

UNITED STATES GOVERNMENT

# Memorandum

Thornton

TO : CB/All Astronauts

DATE: June 9, 1969

FROM : CB/David R. Scott

SUBJECT: Meeting with Cosmonauts at Paris Air Show

On June 2, Jim, Rusty, and I met with Vladimir "Volodya" Shatalov and Alexei "Liosha" Yelisyev. Shatalov was the commander of Soyuz 4, Yelisyev launched on Soyuz 5 and returned on Soyuz 4. The tone of the meeting was more than congenial. It took several days to arrange, but everybody obviously wanted to get together. We had each toured the other's pavilion a previous day. Through our representatives we invited them to our pavilion, they accepted and reciprocated the invite.

They appeared exactly on time, in civilian clothes. Both were most pleased to get in Apollo 8 and have the opportunity to ask questions. They were shown a full scale LM mockup and cockpit, and a live demo of a lunar excursion.

After about one hour in our pavilion, we went to their pavilion which was void of manned hardware; but, we did discuss Soyuz 4/5 referencing some photos on the wall. We then proceeded to the Yak 40 executive jet with a small group (small airplane) for light conversation and refreshments. A quick visit to the AN-22, terminated the visit after a total of about 3-1/2 hours.

We were invited to see a film on the Soyuz 4/5 flight which Jim and I had to miss due to our departure dates but, hopefully, Rusty saw on Saturday, the 7th, when he returned for the flying part of the Air Show.

I was most impressed by both cosmonauts - sharp, clean cut, good shape, about 6 ft., 180 pounds solid, good sense of humor, aggressive. They were very responsive to most questions; however, some questions never did get adequately answered, whether due to the translation or the questions I don't know which.

Shatalov is an Air Force Colonel, Yelisyev is a civilian engineer with apparently no flying experience. Both were very active in the discussions. They were also quite well informed on our program. Most of their questions to us concerned training and impressions in flight.

Many things were discussed. I'll note below the technical items I can remember, not necessarily in any order and without many of the details I too would like to find out. It was difficult to complete a point of discussion for several reasons. There was only one interpreter (excellent), but 3 of us, our wives, two of them, Clo Wood (NASA European Rep), and the Russian's Pavilion Director in the conversation individually, simultaneously,



in pairs, and groups. And, during the tours of the pavilions, there were so many photographers and people around it was difficult to get more than one question at a time answered, much less a technical series.

We have a small book, in Russian, which describes the flight of Soyuz 4/5 which should tell the story in more detail and with more accuracy. Our interpreter is going to read it onto a tape, and we will have it transcribed for your info. That will probably require a month or so.

a. The rendezvous is initiated from two identical orbits slightly out of plane. At a nodal crossing the spacecraft are separated by approximately 2,000 ft (?). When the separation then increases to 10 km, the active vehicle performs a maneuver to initiate the terminal phase. This maneuver is ground computed, onboard controlled. (Surprising, but that's what he said.)

b. Braking is performed manually using radar, TV, and visual through a periscope.

c. Docking is manual using a "target" on the passive (Drogue) vehicle and periscope/TV on the active (Probe) vehicle. The target was referred to as a "beacon".

d. The probe captures and retracts mechanically, making the electrical connection when hard docked much like Gemini.

e. Attitude and translation thrusters are at the aft of the service module, controlled by two hand controllers similar to our RHC and THC.

f. Attitude reference is relative to both the horizon and an inertial platform.

g. The platform is aligned using the stellar optical instruments. They asked about and could not see stars in the daytime either.

h. All electrical power is provided by solar cells through buffer batteries.

i. The lab hatch can be opened electrically or manually, was electrically opened on this flight.

j. Shatalov got his wings in 1949 (born 1927), flew prop fighters as an instructor, then all sorts of jet fighters. Now flies for training and goes as a passenger when traveling.

k. The "PLSS" has a 12 hour duration; comm is by wire; a tether is used for safety; the PLSS is mounted on the leg, based on the optimum position determined in training, but could be mounted anywhere using straps.



l. Most of their 0-g training is done in aircraft. They were interested, and apparently surprised, in the percentage of time we spent in the water.

m. After undocking they spent 20 minutes stationkeeping, some at night; were very impressed with the "spectacular" view of another S/C in flight; their S/C have navigation lights and a spot light.

n. Soyuz uses lift for reentry control, the L/D being  $\sim 2$  (we had a very difficult time communicating the concept of "L/D", even though two years ago Feoktstov asked what the Gemini L/D was).

o. Shatalov was very interested in the control of the CSM and LM and, in particular, the control problems experienced on Apollo 10.

More later when the 3 of us can get together and go over the discussions.



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