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SECRET

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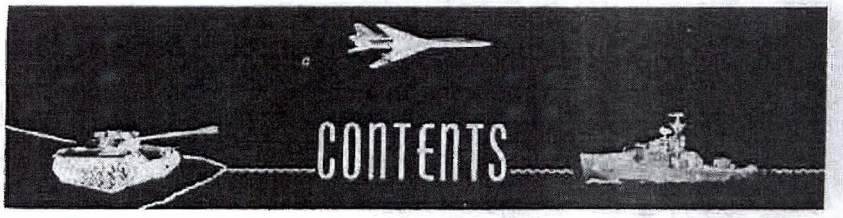

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Portion identified as non-responsive to the appeal

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THE COVER

CHINESE Communist troops patrolling the high country. This type of operation has provided valuable experience for those Chinese troops assigned to the Indian frontier region, an area of international dispute for centuries. Communist claims have varied, but two main border areas—Ladakh and the Northeast Frontier Agency (NEFA)—persist in Chinese plans. Of the two, the NEFA must be regarded as the section facing the sharpest Communist threat, because of the greater Chinese capability opposite it and because the Chinese already occupy almost all of the disputed parts of Ladakh. Consideration of the possible Chinese courses of action within the areas involves various assumptions and evaluations in the light of military capabilities. The prevailing possibilities are discussed in the article "Chinese Communist Options on the Indian Frontier," beginning on page 4.

FOREWORD

MISSION: The mission of the monthly *Defense Intelligence Digest* is to provide all components of the Department of Defense and other United States agencies with timely intelligence of wide professional interest on significant developments and trends in the military capabilities and vulnerabilities of foreign nations. Emphasis is placed primarily on nations and forces within the Communist World.

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Joseph F. Carroll

JOSEPH F. CARROLL
Lt General, USAF
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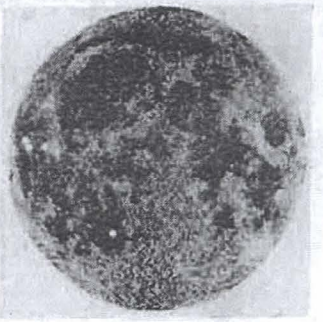


More than seven years of lunar-probe launchings indicate that problems are being surmounted and valuable data gained; among many launches, there have been failures; while no timetable has been suggested, it appears clear that . . .

SOVIET LUNAR EFFORTS POINT TOWARD MANNED EXPLORATION

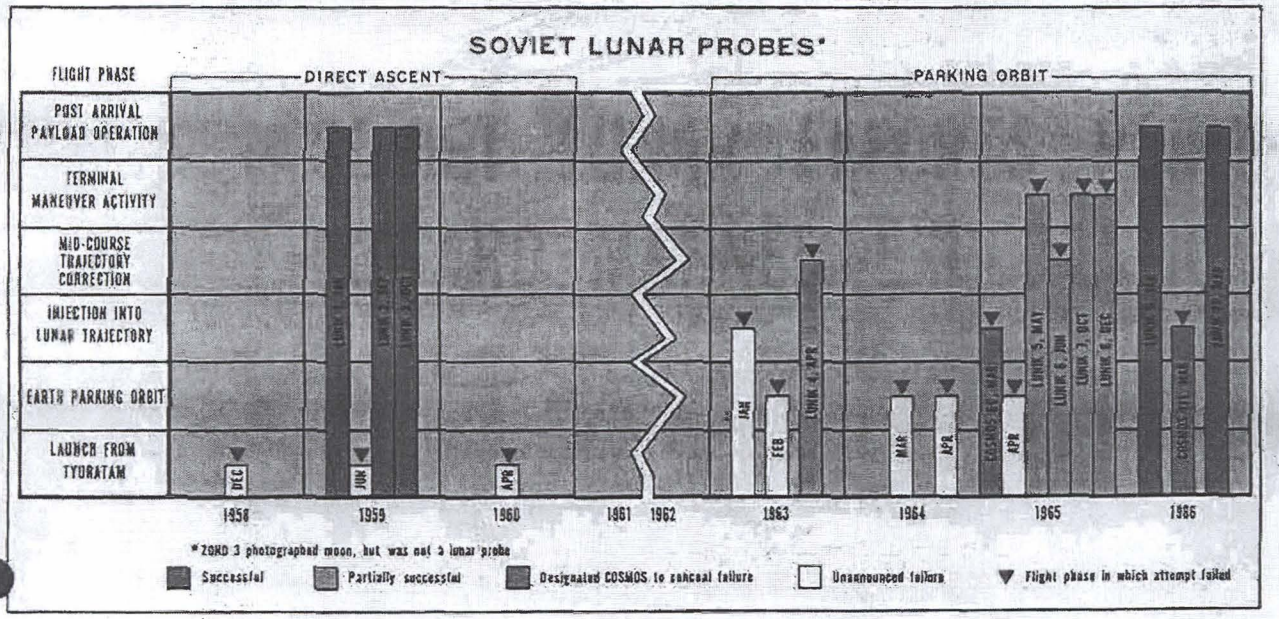
THE sequence of events in the Soviet lunar program indicates an effort that is directed ultimately toward landing a man on the moon. While Soviet press and radio announcements frequently refer to the possibility that this feat will be achieved in the foreseeable future, official Soviet comments have avoided any indication of a timetable.

On their route to manned lunar exploration, the Soviets have achieved success in four phases:

- Phase one—initiated late in 1958—consisted of attempts to hit the moon.
- Phase two—1959 and 1960—involved sending probes around the moon to photograph its far side.
- Phase three—begun in January 1963—involved a soft landing on the surface of the moon.
- Phase four—the current phase—consists of a probe in an orbit around the moon.

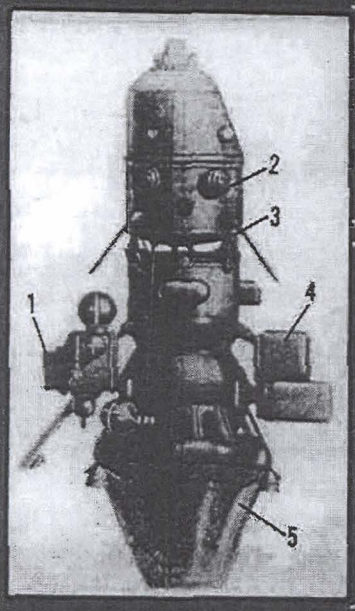
One final phase that would be required before manned vehicles could be sent to the vicinity of the moon is a circumlunar flight and safe return of the vehicle to earth.

The Soviets are expected to continue the current programs of soft landings and lunar orbitings in an effort to ac-



SOVIET LUNAR ORBITER – LUNA 10

SOVIET DESCRIPTION OF LUNA 10 PROBE VEHICLE



ENTIRE CRAFT WEIGHED ABOUT 3525 POUNDS INITIALLY

1. ALTITUDE SENSOR EQUIPMENT
2. SATELLITE PAYLOAD
3. SEPARATION SYSTEM ATOP CENTRAL CANNISTER AND SPHERICAL PROPELLANT TANK
4. STELLAR ORIENTATION SYSTEM
5. CONE ENCLOSING RETROROCKET NOZZLE

ESTIMATED BREAKDOWN OF PAYLOAD WEIGHT

SCIENTIFIC INSTRUMENTATION *	75 POUNDS
TELEMETRY SYSTEMS	44 POUNDS
STRUCTURE	140 POUNDS
ATTITUDE CONTROL SYSTEM	75 POUNDS
BATTERIES	180 POUNDS
MISCELLANEOUS (ELECTRONICS/ ENVIRONMENTAL)	26 POUNDS
TOTAL	540 POUNDS

* INCLUDES MICROMETEORITE DETECTOR, GAMMA SPECTROMETER, MAGNETOMETER, INFRA-RED RADIOMETER, COUNTERS, AND ION CONCENTRATION SENSORS.

quire additional photographs of the lunar surface.

Chronological sequence

The first successful Soviet lunar probe—Lunik 1—was launched on 2 January 1959. This event was preceded by at least one failure in December 1958. The Soviets announced that Lunik 1 weighed 3,240 pounds—796 pounds of which were the instrumented payload. This probe passed within approximately 4,000 nautical miles of the moon. The next lunar-probe attempt was made on 18 June 1959, but it failed early in the flight.

The second successful launching of a lunar probe—Lunik 2—occurred on 12 September 1959. Lunik 2 impacted on the moon's surface after a flight time of about 38 hours and 23 minutes. The probe weighed about 3,340 pounds, including the 850-pound instrumented payload.

Lunik 3 was successfully launched on 4 October 1959 with the announced objective of photographing the hidden side of the moon. Published photographs confirm that this goal was achieved.

Not all the attempts were successful. On 15 April 1960 a lunar probe was launched but an inflight failure occurred when the third stage failed to achieve the required velocity for a lunar trajectory.

An extended lull—lasting nearly three years—followed the failure of this lunar probe. The Soviets apparently decided to abandon the direct-ascent technique in favor of the new parking-orbit technique.

The first attempt to launch a lunar probe from a parking orbit occurred on 4 January 1963. Although the launch phase was successful, failure of the fourth stage prevented the probe from achieving transfer trajectory toward the moon. This was followed by another attempt on 3 February 1963. This time the third stage failed, and the probe did not achieve a parking orbit.

Success finally was achieved on 2 April 1963. Lunik 4 marked the first time that a probe was ejected successfully from a parking orbit. Although the specific mission of Lunik 4 was never stated, a soft landing of an instrumented payload on the moon probably was intended. The Soviets claimed that the probe passed within 4,560 nautical miles of the moon.

Another long pause

On 9 May 1965—after a two-year lapse—Lunik 5 was launched. After a 3¼-day flight it impacted on the surface of the moon. On this occasion, the USSR—for the first time—indicated that it was attempting to soft-land an instrumented payload on the lunar surface. Unfortunately for the Soviets, Lunik 5 made a hard landing on the area of the Sea of Storms and was destroyed on impact.

Lunik 6—launched on 8 June 1965—was ejected successfully from a parking orbit, but the mission resulted in failure when the midcourse correction motor failed to shut off.

Both Lunik 7, launched on 4 October 1965, and Lunik 8, launched on 3 December 1965, performed most of the operations necessary to produce soft landings. But in each case hard landings resulted and both were destroyed on impact. By this time the Soviets were making no secret of their attempts to soft-land an instrumented payload on the moon.

Efforts finally successful

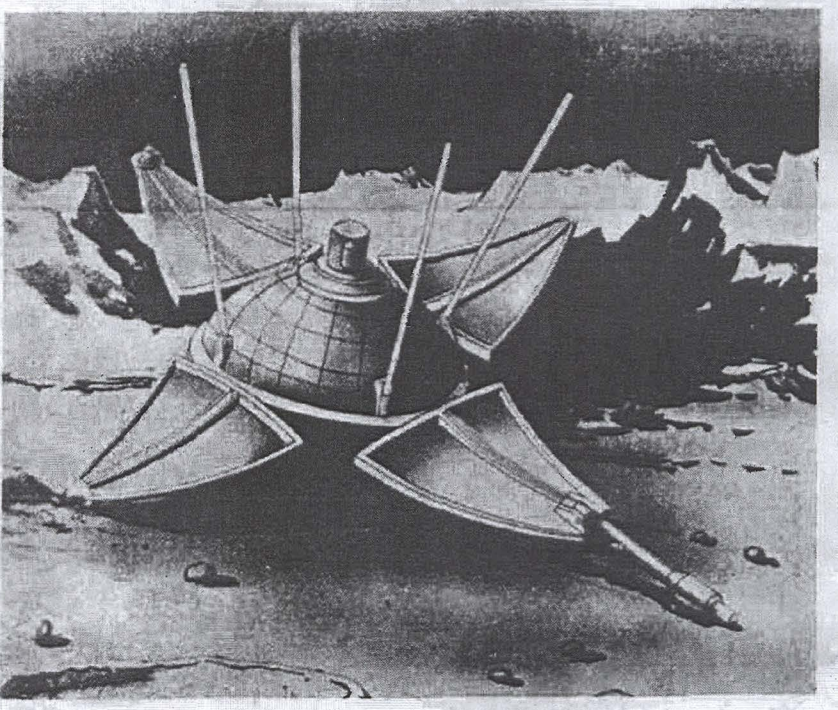
Lunik 9—launched on 31 January 1966—achieved the first successful soft landing and represented a significant accomplishment in the Soviet lunar exploration program (see drawing at right). Valuable data was transmitted back to earth.

According to Soviet announcements, Lunik 9 consisted of three basic parts:

- A "lunar station"—weighing about 220 pounds—that was soft-landed on the moon.
- A propulsion system used both for the midcourse correction and for the soft landing.
- Two compartments carrying attitude control and guidance systems.

Weight of the payload after it was ejected from its parking orbit was stated to be 3,483 pounds, which is consistent with the weight of previous lunar probes. In a Moscow press interview on 10 February 1966, M. Keldysh, President of the Academy of Sciences, stated that the only two missions of Lunik 9 were "to photograph the lunar surface and to measure radiation at the lunar surface." Both missions were accomplished successfully.

The next lunar probe attempt—designated Cosmos 111 by the Soviets and probably intended for a soft landing—was launched from the Tyuratam Missile Test Range on 1 March 1966. However, the probe vehicle failed to eject from the parking orbit into a lunar transfer trajectory. In an apparent attempt to conceal the mission failure the Soviets issued a routine Cosmos earth satellite announcement.



SOVIET drawing reportedly depicts Lunik 9 in position on the surface of the moon. [U]

Lunar orbit accomplished

Lunik 10—launched on 31 March 1966—marked another milestone. During its flight toward the moon, Tass announced that the mission was "to test systems for launching payloads around the moon." After a lunar orbit was achieved, Tass amplified the announcement somewhat by stating that Lunik 10's mission was:

- To seek a landing place on the moon for manned spacecraft.
- To determine whether meteorites are a hazard to manned flights in the vicinity of the moon.
- To measure the moon's temperature and gravitational fields.

Lunik 10—according to the Soviet announcement on 3 April, 1966—was orbiting the moon once every three hours, with an apogee of about 621 nautical miles, a perigee of about 217 nautical miles, and a lunar inclination of approximately 72 degrees. The Soviets also have stated that the probe's communications are stable and that scientific data are being relayed back to earth. The lunar orbiter is a 540-pound sealed cylindrical container; total weight of the package injected into a lunar trajectory was given as 3,525 pounds.

Other problems remain

Several important steps remain before the Soviets can land a man on the moon and return him safely to earth. These include the developing and testing of:

- Larger propulsion units.
- Techniques and equipment for rendezvous, docking, and assembly of spacecraft in orbit.
- Techniques and equipment for reentering the earth's atmosphere.
- A means to protect man against possible solar flares while en route to, on, and returning from the moon.

Despite these remaining hurdles, the Soviets have scored a marked success with Lunik 10 from the standpoints of developing propulsion and guidance to achieve a favorable lunar orbit, collecting data on the near-lunar environment, and transmitting this data back to earth. [END]