowing a detailed study of the nearest to us heavenly body. Scientists give particular attention to the detailed study of specific regions, for they must know the dimensions, the number and the shape of craters, and the character of the relief. To that effect photographs with high resolution are required and the ground telescopes do not provide them. Even with optimum atmospheric conditions details of smaller limensions than 400-500 meters cannot be photographed.

In order to resolve successfully this problem, operation from a near-lunar orbit was the result of long research begun in the USSR in 1959, when the foundation was laid by three Soviet lunniks by planometric study of the Moon from close distance.

In October 1959 Luna-3 transmitted the image of the far side of the Moon, these pictures encompassing near two-thirds of the lunar surface. earlier inaccessible to observations. No one could repeat this experiment for the next six years.

Another Soviet automatic station "Zond-3" having passed in July 1965 at a distance of some 10,000 km from the lunar surface, photographed the part of the invisible hemisphere of our satellite having remained outside the visual field of Luna-3. By completion of both these programs, more than 95 % of the lunar surface is now available in photographs. Broad depressions, called "tallasoids", crater chains of great extension and a great number of craters were revealed on the

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* [Excerpts only are presented in translation, dropping the numerous repetitions characteristic of the Russian way of writing.]

far side of the Moon. The Commission of the USSR Academy of Sciences has conferred some 170 new designations to objects located on the far side of the Moon, honoring the various prominent scientists of different fields of knowledge.

But this program did not anticipate the obtaining of photographs with high resolution, since photographing was performed at high altitudes.

On 3 February 1966, LUNA-9 was first to effect a soft landing on the Moon, releasing a series of photographs of its surface with very high resolution, allowing to distinguish details near 1-2 mm. But this information was only in reference to the immediate region near the place of landing.

On 3 April 1966 LUNA-10 became the first artificial satellite of the Moon. It was followed on 28 August 1966 by "LUNA 11". Both contributed new data concerning the Moon and the space surrounding it.

And here comes the last achievement — the third Soviet artificial satellite of the Moon -LUNA-12. One of the problems of this station is to release photographs of separate portions of lunar surface from comparaively close range.

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LUNA-12 is a complex spacecraft. The fundamental power construction system is a correcting braking engine installation, in which hermetic containers with astroorientation system blocks, the on-board radioorientation, the guiding system and the feeding devices are disposed. There is in the upper part of the station an instrument compartment partially shut by the radiator of the thermoregulatory system. Fastened on the station's frame are the receiving and transmitting antennas, the part part of the scientific apparatus not requiring hermetization, gas tanks with reserves for microengine system of orientation and the microengines themselves, installed on special supports.

The station's motive installation, consisting of a liquid-fuel rocket engine with a pump system of fuel feed, of various guidance and control devices and fuel tanks, is designed for performing flight trajectory corrections and station's deceleration near the Moon and the stabilization of its position in space during engine operations.

The guidance and astroorientation systems materialize the station's orientation in space and its subsequent stabilization prior to correction and braking, its turn in order to obtain the required orientation of the deceleration impulse, the engine switching off after correction and braking, the orientation and stabilization of the station during photographing of the lunar surface, the switch-on and off of photo-television installation, and so forth.

The compartments of the systems of guidance and astroorientation include a complex of various gyroscopic and guidance devices, electro-optical and program-temporal installations.

The radiocomplex assures the control of the station from the ground, as well as autonomously, the transmission of information on the operation of the station's systems and of scientific apparatus, as well as the conducting of trajectory measurements.

For the photographing of the lunar surface and transmission of of photos to Earth a special on-board photo-television installation is set up on-board.

This installation performed the photographing of the lunar surface, processing the film automatically. At the beginning the photographs were transmitted to the center of remote cosmic radiocommunication for reviewing. Then the most interesting photographs were sorted and transmitted from the station in a normal regime.

The complex of the various devices and systems, disposed aboard LUNA-12, yields a substantial amount of heat. Besides, the station receives an additional amount of heat on account of solar irradiation. This is why in order to sustain a normal thermal operational regime for all devices and instruments, there is installed aboard the station a special system of passive-active type of thermoregulation.

The passive means of thermoregulation applied consist in corresponding painting of external surfaces, in thermic isolation and in the use of special screens. This allows the maintenance of a normal thermal regime in all the compartments of the station, except the instrument compartment of the control system, where the preassigned thermal regime is assured by an active thermoreulatory system.

The official insignia of USSR, as well as the pennant of the Soviet Union are fastened on station's frame.

In accord with the flight program of the station LUNA-12, the latter was placed into a near-equatorial selenocentric orbit. The computed aiming point was then located at 1290 kilometers from the surface of the Moon. At time of attaining this point the station LUNA-12 moved with a velocity of 2,085 m/sec. With such a velocity the forces of Moon's attraction were not able to modify the station's flight trajectory to the extent of transferring it to the orbit of an AMS. Thus deceleration was required in order to achieve the station's transfer into a selenocentrical orbit.

In order to achieve the deceleration one hour prior to reaching the aiming point of trajectory, when the station was located some 8,000 km from the surface of the Moon, it was oriented in a rigorously specific position relative to the Moon, namely along the vertical. Then the station was rotated by a specific angle from that direction, the motive installation being switched on at time of attaining the computed point. The motive installation thus had operated 28 seconds which is the computed time. As a result the motion velocity of the station decreased to 1,148 meters per second, and the automatic station LUNA-12 passed from the flight trajectory to the orbit of an artificial satellite of the Moon (AMS) with the following parameters:

— maximum distance from the Moon's surface (in periselion) about 1,740 kilometers;

— minimum distance from the Moon's surface (in aposelion) about 100 kilometers;

— revolution period around the Moon — 3 hours 25 minutes.

All the operations for this maneuver were completed automatically.

After the station was placed into the AMS orbit, it was in an oriented position. Moving along the orbit the automatic station appeared above the illuminated part of the Moon, and at that moment of time the photo-television device was switched on.

The high precision of systems' operation, alongside with the complementary organs assuring the orientation of the station over the portion of the trajectory corresponding to photographing, should be noted in particular. The maximum deviation of the station from the preassigned direction did not exceed a few angular seconds. The photographing altitude and the coordinates of the area of photographing did not factually depart from the computed ones.

Upon ending the photographing the station began the transmission of photographs to the ground by way of a television channel. Each photograph was then decomposed into 1,100 lines in the television

picture (note that in the standard television there are 625 lines in all). This assured a good quality picture.

After transmission of photos the photo-television device was switched off.

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The automatic station LUNA-12 pursues its scientific investigations, following those of LUNA-10 and LUNA-11. Currently studied are the gravitational field of the Moon according to station's orbit evolution, the radiation conditions in the near-lunar space and the distribution of micrometeorites near the Moon. The radioastronomical observations, started on LUNA-11 are being pursued on LUNA-12; these studies are made in otherwise inaccessible long and medium wave bands from the ground.

The launching of the automatic station LUNA-12 is a new achievment of Soviet science and technology.

(TASS)

**** T H E E N D ****

Contract No.NAS-5-12487
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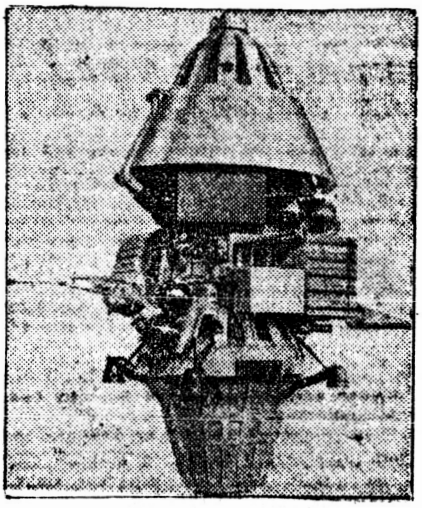
Translated by ANDRE L. BRICHANT

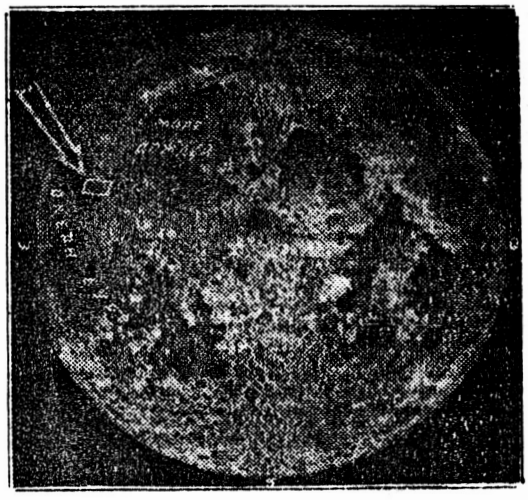
on 9 November 1966

DISTRIBUTION

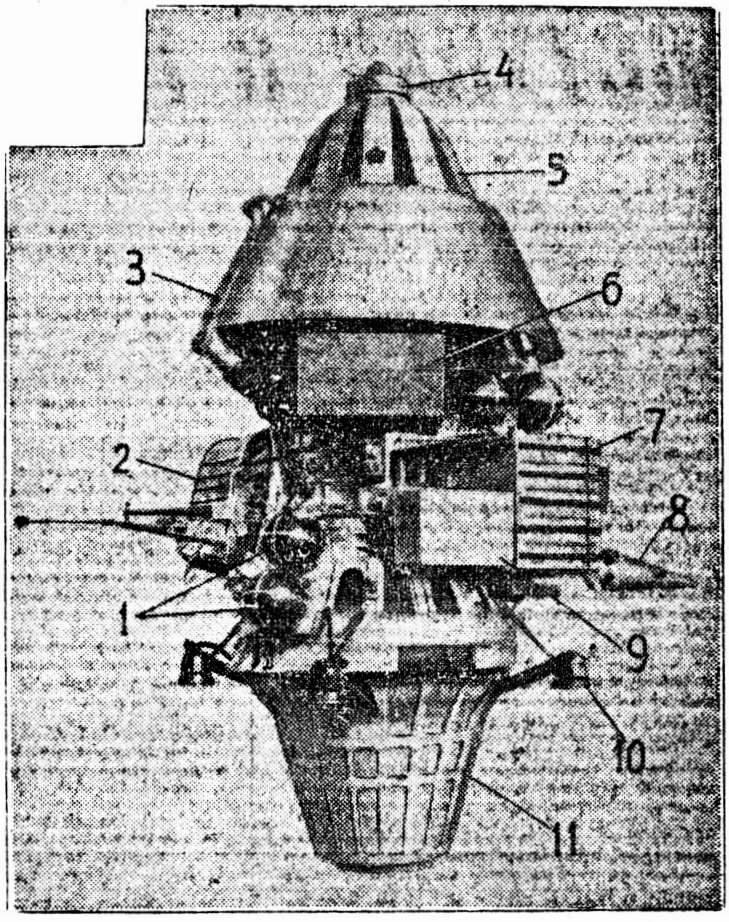
same as ST-PR-LPS-10534

A.M.S. L U N A - 12

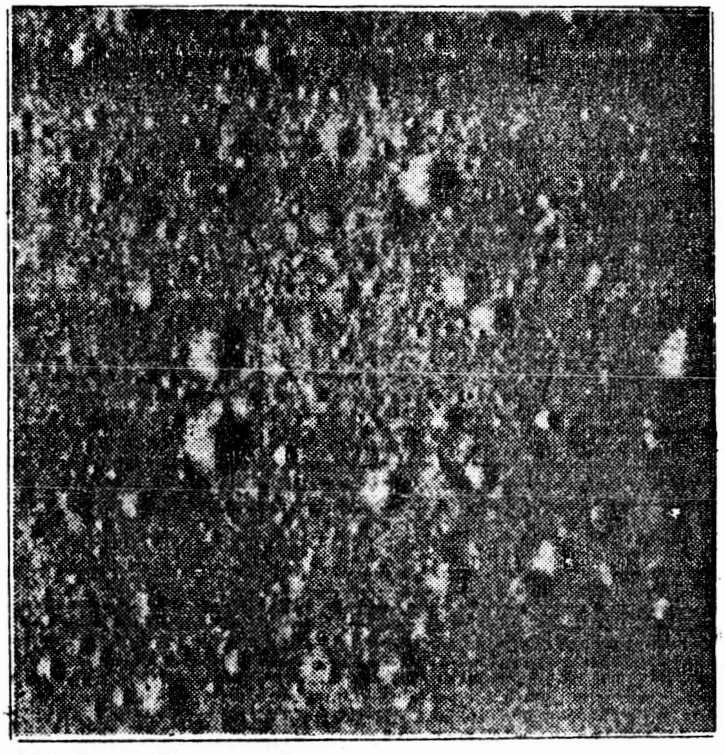




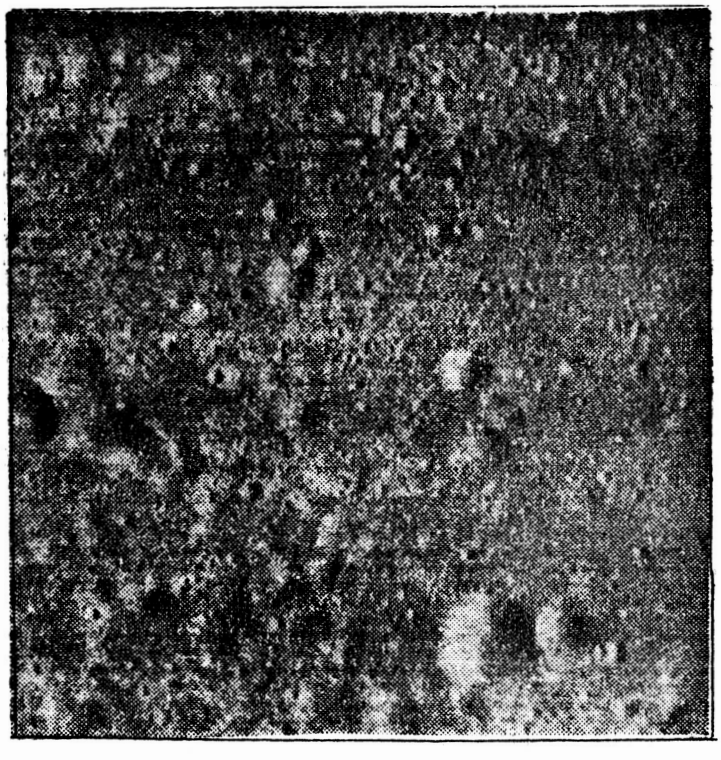
Map of the visible side of the Moon. The arrow indicates the region of the lunar surface corresponding to photographs presented in this paper.



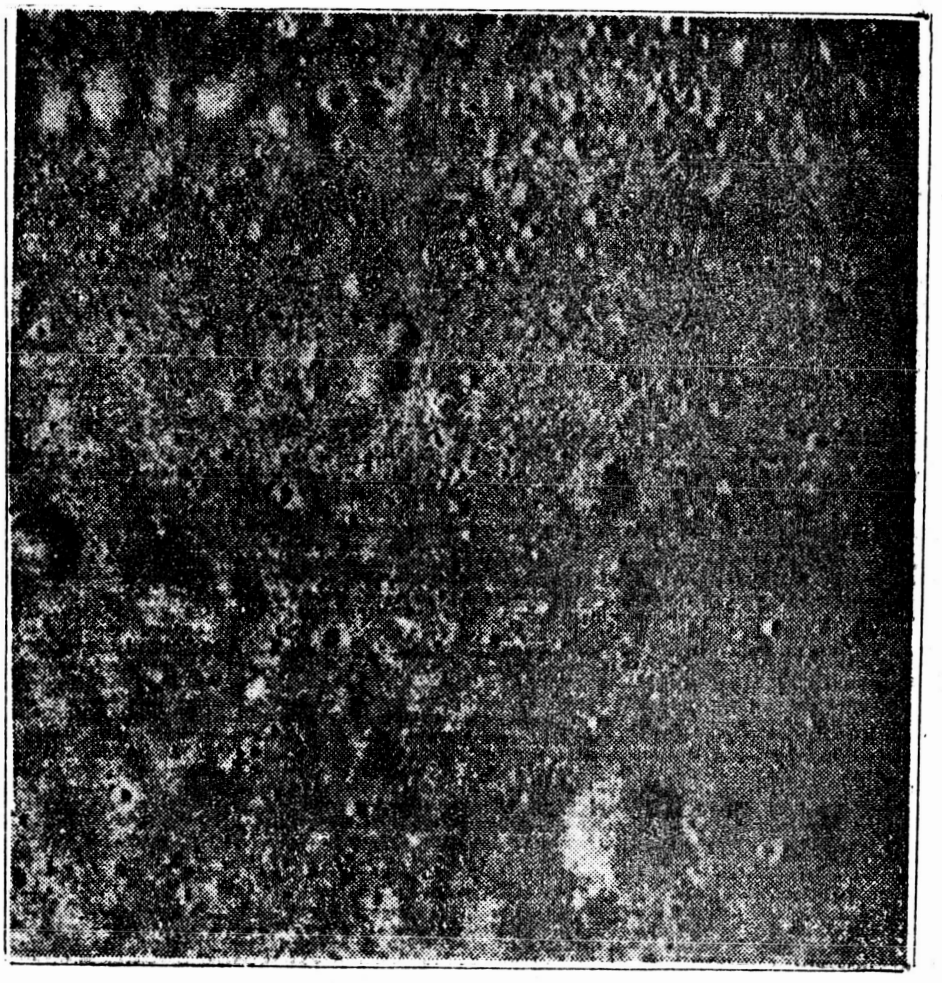
Automatic Station LUNA-12.
1) Gas tanks for astroorientation system manipulation. 2) Photo-TV device. 3) Thermoregulation system's radiator. 4) Radiometer. 5) Instrument compartment. 6) Chemical battery. Optico-mechanical astroorientation (7) system's block. 8) Antenna. 9) Electronic block of astroorientation sys. 10) Guiding engines. 11) Correcting breaking device.



Photograph No.1

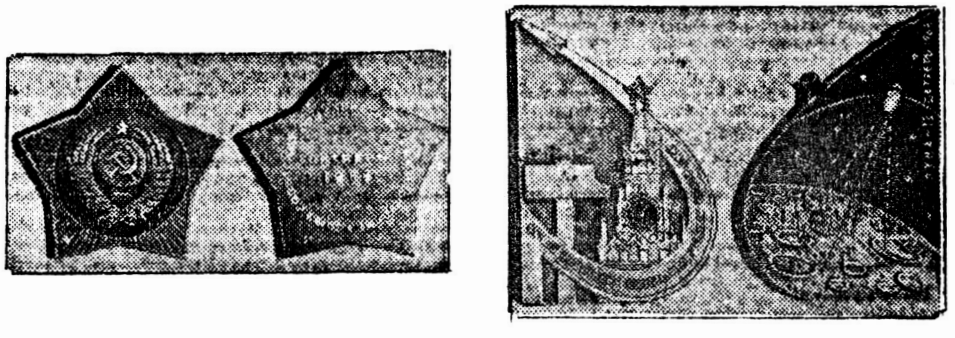


Photograph No.2



Photograph No.2 bis

(For captions see the ~~following~~ preceding pages)



Soviet insignia and pennant, front and rear
installed aboard LUNA-12