Launch of Soyuz TM-15 and Tour of Soviet/Russian Space Facilities

by

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Shrouded in secrecy, the mystic of the Soviet space program enchanted me ever since the launch of Sputnik 1 on October 4, 1957, when I was eleven years old. Forty-two years later, I still remember the fear of Soviet/Russian dominance of space that swept the country during the early years of the space race. The Soviets continued to dazzle Americans by their launches of Yuri Gagarin, Valentina Tereshkova, and the first man to walk in space, Alexei Leonov. They angered us by shooting down the Lockheed-built U2, the spyplane flown by Francis Gary Powers. Proudly, we at last beat the Russians to the moon on the Apollo 11 mission, with Neil Armstrong and Buzz Aldrin "flying" the American Flag on the first planetary body other than Earth. While people in the intelligence community probably knew something about it, it has only been in the past few years that the average American learned of the N-1 rocket that harbored the hopes of the Soviets to beat us to the moon.

The day I read Aerospace Ambassadors advertisement in Aviation Week and Space Technology seeking "delegates" to travel to the Baikonur Cosmodrone in Kazakhstaan to watch the launch of Commander Anatoly Solovyev, Flight Engineer Sergei Avdeiev, and guest cosmonaut Michel Tognini (French) on Soyuz TM-15 on 27 July 1992 is the day I realized that I could witness the mother lode of Soviet space program if I spent $5000.00 for the tour. It was expensive, but well worth every cent.

As delegates of Aerospace Ambassadors, our group of Space Nuts met at the Finnair counter at the JFK airport in New York on 22 July 1992. It was easy to spot the others - cameras, space lapel pins, talk of moon rockets, starry eyes! We were the one that Normal People didn't want to sit next to on Flight 102 to Helsinki, Finland.

Calling our group "Space Nuts" is a modest statement. Except, we were not modest - all of us had passed through the Space Nut Galaxy a long time ago. It could be argued that a "Space Nut" is someone who has an interest in space, but otherwise may live in the proximity of the "Normal Zone". Not us! It was as if the Solar Winds stole from our space consciousness particles of Cosmic Dust, remnants of the Big Bang, flushed Normalcy down a Black Hole, and coagulated into a vibrant, pulsating quasar of space energy at the JFK Airport. Our trip coordinators Wayne Matson and Abby McKinnon handed out our Russian visas while we started making friends with each other.

Ours was a mixed lot - the only real thing some of us had in common was the desire to see this launch. Butch Head is a Chemist at a paper plant. His father had been Gus Grissom's best friend; Butch told us several stories about "Uncle Gus". Bob McCullough teaches math at Ferris State College in Big Rapids, Michigan. He is responsible for having the local cable company carry NASA Select TV. He and Ed Cameron and I are all about the same age, so we all could remember very vividly the launches of Sputnik I and Yuri Gagarin. Ed, Peter, Steve, and Susan worked for various branches of the U. S. government. I have forgotten the last names of some of the people. Bob

Gaylord works for Bethlehem Steel. Ron Caswell and Rick Vargo work down at the Cape as engineers on the shuttle and space station programs. Richard Tonkin is a lawyer from Australia. Later, he led a group to Xichang, China to see the launch of a Long March. Our two Canadians, Ken Harman and Chris Gainor, both work in the medical field. Ken has built excellent models of both American and Russian spacecraft and rockets; Chris is working on a book about Canadian astronauts. LeRoy Peterson, his son Doug, and grandson Dave are from Michigan. LeRoy and Doug own a machine shop that contracts out to General Motors. While we were in Russia, they took a ride in a MiG 29. Bart Hendrickx and Art Schoeters are from Belgium. Bart works as a Russian translator, but also has strong interest in space. Art is also a math professor. Roger Schlueter wrote a science column for a small newspaper near St. Louis. Rounding out the group were Tom Conrad, Dave La Blanc, and Dave McCarty, the professional camera crew from Rockit (spelled correctly) Productions, Inc., out of New Orleans. Dave La Blanc is listed in the credits of the movie, “JFK”. Dave McCarty had just finished a one week training course at the Yuri Gagarin Cosmonaut Training Center in Star City. He was able to fly on their version of the KC-135 aircraft.

In Helsinki we had a change of planes. Thoughts of what happened to KAL Flight 007 surfaced as our Finnair flight entered Soviet - ah, Russian - airspace. Of course, I didn’t have any desire to be shot down, but in some bizarre manner, felt somewhat disappointed when no MiG’s appeared off of our

wing. Unlike other international airports I have flown into, Moscow's Sheremetyevo Airport had no other air traffic in sight when we landed.

After seeing the sights of Moscow for two days, we were anxious to stop acting like tourists and start acting like Space Cadets. Prior to the Space Age, the Golden Age of Aviation thrived. Every bit as impressive as the Smithsonian's Paul Garber facility for the restoration of vintage airplanes, but far less glamorous, is the Monino Air Museum outside of Moscow. This place was fantastic!

Apparently, we were not expected, because the director acted surprised to see us. After a discussion that included a bribe by Dennis Pivnyvk (our interpreter and also, the son of a very high ranking Russian space official) the director agreed to show us around. Young Russian soldiers eyed us with curiosity. Just in case we weren't allowed entry, I snapped a photo of a gigantic aircraft that was a combination of airplane and helicopter.

Combination Airplane and Helicopter at Monino Air Museum

In the third room of the museum I received one of the most memorable experiences of the trip. Two actual pieces of the Lockheed-built U-2 flown by Gary Powers and shot down by the Soviets on May 1, 1960 were displayed on a table. It never had occurred to me in my life that I would see this wreckage, let alone touch it. From what I understand, Powers had flown over Baikonur on that eventful day that became one of the cornerstones of the Cold War.

Left: Wreckage of Gary Power's U-2
Right: Cu-100 built to carry Hydrogen Bomb
Bottom Left: Russian version of Wright Flyer
Bottom Right: Bear Bomber

Outside, there were planes of every description. The most awesome looking plane was the Cu-100. It is built of Titanium, and was designed to carry two Hydrogen bombs. Only four were ever built. Inside another hanger was a plane that very much looked liked the Wright Flyer (below, left). A Bear bomber with four engines and two counter-rotating props on each engine looked menacing just sitting on the ground (below, right).

Also, on display was the very helicopter that dropped eight thousand gallons of water on the Chernobyl Nuclear Plant after the accident there a few years ago. Among the many other aircraft grabbing our attention was a row of MiGs ranging from the MiG-15 to the MiG-29, I called it “MiG Alley”. The vehicle that fascinated me was the MIG-105 EPOS (Experimental Passenger Orbital Spacecraft). It was about twenty feet long and looked like a small space shuttle.

MIG-105 EPOS (Experimental Passenger Orbital Aircraft)

“It was one of Russia's shuttle designs in the 1970s, canceled -- but then subscale models were flown into orbit in the early 1980s as technology development for the Buran. See http://www.friends-partners.org/~mwade/spaceflt.htm for more details.” Email from Jim Oberg. http://www.friends-partners.org/~mwade/craft/mig10511.htm is the actual web page.[1]

Our final words from the museum director, a former World War II combat veteran, were a prelude to what we would hear many times during the other tours of the Russian/Soviet aerospace facilities: “May you have blue skies and

now let us talk about peace and friendship and forget about all these combat planes." This was definitely a day to remember.

The next day we were taken to another one of Moscow's four airports (which was the one used by Presidents Boris Yeltsin and Milhail Gorbachev) to board an Aeroflot Tu-134 jet, tail number CCP-65719, for our flight to Leninsk, which is the city outside of Baikonur. This aircraft still had the hammer and sickle flag painted on its tail section. The Tu-134 is built similar to a DC-9, only it has two seats on each side of the aisle, as opposed to the two and three seat configuration of the DC-9. The first class cabin was quite luxurious with its polished wooden panels and captain-style chairs. Typically, though, I was seated in the second class cabin, which had a slight fishy smell. Prior to takeoff, "Je kypumb" and "3acmezHymb phMhu" signs for No Smoking and Fasten Seat Belts illuminated. (Of course, the Cryllic alphabet is somewhat differently written than the English letters.)

During the three hour flight to Leninsk, which is East of the Aral Sea, we were told not to take photographs from the plane. Our meal of filet of chicken and chicken-fried potatoes, decorated with toothpicks shaped like swords, was one of the best meals I have ever eaten on board a plane. About an hour out of Moscow, we flew over what I think is a defensive zone, sort of a No Man's land. Clearly visible was a road that seemed to form an outer perimeter, running between two barber-wired fences which were separated by perhaps 100 meters. Enroute to Leninsk, some of the people were fortunate enough to go into the cockpit and sit in the co-pilot's or navigator's seats. Beneath the

navigator's seat was a Plexiglas dome which one could clearly look downward. Just as my turn arrived, we were instructed to take our seats for landing at Leninsk. I could not believe that I was actually landing near Baikonur.

In Korolev, by James Harford, Cosmonaut Gyorgi Grechko gives an interesting account about Baikonur:

"In 1958 we were getting ready to launch Sputnik 3 from the cosmodrome. I don't like "Baikonur." It was a name invented for the Americans. Baikonur is hundreds of miles from the cosmodrome. It was for your CIA. I like the name Tyuratam, the railway station near the cosmodrome."[2]

Radars at Leninsk Airport (left) and at Monino Air Museum (right)
Photo on right by Ed Cameron

Surrounding the Leninsk airport were all kinds of radars (left), which were similar to some I saw at the Monino Aviation Museum (right). The rotating antennas (or to be more precise, antennae) intrigued me, and the engineer-in-me wanted to ask the Russians for a look inside the vans, but somehow I managed to squelch my curiosity and joined the others unloading our baggage from the plane to the waiting antique bus. On the way to Baikonur we passed through the city of Leninsk, which seemed like a ghost town. Crumbling apartments which once housed thousands of workers for the space complex stood empty. Where were these workers now?

As we continued on to Baikonur in the oppressive 110 Degree F. heat, we saw many camels near the road. Baikonur covers many hundreds of

square kilometers. The country side is similar to that of New Mexico or West Texas. Soon, we passed the red-letter sign that said, in Cryllic, “Baikonur”. (On the day we departed, we had a group photograph taken at this sign, which is shown on Page 31.) Off in the distance launch gantries could be seen.

Each of us were given our own room in the dormitory, complete with a bath. We were told that cosmonauts stay in the same dorm, but I don’t know if that is a true statement or not. A window air conditioner provided a short but welcome relief from the heat. However, the toilet had no seat, there was just the bare porcelain, and the water out of the sink was rusty. The shower drain was just a hole in the floor and was full of bugs, so I didn’t use the shower - I just washed up at the sink with the rusty water.

Our Russian guide, Boris Lokhmatchev, had been working at Baikonur since the launch of Sputnik I. A short man with silver hair, he jovially toured this group of space cadets all over Baikonur for the two days while we were there. I couldn’t help but wonder about all of the launches he had witnessed, and the thirty-five years of Cold War activities that he didn’t mention. I knew it would have been imprudent to ask him, so I kept my thoughts to myself. But if one is going to tour the Russian/Soviet Space launch complex, there is no one better to have as a tour guide than the man who had been there since the beginning.

Our first activity after checking into the dorm was to go near the Soyuz launch pad. At one point, the road made a 90 degree turn. The bus stopped, and we all disembarked to take photographs of the Soyuz rocket enclosed by its service gantries. There it was! This magnificent rocket was but a short

distance from us, a sight that few Westerners had ever seen before (top of next page).

Boris told us that when Yuri Gagarin was on his way to the pad for his historic first flight into space, he needed to answer the call of nature. His bus stopped at the spot where we stood, and then he urinated onto the bus tire. Since that time, all cosmonauts do the same thing at the same place on their journey to the pad. I wish I had done the same thing.

Boris may not have been thrilled showing Westerners the launch pad, but if so, he didn't show these emotions. This was not the case of one guard, perhaps twenty years old. He was clearly agitated, and didn't know what to do when a bus load of tourists stopped by his guard gated and started taking photographs of the Soyuz rocket. I can understand his confusion. After holding security clearances for many years, I would be very reluctant even now to allow a bunch of Russians take photographs of my work area, even though it is unclassified. Somehow, it just doesn't seem right.

Next, we went to an observation room next to the room where the cosmonauts have their final medical and suit checks prior to launch. Standing at the front of this small observation room filled with wooden chairs, Boris described the procedures of the medical checks. He then took us outside to show us the three painted blocks on the concrete where the cosmonauts stand for their pre-launch ceremony, salute the head man, and then the commander of the mission announces that the crew is ready to fly. In this same area is a large sculpture of Sergei Korolev, who was the Chief Designer of Soviet Spacecraft.

Left: Cosmonaut medical check out facility
Right: Positions that cosmonauts stand at pre-launch ceremony: L-R: Sergei Avdeiev (Flight Engineer), Anatoly Solovyev (commander), Michel Tognini (guest cosmonaut)

Gagarin and Korolev each had a little white cottage near the Cosmonaut dining hall, which are now museums. The bed that Gagarin slept in the night before his launch (how could he?) is preserved as well as an old radio and a photograph of Lenin. Hanging on the walls were a poster-size photo of Gagarin in his space suit and another one of him and Korolev.

Left: Yuri Gagarin
Right: Yuri Gagarin and Sergei Korolev

We were privileged to eat in the Cosmonauts's dining hall. Ladies dressed as if they were going to a ball waited on us. During one meal, I had a whole bottle of Orange Fanta to myself. The food was good, but consisted mainly of barley and rice. By now, we were sort of used to eating the fatty salami. The drinking glasses we used had logos from Shell Oil, Marlboro, and the Havana Club.

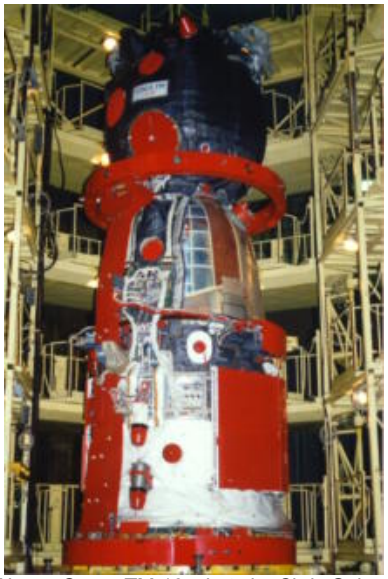
After dinner on the first night, we then boarded the bus again to go to the Soyuz preparation facility. Soyuz TM-16 was being readied for its launch, and at the other end of the facility a Progress re-supply ship to the Mir was being prepared. Just by looking at a Progress and a Soyuz, it is difficult to tell the difference, but the Soyuz is man-rated, while the Progress is not. The letters, "CCCP" were written on the Soyuz TM-16 capsule, indicating that not all the reform had yet taken place. The capsules are attached to the Soyuz SL-4 Launch Vehicle in this facility, and then transported to the pad via rail cars. I

took four close-up photographs of an instrumentation panel, and was told not to. This was the only time on the trip I was told not to take photographs.

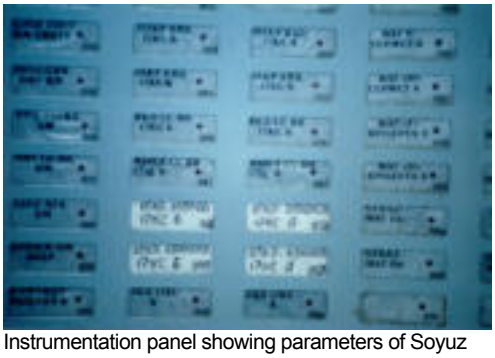
Overlooking the Soyuz preparation facility were murals of the Soviet space achievements, as well as a large photograph of Yuri Gagarin and the Soyuz-Apollo mission (as it is rightfully called there). The Soviets/Russians are quite proud of their participation in these missions. Through-out the country we saw several mission related items celebrating the first time the Soviets and the Americans met in space. I saw as many photographs of Deke Slayton, Vance Brand, and Tom Stafford as I did of Alexei Leonov and Andreyev Kubasov.

After dark, we rode the bus back to the pad, to see the Soyuz rocket bathed by white spot lights. Reflections of the spotlights gleamed off the railroad

track. T-14 hours. Were we excited?



Above: Soyuz TM-16, photo by Chris Gainor



Instrumentation panel showing parameters of Soyuz

Right: Soyuz-Apollo banner in Soyuz checkout facility

Later that night at the dorm, we celebrated with a pre-launch party. One of the Canadian members of the group, Chris Gainor, suggested we all sing our respective national anthems. Vodka flowed that night for most of the party. (I was one of the exceptions.) Adding to the cause for celebration was the 21st birthday of Dennis Pivnyvk.

Probably none of us had much sleep that night. After breakfast, we rode to bus back to the building where the cosmonauts suited up and had their medical checkouts. As mentioned earlier, this is where the cosmonauts salute and report that they are ready to fly into space. A large crowd had gathered there, with a considerable number of French people, including a group of high school kids who were there to see the French Cosmonaut Michel Tognini. I thought I had a good spot to watch the ceremony, but others quickly moved in, obscuring my view. Fortunately, Ron Caswell managed to have a better view to take this photograph:

Michel Tognini (guest cosmonaut), Anatoly Solovyev (commander), Sergei Avdeiev (Flight Engineer) - photo by Ron Caswell

After the ceremony, the crew carried their portable life support systems onto the bus. Next stop: Yuri Gagarin Relief Station. Our group boarded a bus heading the opposite direction of the launch pad, to another pad preparing to launch a Proton rocket three days later. Except for missing the activities in

Moscow two days later, I could have easily stayed in Baikonur to watch that launch. A totally white rocket, the Proton majestically dwarfed all of us. Tom Conrad, Dave Le Blanc, and Dave McCartney were with us to video tape the launch of TM-15, so they had the opportunity to ride the service basket to the top of the Proton. I have to admit, I was envious.

I was impressed with the Proton, but I hadn't paid five thousand bucks just to see this rocket. Come on people, let's go back to the Soyuz pad to watch the launch. Finally, the time came for us to go.

As of the time of this writing (March, 2000), I have seen 9 space shuttle launches, one Conestoga launch from Wallops Island, and the launch of Soyuz TM-15. Each have been very exciting to watch. I suffer from a disease called "Launch Fever", and there is no cure that I would ever want to take to ease this suffering.

Proton on the pad

But the launch of TM-15 was different. This was in Kazakhstan! Instead of being at least three miles away at a shuttle launch, we were allowed to set up our cameras and stand 950 Meters from the Soyuz Pad. A man wearing a short-sleeved shirt stood in a wooden structure calmly announcing the count-down. Precisely at 10:00 AM, 27 July 1992, the four counter-weighted clam shell fixtures rotated away from the rocket, ignition occurred, and the Soyuz TM-15 rocket carrying the three cosmonauts to rendezvous with the Mir was vibrantly and wonderfully on its way! Except for actually being on-board the TM-15 capsule, there is no place at that moment in time I would rather have been. WOW!

French newspaper people interviewed Mrs. Tognini after the launch. Some Russians made speeches. Newspapers written in Russian reporting the

Launch of Soyuz TM-15, 27 July 1992

launch of Soyuz TM-14 the previous March were given to us. Witnessing the launch of an SL-4 in Baikonur shortly after the Soviet Union broke up, after years of living through the Cold War, is still one of the most important days of my life. I would never have dreamed it was even possible a few years earlier.

The events of the next few paragraphs are out of chronological order, but are more fitting with the Soyuz launch. We visited the pad the next day. This is the same pad that had launched Sputnik 1, Yuri Gagarin, and 240 other missions. Soyuz TM-15 was the 243rd launch from that pad. First, we went to the gantry, and then, we scrounged around the flame pit. Foreign Object Debris (FOD) is the nemesis of all flight operations around the world, but I was surprised at what lay at the bottom. There were wrenches, cables, machined parts, and all kinds of other junk. I found a piece that Doug Peterson wanted to make a lamp base at his machine shop in Michigan. He had some electrical part, which was in worse shape, but since I work with electronics, I decided to trade. Sometimes, I wish I hadn't been so hasty in my decision, because I bought a model of the SL-4 that would have looked nice on the part Doug received. Ed Cameron found a T-0 umbilical cable that was made of asbestos that he took home.

We then visited a museum that had artifacts from the entire Soviet/Russian space program. On display were several spacecraft, including a Soyuz capsule with a mannequin dressed like a cosmonaut inside. The panels of their spacecraft have a world globe about 4" high that rotates, showing the cosmonauts their position over Earth. It looked as if they may have

been bought as toy globes from the GUM department store in Moscow. It was a simple, but very effective idea.

Left: Soyuz Launch Pad

Right: Matt Nelson and Ed Cameron with pad debris

Bottom: Inside mockup of Soyuz Capsule

Ed Cameron had been researching the N-1 moon rocket for many years. He even has a theory that Pavel Belyaev (the cosmonaut that was with Alexei Leonov in Voskhod 2) had been killed in one of the fateful explosions when the Russians were trying to beat the Americans to the moon. At the space museum in Baikonur, he held a turbo pump that had been recovered from an N-1. That same day, just prior to our leaving, he was presented a model of the N-1. However,

we had to wait for him to come to the Baikonur gift shop after lunch for the presentation, because one of the workers had taken him aside to a storage shelter that had been made out of a N-1 upper stage. Ed was given a crowbar to rip off a section of that stage to take home. One happy camper that day!

The photograph of the N-1 rocket shown below is from a slide that Boris gave Ed at the party on the night of the launch. Boris had given a slide show about the history of Baikonur, after which he gave Ed the slide.

Upper: N1 upper stage which was a shed. Photo by Ed Cameron
Lower: N1 on the pad. Photo contributed by Ed Cameron and Boris Lokhmatchev

After the launch we visited the Buran in its hangar, as well as its massive transporter. In April of this same year I had worked at the Kennedy Space Center troubleshooting a Ku-Band antenna problem on the Space Shuttle Atlantis that occurred during the STS-56 flight. I was within 2 feet of the nose of Atlantis. Had I touched it, I am sure that I would have been fired. At Baikonur, we climbed all over the Buran. The film crew was even allowed inside the cockpit. It is a shame that Buran operations money ran out, because

I think Russia and the United States could have benefited with shuttles from both countries flying. Although the Buran made its first (and only) flight on 15 November, 1988, and was unmanned, there is an interesting story that goes around that makes one wonder how much of the technology may have been American made: The space shuttle's automatic microwave landing system (MLS) from Dakar, Senegal and a MLS receiver from an U. S. Air Force F111 were both stolen prior to the launch of Buran.

Despite the strong similarities, there are two main differences between the space shuttle and the Buran:

1) The Buran doesn't have main engines in its tail - four engines are mounted in the Energia main tank.
2) The space shuttle uses two solid (fueled) rocket boosters; the Energia has four strap-on boosters, and each of these liquid fueled boosters also have four engines.

I figured since Boris had given Ed his slide of the N-1, I would ask for one slide for myself. This is the one that I chose:

Buran on transporter. Photo contributed by Boris Lokhmatchev

Boris also gave each of us a set of six pins depicting the Buran's flight. Following the tour of the Buran, we then went out to the pad from which it launched. This is the same pad area that was used for the N-1. Like a bunch of kids, we all climbed all over the pad structure, and were able to take an elevator to the top. Notice the two slanted pipes on the right side of the photograph (below). The top pipe is the emergency escape tube for the cosmonauts. At the bottom of the pipe is a room upon which the cosmonauts land on thick layers of soft padding. Boris arranged for us to ride an open train car up the bottom pipe, which was like a Disney Land ride, but wouldn't give in to our pleas for us to "accidentally" drop through the escape tube.

Buran launch pad, which also had been the N1 pad location

Our next stop was to the airstrip where the Buran landed after its unmanned launch. It looked like any other airstrip. Off to the side was a mate/demate fixture to mount (or remove) the Buran from the An-225 aircraft, which looked very similar like the same fixture NASA uses to mate/demate the shuttle to/from the 747, respectively.

Monday, July 27, 1992: What a day to remember! I saw the Pre-Launch Ceremony for the crew of Soyuz TM-15, the actual launch itself, a Proton on the pad, and climbed around the Buran and its launch pad. Not too shabby for a kid from Wyoming who has made a career working in space communications and has to look at every antenna he comes across!

Antennae near Soyuz Pad; photos by Ed Cameron

After more touring and group photographs, we left Baikonur the following day to go back to Moscow.

On Wednesday morning we were driven to the Russian Mission Control Center in Kaliningrad to watch the docking of the Soyuz TM-15 capsule with the Mir. The Russian MCC has marble walls, unlike the similar one in Houston.

Top Left: Soyuz TM-15 (photo by Ed Cameron)
Top Right: Mir (photo by Ed Cameron)
Center Left: Soyuz TM-15 from Mir
Center Right: Mir from Soyuz
Bottom Left: Hatch opening in Mir
Bottom Right: TM-15 Crew of Anatoly Solovyev, Michel Tognini, and Sergei Avdeiev
All photographs on this page were taken from live video downlinks from Mir on 29 July 1992 in MCC.

The actual controllers for this mission sat in the lower level of the two control centers, while we watched the docking in the upper control center. This control center had been used only during the Energia flight test and the Buran flight.

Just prior to the docking of the Soyuz TM-15 to the Mir, a video monitor on the left side of the world map showed the approaching Soyuz spacecraft as seen by the Soyuz TM-14 crew, Aleksandr Viktorenko and Aleksandr Kaleri, on-board the Mir; at the same time, the monitor on the right side of the map showed video of the Mir, taken from the Soyuz. Coordinate information, range, and rate of approach data updated as the two spacecraft made their rendezvous. An orbit later the Mir crew opened the hatch for the Soyuz TM-15 crew to enter. They exchange hugs and soon held a news conference. I don't know which crew was the most excited: TM-15 because they were just beginning their Mir stay, or the TM-14 crew, because they knew they would be headed home soon.

Between the two orbits of docking and opening the hatch, we were given a welcome speech by Cosmonaut Pyotr Klimuk, the Chief of the Gagarin Cosmonaut Training Center. Our translator was named Peter, a man that had been with our group from the start. Rick Vargo presented a photo of the launch of STS-1, signed by Bob Crippen, to Yuri Semenov, the General Designer of RSC Energia. Then, we entered the lower mission control room. Adorning the walls were mission posters spanning all manned missions from Yuri Gagarin to the TM-15 crew. Another one of the cosmonauts, Alexander Serebrov, greeted us, and signed a 1 Ruble note for me. I didn't have anything he could

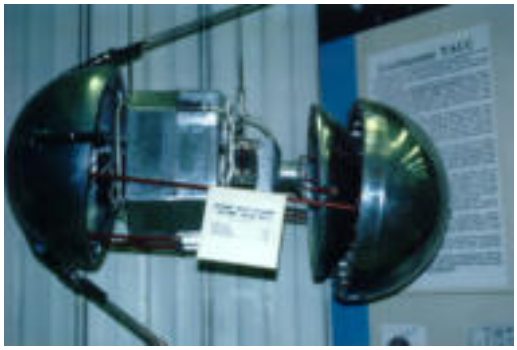
write on, so I took the 1 Ruble note from my wallet. He joked, “I am a cosmonaut, not a banker!” He had been in the United States testing out the shuttle’s MMU, since he was the first Russian to test the SPK maneuvering unit in space during the fourth EVA of Soyuz TM-8 on 1 February 1990.

Bottom Left: Cosmonaut Alexander Serebrov, Matt Nelson, and Chris Gainor

Bottom Right: Cosmonaut Pyotr Klimuk and Peter (translator). Klimuk flew 3 missions, and had trained to be an N-1 cosmonaut

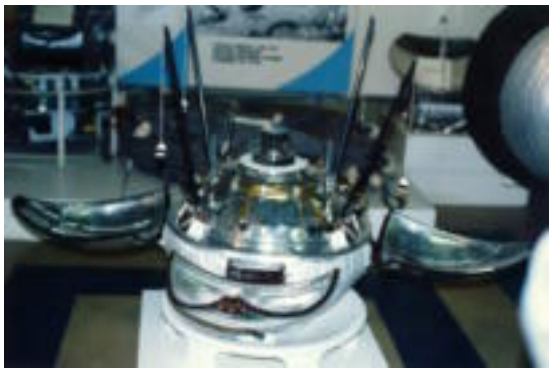
After lunch, we had another treat: Korolev’s Spacecraft Museum (NPO Energia's museum) is a place a space enthusiast could spend days. Unfortunately, we were only there for an hour or so. That was still OK. On display

were duplicate or actual capsules of Sputnik I, Sputnik II, Yuri Gagarin's historic actual Vostok spacecraft, the Soyuz used in the Soyuz-Apollo flight, a Molniya, a Zenit, a Zond, and the back up Luna 9 soft lander. I think there was also a Voskhod capsule. Most of the capsules had a Plexiglas window covering the entrance.



Sputnik I museum mockup (above)
Sputnik II mockup with dog Laika (right)

In James Harford's book, Korolev, there are several references about dogs being flown in space as test subjects. Apparently, this practice still went on as late as 22 February 1966, because sitting right next to Yuri Gagarin's Vostok was a capsule that had been launched on this date. Inside this capsule was a photo of two dogs, and a sign in Cryllic that said Kosmos 110. In James Oberg's book, Red Star in Orbit, a reference at the back ("Soviet Man-Related Space Shots") said the mission lasted 22 days, and was called a "Voskhod bio-satellite".[3] The next reference listed in the appendix titled was for Kosmos - 133, an unmanned Soyuz test, launched on 28 November 1966. Soyuz 1 was launched the following April with Vladimir Komarov on-board (who died during



Upper Left: Yuri Gagarin's actual capsule
Upper Right: Kosmos 110 two dogs
Center Right: Soyuz capsule from Soyuz-Apollo
Bottom Left: Luna 9 backup spacecraft
Adjacent: Luna 9 pin given to Matt Nelson by a Russian
Bottom Right: Molniya spacecraft

reentry when his parachute tangled). Since the Kosmos 110 mission occurred in the month following Korolev's death, I now have the impression that his plan was to test the next generation manned spacecraft (Soyuz) with dogs prior to launching Komarov.

The display of Luna 9 was of personal interest to me. Luna 9 made the first soft landing on the moon on 3 February 1966, and transmitted television images back to Earth. Once, many years ago, I met a Russian sailor. I gave him a small pocketknife and a couple of American coins. In exchange, he gave me a Russian coin, a lapel pin of Luna 9, and pack of Russian cigarettes, which I kept, even though I don't smoke. The cigarettes are very dry now, but I still have them.

For lunch the next day we ate in the Cosmonauts Dining Hall in Star City, after visiting some of the training facilities. We drank out of exquisite china coffee cups with an emblem on them - quite a contrast to the government issued coffee cups served in the cafeteria at the Johnson Space Center. We toured two different centrifuges, a room that showed the status of the mission utilizing an electronic screen that showed what looked like a timeline, and a very small planetarium that the cosmonauts trained in to learn the stars. But the most enjoyable part of this tour for me was seeing the Priroda and Spektr Mir modules. The photo of the Mir (next page) is of the same one that Astronaut Bill Readdy and two other astronauts are shown entering in the IMAX movie, "Mission to Mir". For me, that movie was just about the ultimate video for this trip. The movie starts off with a launch of the Soyuz rocket, shows Anatoly

Solovyev training another cosmonaut in the Soyuz spacecraft, and shows him flying in Mir.

Large Centrifuge at Star City, good for 20 G's

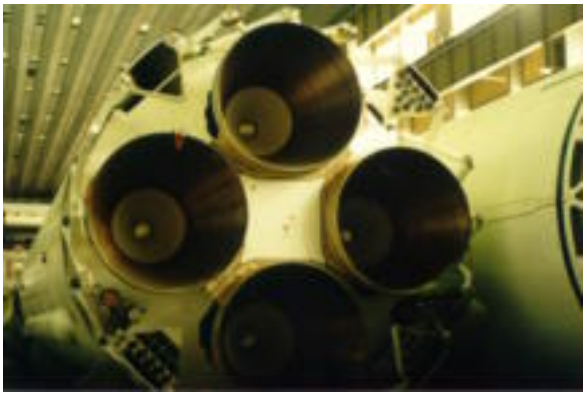
Mir trainer at Star City

That afternoon we concluded the space portion of our tour to Russia and Kazakhstan by a visit to the Khrunichev plant, where remote sensing satellites, the Proton rocket, and the modules that go on the Mir are built. Chris Gainor wrote, "We saw the actual Spetkr and Priroda modules which were later launched to Mir."[4] Now, the company makes mundane things such as bicycles in addition to rockets.

Kvant Mir module (left) and a remote sensing satellite (right) in Khrunichev plant

The Khrunichev plant is a non-descript building surrounded by a stone fence with two strands of barbwire on top and guarded by a young soldier.

Railways tracks ran the length of the building, an estimated 300 meters long. Approximately 20 Protons in various stages of assembly were observed. Never under-estimate the power of the Russians to mass-produce missiles. I stood in the same spot when I took both of the top photos, looking left to right:



Upper Left and Right: Protons in Khrunichev plant

Lower Left: Proton 1st stage
Center Right: Proton 2nd stage
Bottom Right: Proton strapon booster for 1st stage

That night we all left on an overnight train to St. Petersburg, where we did more standard tourist type of activities. One disappointment we had was that we were not able to see a Lunokhod reported to have been in St. Petersburg. Oh, well. That is not much to complain about for this fantastic trip of a lifetime, three years prior to the Shuttle-Mir missions. The Soviets had had a space program that was robust, very functional, and in many ways used a more practical approach than the United States. Although their space program was a product of the Cold War, they certainly deserve the credit for their many first achievements in the history of space exploration.

Some of us are still good friends. Butch Head stayed at my house when he came down for Deke Slayton's funeral (which was also attended by Alexei Leonov). He, Ron Caswell, Bob McCullough, Richard Tonkin, and Ken Harman saw an Ariane 4 launch in French Guiana. Bob McCullough, Bob Gaylord, and I saw the launch of STS-66, and Ron and I saw STS-51 launch. Ed Cameron,

Ron and I saw the launch of STS-88. Chris Gainor has been to Houston twice researching his book. We are all a bunch of rocket bums!

APPENDIX

The next two pages are quoted directly from Mark Wade's Encyclopedia Astronautica:

http://www.friends-partners.org/~mwade/flights/soyztm14.htm
http://www.friends-partners.org/~mwade/flights/soyztm15.htm
http://www.friends-partners.org/~mwade/astros/avdeyev.htm
http://www.friends-partners.org/~mwade/astros/solovyov.htm
http://www.friends-partners.org/~mwade/astros/tognini.htm

Soyuz TM-14
17 March 1992 10:54 GMT. Duration: 145.59 days. Call Sign: Vityaz (Knight). Return Crew: Kaleri, Tognini, Viktorenko. Backup Crew: Avdeyev, Ewald, Solovyov. Nation: Russia. Launch Site: Baikonur. Launch Complex: LC1. Launch Vehicle: Soyuz 11A511U2 . Program: Mir. Class: Manned. Type: Spacecraft. Spacecraft: Soyuz TM. Payload: Soyuz TM 11F732 s/n 64. Mass: 7,150 kg. Perigee: 373 km. Apogee: 394 km. Inclination: 51.6 deg. Period: 92.2 min.

Mir Expedition EO-11. Joint flight with Germany. Docked at the Kvant rear port at 12:33 GMT on March 19. The Soyuz TM-14 crew, Aleksandr Viktorenko and Aleksandr Kaleri, returned to Earth together with French astronaut Michel Tognini. The Soyuz TM-14 undocked from Mir at 21:47 GMT on Aug 9, and landed in Kazakhstan at 01:07 GMT on August 10.

Soyuz TM-15
27 July 1992 06:08 GMT. Duration: 188.90 days. Call Sign: Rodnik (Spring - water spring). Return Crew: Avdeyev, Solovyov. Backup Crew: Haignere, Manakov, Polishchuk. Nation: Russia. Launch Site: Baikonur. Launch Complex: LC1. Launch Vehicle: Soyuz 11A511U2 . Program: Mir. Class: Manned. Type: Spacecraft. Spacecraft: Soyuz TM. Payload: Soyuz TM 11F732 s/n 65. Mass: 7,150 kg. Perigee: 196 km. Apogee: 216 km. Inclination: 51.6 deg. Period: 88.6 min.

Mir Expedition EO-12. Russian astronauts Solovyov and Avdeyev and French astronaut Tognini were inserted into an initial 190 x 200 km orbit inclined 51.6 deg. Later on July 27 they maneuvered to a 223 x 343 km orbit, and on July 28 docked with Mir in its 405 x 410 km orbit. Aleksandr Solovyov and Sergei Avdeyev undocked from the Mir complex aboard Soyuz TM-15 on February 1 and landed the same day in Kazakhstan after six months in space at 03:58 GMT. Soyuz TM-15's flight was an in-orbit record for a Soyuz spaceship - 188 days 21 h 39 m.

Anatoly Yakovlevich Solovyov
Status: Inactive. Trained as: Cosmonaut.
Profession: Pilot. Sex: Male. Marital Status: Married. Children: Two.
Birth Date: 16 January 1948. Birth City: Riga. Birth State: Riga. Birth Country: Latvia.
Nationality: Russian. Affiliation: Soviet Air Force. Group: 1976 Air Force Group.
Detachment: TsPK-6. Date Selected: 23 August 1976. Date Departed: 25 January 1999. Number of Flights: 5. Total Time: 651.00 days.
Number of EVAs: 15. Total EVA Time: 74.68 hours.

(NOTE: Both Solovyov and Avdeyev performed these EVAs)

EVA Soyuz TM-15-1 - 03 September 1992 Assignment: EVA Crew. EVA Duration: 3.93 hours. Summary: Began installation of VDU thruster pod on Sofora tower.

EVA Soyuz TM-15-2 - 07 September 1992 Assignment: EVA Crew. EVA Duration: 5.13 hours. Summary: Continued installation of VDU thruster pod on Sofora tower.

EVA Soyuz TM-15-3 - 11 September 1992 Assignment: EVA Crew. EVA Duration: 5.73 hours. Summary: Completed installation of VDU thruster pod on Sofora tower.

EVA Soyuz TM-15-4 - 15 September 1992 Assignment: EVA Crew. EVA Duration: 3.55 hours. Summary: Installed Kurs docking system antenna on Kristall module.

Soyuz TM-5 - 07 June 1988 Assignment: Prime Crew. Flight Time: 9.84 days.
Soyuz TM-9 - 11 February 1990 Assignment: Prime Crew. Flight Time: 179.05 days.
Soyuz TM-15 - 27 July 1992 Assignment: Prime Crew. Flight Time: 188.90 days.
STS-71 - 27 June 1995 Assignment: Prime Crew. Flight Time: 75.47 days.
Soyuz TM-26 - 05 August 1997 Assignment: Prime Crew. Flight Time: 197.73 days.

Sergei Vasilyevich Avdeyev

Status: Active. Trained as: Cosmonaut.
Profession: Engineer. Sex: Male. Marital Status: Married. Children: Two.
Birth Date: 01 January 1956. Birth City: Chapaevsk. Birth State: Samara.
Birth Country: Russia. Nationality: Russian. Affiliation: Civilian Engineer,
Energia NPO. Group: 1987 Civilian Engineer Group. Detachment: NPOE-8.
Date Selected: 26 March 1987. Number of Flights: 3. Total Time: 747.59 days.
Number of EVAs: 10. Total EVA Time: 41.98 hours.

Soyuz TM-15 - 27 July 1992 Assignment: Prime Crew. Flight Time: 188.90 days.
Soyuz TM-22 - 03 September 1995 Assignment: Prime Crew. Flight Time: 179.07 days.
Soyuz TM-28 - 13 August 1998 Assignment: Prime Crew. Flight Time: 379.62 days.

Avdeyev remained on Mir with the EO-27 crew delivered on Soyuz TM-29, heading for a manned space flight time record.

Michel Ange-Charles Tognini

Status: Active. Trained as: Cosmonaut.
Profession: Mission Specialist. Sex: Male. Marital Status: Married. Children:
Four. Birth Date: 30 September 1949. Birth City: Vincennes. Birth Country:
France. Nationality: French. Group: 1986 International Group.
Date Selected: 09September 1985. Number of Flights: 2. Total Time: 18.74 days.

Soyuz TM-15 - 27 July 1992 Assignment: Prime Crew. Flight Time: 13.79 days.
STS-93 - 23 July 1999 Assignment: Prime Crew. Flight Time: 4.95 days.

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1. http://www.friends-partners.org/~mwade/craft/mig10511.htm
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Unless noted otherwise, all photos were contributed by Matt Nelson. Thanks to Ed Cameron (via Butch Head), Chris Gainor, and Ron Caswell for their fine photographs.