~~SECRET~~

FTD-CP-17-26-66

PRIVILEGED INFORMATION

SEE INSIDE COVER FOR SAFEGUARDING GUIDE





NO FOREIGN DISSEM



16 SEPTEMBER 1966

(Including Issues for 2 & 9 September 1966)

FOREIGN TECHNOLOGY DIVISION

# AIR FORCE SCIENTIFIC & TECHNICAL INTELLIGENCE

# BULLETIN



~~GROUP-1~~
~~Excluded from Automatic~~
~~Downgrading and Declassification~~

~~SECRET~~

~~SECRET~~

AIR FORCE
SCIENTIFIC & TECHNICAL INTELLIGENCE
BULLETIN

FTD-CP-17-26-66

16 September 1966



TABLE OF CONTENTS







~~SECRET~~

*Non-FTD items.

16.02

1. Soviet Manned Space Program (U)
Capt A. F. Herrmann (TDFSE)

The Soviet Union has not launched a manned spacecraft for about 18 months (as of 18 September 1966). Because of the obvious importance of the manned space effort, both in terms of system development and national image, this delay is not considered to have been programmed nor is it considered to be acceptable to the Soviet Union. Possible reasons for the delay have been examined.

The Soviets encountered two significant problems on their last manned flight (Voskhod 2, 18-19 March 1965). One was the relative difficulty of Leonov's extra-vehicular activity (EVA) which was admittedly underestimated by Soviet planners. Ground simulations of EVA have not been reliable indicators of the difficulty of performing the mission in the Soviet Union or in the US. The Soviets also encountered stabilization/orientation problems which precluded the automatic deorbit of the spacecraft. Deorbit was accomplished by manual control. If the next programmed step in the Soviet program at that time involved crew transfer with Voskhod 2 hardware, these problems would have been of sufficient magnitude to cancel any programmed follow-on mission. The crew transfer concept was and is mentioned frequently in Soviet literature.

If the Voskhod 2 follow-on was programmed to extend the Voskhod hardware in terms of mission duration, this could have been accomplished in the Summer of 1965. There would have been little or no risk involved as the physiological parameters of the crew could have been continually monitored and any retro "window" (essentially one per day) could have been used to terminate the mission if problems developed. FTD concludes that an extended mission was programmed for 1965, but it was to use a new spacecraft with a larger complement, not the Voskhod. Soviet statements tend to support this conclusion.

Numerous Soviet statements regarding program direction indicate that the ability to maneuver a manned spacecraft is a firm requirement. If the Voskhod spacecraft is maneuverable, or could be modified to be maneuverable, a maneuver/rendezvous mission could have been accomplished at any time. Again it is concluded that a maneuver/rendezvous mission was not programmed for the Voskhod, but was to be a part of the mission of the next generation spacecraft.

The flight of two dogs in a Voskhod-type spacecraft called Cosmos 110 lasted 22 days (22 February - 16 March 1966). The mission was only marginally successful as deterioration of the bio-sensors on the dogs coupled with life support system problems probably led to an early mission termination. It is considered to have been successful enough to allow a manned follow-on mission, if any had been programmed.

The basic question then appears to involve the lack of flight testing of a new manned spacecraft with a crew of more than three and with a maneuver/rendezvous capability. The flight testing of such a spacecraft depends on the availability of a man-rated launch vehicle. It is estimated that this launch vehicle should have the capability of placing 40,000-60,000 pounds in earth orbit to support future earth-orbital manned missions and manned circumlunar flight.

Four events involving the SL-9 launch system appear to be directly related to the development of this payload capability. These four events include the three successful Proton launches and a launch system failure on 24 March 1966. It is estimated that the two-stage SL-9 will ultimately be modified to include a third stage and that this modified system will have the 40,000-60,000 pound payload capability.

In addition to the obvious delay in any developmental program caused by a system failure such as the one which occurred on 24 March in the SL-9 program, it is possible to see abnormal Soviet concern in the progress of this program; this may indicate an accelerated attempt to resolve problems. For example, the SL-9 used to launch Proton 3 on 6 July 1966 was instrumented with two 20 and two 256 channel data links. No other space launch system has been instrumented to this degree.

FTD concludes, therefore, that the delay in the Soviet manned space program is caused primarily by a delay in the launch vehicle development cycle. Contributing factors are EVA difficulties and concern for the physiological effects of prolonged weightlessness and exposure to radiation.

The Soviets may consider this program delay to be significant enough to justify major program redirection; this could include previously unprogrammed use of the Voskhod spacecraft. (The overall classification of this item is ~~SECRET~~.) (~~Gp 1 - Excluded from automatic downgrading and declassification.~~) (NO FOREIGN DISSEM, except UK, Can, Aus, NZ and NATO.)

The following items were originated at other AFSC Divisions and Centers, as indicated. Questions and/or comments concerning the technical content of these items should be addressed to the originating organizations.

16.01

6. Identification and Assessment of Molniya Spacecraft Components (U)
Capt M. Stenger (ESD/ESY)

Soviet photographs of Molniya spacecraft provided to the International Telecommunications Union confirm many of the previous assessments of the vehicle and show several new aspects of it.

The photographs reveal that the antenna system consists of two parabolic dishes mounted by means of rigid metal booms extending from knuckle-joint mounting assemblies on the spacecraft. A second knuckle-joint or possible ball-joint assembly connects the booms to the parabolic dish antennas. The parabolic reflector is constructed from a transparent material, probably a fine wire mesh, and is formed by means of sixteen probable aluminum ribs. The parabolic reflector is folded in umbrella fashion and placed on a ledge formed by the spacecraft "heater panel" during vehicle launch. The antenna feed structure extends about 0.75 feet in front of the center of the reflector and appears to be backed by a square plate. The earth sensor is mounted in front of the feed structure. The slightly skewed attitude of the earth sensor indicates that it is a probable single-plane horizon scanner with a pre-set offset.

The orientation correction (apogee) motor unit is apparently not an intregal part of the spacecraft and can easily be detached. This unit probably provides the necessary power for orbit change or correction maneuvers.

The stabilization system appears to consist of the gyrostabilizer and two cold gas jet attitude control units. The gyrostabilizer unit consists primarily of a conically-shaped flywheel-type momentum storage device, probably mounted so that the flywheel is perpendicular to the longitudinal axis of the spacecraft and facing the sun, in the minimum torque attitude. The conical shape of the flywheel probably provides improved wheel stability. De-torquing of the flywheel is probably accomplished by the cold

gas jet control units, which are mounted on the outside of the spacecraft, below the apogee motor unit, probably 180° apart. It is not clear whether the 10 cylindrical fuel tanks located between the gas jet units and the apogee motor unit provide the fuel supply for the cold gas jet units or the apogee motor, or both.

The purpose of devices located at the end of two of the solar panels is not known. The location of the devices suggests that they may be some type of sensor used for off-angle earth orientation of the spacecraft.

The Soviet text submitted to the ITU states that a portion of the vehicle solar cells are mounted on the bottom of the spacecraft heater panel in addition to the solar cells mounted on the six foldable solar panels. About 20 square feet of solar panels could be mounted on the heater panel.

The television pictures taken by Molniya and released by Pravda suggested that the TV camera was located in the spacecraft in the vicinity of the apogee motor unit. Identification of a possible window on the spacecraft above the cooling radiator coils and between the two cold gas jet units provides possible confirmation of the news release. In addition, it is felt that the parabolic antenna feed structure is too small to house any portion of such a TV system. (The overall classification of this item is ~~CONFIDENTIAL~~.) ~~(Gp 3 - Downgraded at 12 year intervals; not automatically declassified.)~~ (NO FOREIGN DISSEM, except UK, Can, Aus, NZ and NATO.)

04.01

7. Soviet Vacuum Chamber Identified at Moscow/Khimki (S)
Mr. W. S. Bacon (AEDC/AEYA)

A large sphere observed at Plant 456 on North Khimki Airfield, Moscow, between 1959 and 1961 was identified as a probable vacuum chamber. Subsequent observations of the field led to the conclusion that the vacuum chamber had been removed. This conclusion now appears to have been wrong as it is now believed that the spherical vacuum chamber was enclosed in a building in 1961 or 1962. The building is now part of a new laboratory complex probably used in support of the post-1962 Soviet space vehicle program.

North Khimki Airfield has not been used by aircraft for some time; portions of the field have been used as a test area by Plants 293, 301 and 456 in recent years. The adjacent plants all have been involved in aerospace activity but none of them are known to be involved in satellite or space capsule development. The new complex has its own administrative and support buildings and thus does not appear to be a subdivision of the adjacent plants.

The sphere has been tentatively identified as a vacuum chamber on the basis of its design features, its support equipment, its close association with complexes developing aerospace hardware, and the fact that it has been enclosed in a building. Over the sphere is a bridge crane which probably lifts the upper part of the sphere so that test items can be inserted from the top. At the sphere's equator is a balcony probably leading to an access door. A small building beside the sphere probably houses pumping equipment. The building enclosing the sphere is multistory. Measurements have not been made of the sphere's diameter or the building height, but it is probable that the sphere has a diameter of 30 to 50 feet. Other possible uses for the sphere, such as liquid or gas storage, have been ruled out as they would not require the bridge crane or enclosure in a building.

The vacuum chamber was built between September 1956 and April 1959. It does not have the necessary support facilities for firing testing of rocket engines. Its capability is probably limited to solar simulation under high vacuum conditions for spacecraft within its size limitations and/or inert upper stages. (The overall classification of this item is ~~SECRET~~.) ~~(Gp 1 - Excluded from automatic downgrading and declassification.)~~ (NO FOREIGN DISSEM, except UK, Can, Aus, NZ and NATO.)