TWO SIDES OF THE MOON

DAVID SCOTT

and

ALEXEI LEONOV

with Christine Toomey

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CHAPTER 2

Cold War Warriors

1956–61

Lieutenant David Scott

32nd Fighter Day Squadron, Soesterberg, Holland

Soviet tanks rolled into Budapest in October 1956 and we suited up for war. The rise of Nikita Khrushchev to power in the Soviet Union following Stalin's death had created expectations of change in the Eastern bloc. But the Soviet reaction to internal dissent was brutal. Demands by Hungarian workers for more freedom met with a bloody crackdown; within weeks 3,000 were killed.

As a front-line fighting unit our squadron was placed on highest alert. The whole squadron could be airborne and in combat within an hour. Four airplanes, in rotation, were on a five-minute alert, their pilots sitting in the cockpit on the runway for hours at a time. Another eight were placed on thirty-minute alert and the rest of the squadron on forty-five-minute alert. We knew the Russians had far more planes, something like four or five to one. They had excellent pilots, too, so our chances of getting into a fight and coming out of it OK were not good.

We had been trained in techniques of escape and evasion—how to evade capture by the enemy in the event of being shot down. We had been dropped, on one occasion, in Germany's Black Forest. Our mission: to evade Allied Special Forces deployed to capture us.

If we were captured we knew we would be thrown in jail and interrogated—Korean style. We would be forced to stand in front of bright lights for hours on end, have cold water squirted at us, be made to do calisthenics all night, be subjected to mind games and generally humiliated. If interrogators got too much out of you, your security clearance was taken away and you were grounded. Out of fifty men in our class, only three got through the course without being captured. Toward the end of the last day I was captured, tied up and thrown face down in the mud.

The most likely area of combat for our squadron, in the event of war, was considered to be the skies over Czechoslovakia. So we were issued with Czech maps and currency. We were also supposed to be issued with sidearms to defend ourselves if we were shot down. But when Hungary blew up all we had were signal guns, small pistols—not much good for personal combat. We had to act fast, so two guys hopped in a plane and flew down to Italy, where they went to the Beretta manufacturing plant and bought up as many Beretta pistols as they could load into the plane. When they got back they laid all these pistols out on a long table and everybody bought at least three—we had to buy them ourselves—together with holsters and ammunition, the whole nine yards. In those days we did not have a lot of sophisticated gear. All we had were coveralls and G-suits in mismatched colors which fitted like chaps on our legs. It was equipment left over from the Second World War and Korea. We stuffed the pistols wherever we could, tucking them under our arms and into our chaps along with as much ammunition as we could carry. We looked like something out of a Hollywood movie, a comedy scene from some tale about the Wild West.

But this was not playtime; it was a deadly serious business. The Army was on alert too with their tanks at the ready. This was about World War Three. We really thought the US would defend the Hungarian freedom fighters, since here was a group of people finally trying to break out of communism. There they were down on the streets, fighting. We thought the US would support them the way the US had been saying it would. But it did not.

It was beyond my political scope at the time to understand why we did not respond to the raw aggression of the Soviets. It was an

ugly chapter of the Cold War. We let the Hungarians get had. I was too far down the ranks to know what was going on behind the scenes. All I knew was that after a few weeks on high alert our squadron was stood down.

Lieutenant Alexei Leonov

Higher Military Pilots' School, Chuguyev, Ukraine

Our newspapers were full of shocking photographs at the start of the Hungarian uprising. They showed the maimed bodies of supporters of the communist regime with the star symbol of the Soviet Union carved onto their corpses. I felt both disgusted and indignant. Had those involved in the revolt not been so cruel, they might have evoked a certain sympathy among the Soviet people. There were reasons for their discontent. Hungary's communist regime had brought the country to its knees. But the rebels behaved in a very cruel way. They shot, hanged and burned alive communist supporters and all those who disagreed.

I realize now that we did not know about all the events happening at the time. But we remembered very well that the Hungarians had been allied with Hitler during the Second World War and that a great number of Soviet soldiers had died fighting to liberate that country from the fascists. The prevailing feeling was that we had the moral right to have troops in Hungary and that Soviet garrisons had the right to defend their positions.

At the time all this was happening I had just completed my training with YK11 propeller planes at Chuguyev and was beginning to learn to fly MiG-15s. Our squadron was put on full alert. We prepared for combat. Looking back, I realize it is unlikely we would have been sent to fight. We were young, still in training. We were the future of the Air Force. But we felt prepared to go to war. I was twenty-one, ready for anything. Most of us believed the West would not be prepared to get involved in Hungary and face the might of the Soviet military; Europe had had its share of fighting. We were right. It did not. The rebellion was quickly put down.

Throughout the years of studies starting at Kremenchug Pilots'

College and Chuguyev Air Force School I always scored the highest marks in my exams. Then, at the very last, I took a wrong step. I dared to question an order to decorate a room in commemoration of Marshal Gyorgy Zhukov, the Soviet Union's military leader during the Second World War. I was too concerned with preparing for my final exams and said I would decorate the room once they were finished. This upset one of my tutors, and he marked me down a point in his subject, Marxist-Leninist theory. It upset me so much I vowed to re-sit the exam. But the commanding officer of my squadron said it would do no good: "Don't mess with those rogues. They'll always find a way to grind you down." However, he comforted me with the promise that I would be given first choice of where I wanted to be posted next.

He kept his word. I chose to serve with the elite 10th Guard Division, stationed in Vienna. I was not to know that by the time I was ready to take up my new post, the division would be relocated—to Kremenchug, the aerodrome where I had started out as a cadet four years before.

While we were making final preparations for our graduation ceremony, the astounding news came through that on 4 October 1957 the Soviet Union had launched Sputnik 1 into space. Everyone broke into spontaneous applause. We clapped each other on the back, congratulated ourselves on being the first country in the world to launch an artificial satellite. We were very proud of what Sputnik demonstrated to the world about the Soviet Union's advanced level of technology. We had no idea how spaceflight would progress from there—we thought it would be many years before a man would be launched into Earth orbit—but I was enthralled.

Within hours of Sputnik being launched the Soviet poet Nikolai Krivanchikov wrote a short verse which caught my imagination.

The day will come when we will embark on interstellar flight.
Who can prevent us from dreaming such dreams,
When it was Lenin who taught us how to dream?
All planets in the universe are waiting to be discovered.
We will chart the fifth ocean of space.
Chkalov set us on this path.

Valery Chkalov, one of the Soviet Union's most famous early aviators, was a hero of mine. This poem has had great significance for me all through my life.

David Scott

I was in a beer hall in Cologne when the Soviets launched Sputnik 1 into space. It was Oktoberfest and I loved to go to Germany to drink the beer. So there we were, a bunch of bachelors taking it easy. The Germans had strung a model of the Sputnik from the ceiling of the beer hall and there it was as we drank our beer, above our heads, making its distinctive "beep, beep, beep." I remember people looking at us and could almost hear what they must have been thinking: "What's wrong with you Americans? The Russians have the Sputnik up there." They all thought the Sputnik was great.

"Mmm, wonder why we don't have a Sputnik?" we asked ourselves, with some confusion and embarrassment. The psychological effect of that "beep, beep, beep" overhead for the three weeks that the capsule's radio lasted was very significant. It amplified our perception of the Soviet Union's technical capability. At the time I viewed it very much in military terms. It was almost as if the Soviets had developed a new cannon that could shoot further. It enhanced their position considerably, no doubt about that. For them to put a satellite into space before the United States was a sound demonstration of their technological strength. It also underscored the fact that we had a very strong foe on the other side of the Iron Curtain and that they seemed to have better guns and ammunition than we did.

Since the satellite was unmanned, I didn't view it as being highly significant in terms of space exploration. It wasn't clear then that the 184-pound shiny orbiting sphere was just the opening salvo of a determined Soviet campaign to conquer space. As far as we were concerned it might turn out to be a one-off Soviet stunt. Who knew then if either the Soviets or the Americans would ever put a man into space? Even when the Soviets launched Sputnik 2 a month later

with a dog on board, the full significance of what they were attempting to do did not really sink in.

Through reading the military newspaper *Stars and Stripes*, I was vaguely aware that our own attempts at launching a space satellite were not going well. But the paper did not convey the serious national angst being felt back home in the United States about the fact that the Russians were beating us into space. When the US Navy's Vanguard rocket attempted to launch a satellite on 6 December 1957, and it exploded only a few feet into the air—eliciting such headlines in the mainstream press as "Flopnik!" and "Kaputnik!"—we were not aware of the consternation it caused. We did not have too much contact with our friends and family at home; long-distance communications were not too good back then.

Even if I had been aware of the public reaction to such failures, the new domain of satellites and missiles seemed very far removed from my own. That was the space world and I was still much more concerned about airplanes, bombers and nukes. It was of far greater interest to me, for instance, to know how many MiGs the Russians had on the other side of the Iron Curtain. It wasn't clear that we would ever get a rocket to work. In so far as this might affect the military balance, I knew it was going to be significant, but I had absolutely no idea that this would mark the beginning of one of the most bitterly fought battles of the Cold War—or that I would soon become a warrior on its front line.

Alexei Leonov

Back at Kremenchug I spent the next two years flying modified MiG-15s which had been adapted for take-off and landing on soil airstrips both at night and during the day: risky maneuvers. Toward the end of those two years, I had a serious mechanical problem which almost cost me my life.

I was flying in heavy cloud with poor visibility, when one of the pipes in the plane's hydraulic system snapped. It was found later that the pipe had leaked oil on to one of the blocks of electrical engines, which caused a simultaneous failure not only of the

navigational devices but also of the radio. Warning lights then indicated I had a fire on board, and an alarm was triggered. In such a situation the only solution was to eject. But that was impossible: I was too low. All I could do was cut the fuel supply to the engine and perform an emergency landing.

It turned out that there had been no fire; the signal was a false alarm. But the way I had handled the emergency drew the attention of a mysterious recruiting team who arrived at our base from Moscow shortly afterward and asked if I would be willing to join a school of test pilots.

The colonel in charge of the team told me that training of candidates for this school would involve testing entirely new types of military hardware and aircraft: rocket planes, traveling at huge speeds. If I was willing to accept the challenge, the colonel said, I would be invited to Moscow for a series of tests. If I passed, he said, I would have a very complicated but very interesting life.

I was twenty-five. I was flying the most modern military jets. I was doing well, enjoying life. So I asked him a question.

"There's this girl I really like," I said. (There was indeed a woman I wanted to marry, although she did not yet know it.) "Tell me frankly. If I take up the challenge you are proposing will it preclude me from having a family?"

The colonel broke into a broad smile. "If she is a good woman, there will be no problem. I would even approve of you marrying her."

Several days later I was invited to present myself at a military hospital in Moscow. It was 4 October 1959. I was one of forty candidates selected from three thousand pilots interviewed. All of us had had experience flying the most modern aircraft, MiG-15s and MiG-17s, under all conditions. No minimum number of flying hours had been specified, although by that time I had clocked up around 350 hours. We all had a high IQ and were below thirty years of age. At the end of a month of exhaustive tests only eight of us would be selected.

On the first day we were stripped of our uniforms and issued with hospital pajamas. I was then shown to a ward where another pilot sat in a corner reading a book. It was pretty hot that day and

he was stripped to the waist. When he raised his head I saw he had a very handsome Russian face; large, sparkling blue eyes and a big grin. I looked more closely and saw that the corners of his mouth were turned up so that he looked as if he was always smiling.

"I am Senior Lieutenant Yuri Gagarin," he said. "My air base is in the north of the country. I fly MiG-15s."

"My air base is in the south of the country. I fly MiG-15s, too," I replied.

Yuri Gagarin turned out to be very talkative. Within half an hour I seemed to know his life story. He told me he had a wife and baby daughter. He said he was eager to get home quickly because the polar nights were about to start where he was stationed, near Murmansk on the Kola Peninsula. He said he was keen to add flying under the winter conditions of that unique and beautiful region north of the Arctic Circle to his record so that he would qualify as a pilot of the first class.

From that moment we became firm friends. We had both had hard childhoods—we had both begun working at an early age—and our careers had been similar. We liked the same films and books. The book Yuri was reading that day we met was one I did not know, *The Old Man and the Sea*, by Ernest Hemingway. It was not an easy book to get hold of, but when I read it I came to love it, too, for the way it portrays man's utter determination in pursuit of a goal.

Several years later, on my first trip to Cuba in the summer of 1965, I met Hemingway and I took the opportunity to tell him that his novel had been Yuri Gagarin's favorite book. He was touched. Hemingway was not a well-known writer in the Soviet Union then, because his books were so hard to find. But I found him a great character who showed special interest in our space program.

During that first month Yuri, the other candidates and I underwent tests at the hospital in Moscow, and doctors checked every conceivable aspect of our physical and mental condition. We were put in a silent chamber and set a series of complex tasks while blinking lights, music and noise were played to distract us. We were given mathematical problems to solve while a voice was piped into the chamber giving us the wrong answers. We were put in a

pressure chamber with very little oxygen in extreme temperatures to see how long we could withstand it. We were put in a centrifuge machine and spun at high speed until we lost consciousness.

We understood perfectly well that whatever we were being tested for was beyond the scope of the test-pilot program. There were test pilots undergoing examination in the same hospital and the procedures we were subjected to far outstripped theirs in severity. We were instructed not to talk to them, informed that what we were being put through was top secret. We had our suspicions that the program would involve space flight. We were excited.

Finally eight of us were summoned by a senior air marshal. He addressed us in a fatherly way. He told us we had a choice to make. Either we could continue our careers as fighter pilots in the Air Force, or we could accept a new challenge: space. We had to think it over.

We left the room briefly and talked among ourselves in the corridor outside. Five minutes later we filed back into his office. We wanted to master new horizons, we said. We chose space.

We were told to return to our bases and await further orders. Before leaving for Moscow I had already been told I was to be posted to East Germany. There was no time to lose. When I returned to Kremenchug I knew that I had to talk to the woman I wanted to marry.

We had spent very little time together, but she had caught my eye the very first time I arrived in Kremenchug as a young cadet. She was still at school then. I remember seeing her walking along with her friends, big ribbons in her hair, smooth, dark complexion. When I was stationed in Kremenchug for the second time, I bumped into her in the street again. It was my birthday. I offered to take her to the Officer's Club—an invitation no girl was supposed to be able to resist. She thanked me but told me she had already been invited. When I saw her at the club later with another officer I vowed I would fight for her. I discovered she was called Svetlana and found out where she worked. After that I often walked her home. I did not want to lose her and, as I was about to be stationed abroad, I was very direct.

"Svetlana, I have very little time. I love you very much and I need

you for my whole life. The day after tomorrow I want us to be married," I told her. "If not now, when? The day after that I am leaving for East Germany."

"I agree, Lyosha," was her simple reply, all I needed to hear to make me happy. Under normal circumstances, in Soviet times, a marriage could be registered three months after an application was made. But this delay could be shortened at the discretion of the local mayor and these were exceptional circumstances. We applied for a special license that very day.

We had only two days in which to prepare for the wedding. More than a hundred guests were invited, three thousand chrysanthemums ordered. My bride arrived late for the ceremony, with threads still hanging from her hand-sewn white gown. The next day I flew to East Germany. It was to be four months before she could join me.

At Altenburg, in East Germany, I was attached to a reconnaissance unit making flights over Hungary and East Germany to update military maps of these areas. The base was just 20 km from the border with West Germany, and often, as I flew near the air corridor separating East from West I saw American jet fighters on the other side. I felt no animosity toward the American pilots. Sometimes, as a mark of mutual respect, we tipped our wings in recognition of a fellow pilot.

But it was undeniably tense. The prevailing political climate put enormous pressure on us. All the time we were flying the control tower monitored our movements closely. If we flew too near the air corridor we were warned to change our flight path immediately. Pilots who strayed into the buffer zone were severely reprimanded—grounded.

David Scott

Late at night or early in the morning unmarked F-100s were deployed from bases in West Germany to fly reconnaissance missions over Eastern Europe. "Slick chicks" was the code name given to these spy planes. Specially equipped with photographic

systems, they taxied out to the runway, flew at low level straight into East Germany, took photos and flew back as quickly as they could. Before we had satellites capable of taking pictures, this was our only way of knowing what the other guys were up to. The "slick chicks" were apparently flown mostly by CIA pilots; we didn't know much about them.

We were designated squadron fighter pilots and were issued with strict rules of engagement any time we flew near the air corridor between East and West—a no-fly buffer zone a hundred or so miles wide known as the Air Defense Identification Zone, or ADIZ. I flew close to the zone a lot while I was stationed in Holland, but to enter it was considered a serious violation, an aggressive move, which might be interpreted as an indication of war.

The rule on our side was that you never entered the corridor unless you were specifically authorized or in a combat situation. But every time our radar picked up a Russian airplane approaching the zone someone was scrambled to intercept it if necessary, in case it was some form of aggressive combat maneuver. Sometimes, to test the other side, ground control had us fly directly toward the ADIZ. When we got there we were instructed to turn. We could see the contrails of the Russian planes doing the same. The trick was to see who would turn first. It was like playing chicken, except it was deadly serious.

If a Russian plane entered the buffer zone we were authorized to enter, too, for inspection or interception. If it made an aggressive move, we made an aggressive move. If it shot at us, we'd shoot it down. If the plane seemed lost we pulled up alongside, got its number, and tried to contact it and tell it to go home. If it did not comply we pulled up in front and rocked our wings. According to international law, it should then follow us down. If it did not, our wingman would be lined up right behind it, his finger on the trigger. It was cat and mouse.

I strayed into the zone, once. It was the middle of the night, and my flight leader had taken us in there by mistake—his radio was screwed up. Radar in those days was pretty meager. Ground control couldn't tell him to get out of there. It was just the two of us. I was flying on the wing next to him, in tight formation. Suddenly a very

bright light illuminated both of us. It was an interceptor—on our side. He'd been sent up to bring us home. We got down pretty quickly. My flight leader got into trouble over that.

While I was stationed in Holland I had three different squadron commanders. By far the best, head and shoulders above the others, was the third, a living legend by the name of Frederick C. "Boots" Blesse, or "Major Blesse, sir!" He was a brilliant pilot, a fighter-pilot in the Second World War and a "double ace" in Korea, having brought down ten planes. He wrote the book *No Guts, No Glory*, the early bible of aerial combat tactics. He was at the top of the fighter-pilot pyramid and I wanted to be just like him. He was full of life, full of vigor. When he took command of our squadron he made it clear he was going to fly one-on-one with every pilot in the squadron to see how good we were. That made for a few sweaty palms among the pilots, I can tell you.

When it was my turn to go up there, we really wrung it out. This was real eyeball-to-eyeball material: we flew straight at each other, at a given speed and given altitude, and when we passed we broke out and tried to see which of us could get on the other guy's tail, shoot the other guy down with gun cameras. Boots Blesse got more on my tail than I did on his, that's for sure. Next time up Boots would tell me to try and stay on his wing, and he put me through some pretty violent maneuvers to see if he could shake me off. It was a question of heart and mind—courage, nerve. Some people folded under the pressure; they simply didn't have enough confidence. But I did OK and when we got back down, as we took off our flying suits, Boots slapped me on the back.

"Well, Scotty, you hung in there pretty well. That was pretty good going," he said. "I don't mind flying with you some more." Six months later he chose me to fly on his squadron gunnery team. That was a pretty good feeling.

I had more than a couple of close shaves with aircraft problems in those early years, and they were valuable lessons in how to deal with emergencies. They used to say having a tour of duty in Europe made you a much better pilot than if you'd flown only in the United States. There was a lot more fast-moving bad weather to deal with, for a start. It was not unusual to get diverted, be low on fuel and

have to put in at an alternate destination. I remember flying in Holland once, and being told to bring the plane down immediately because a thick fog bank was moving in; seconds later it was impossible to see the ground. We had to bring our planes down in Germany. We were very low on fuel and got there by only a whisker.

The weather wasn't the only problem. Once I was flying an F-100 in Holland when, just after take off, the throttle became disconnected from the engine. I was flying at full power. There was no emergency procedure for this. I had two choices: bail out or try to get the bird on the ground. The situation was so serious that ground control confirmed I had to decide fast whether to ditch the plane off the Dutch coast or try to bring her in. It's the toughest call for any aviator; I knew a lot of guys had died because they didn't get out when they could. But bailing out isn't without risk—if the ejection seat jams, or the canopy doesn't open, or the parachute fails to deploy, you're a goner. No pilot likes to do it, though with an uncontrollable plane you have no choice. With enough control most pilots will attempt to bring their plane home. I still had enough, I reckoned, to be able to land. I knew it would be tough, but just how hair-raising I had no idea.

To reduce speed I had to cut the fuel supply and shut the engine down, before gliding the plane in to land. This was less of a problem on a clear day, because you could glide from an altitude high enough to judge a proper landing from a circular approach. But the weather that day was bad. There was low cloud cover, which meant that someone on the ground had to calculate how long it would take for me to land from a low approach to the runway once I cut the fuel supply. It was a one-shot deal. I'd get only one try. Once the engine is shut down you are committed to land—somewhere! The person on the ground got his math wrong. He calculated that I should cut my engine 13 seconds from the runway. That was too late.

It was a short runway, about 8,000 feet. For an F-86, which landed at 120–130 knots, that was fine. But for an F-100, which under normal conditions landed at 170–190 knots, it left little margin for error, and I was going faster than normal. I had deployed the speed brake—the big plate that folds out from the

belly of the plane—but the version of F-100 I was flying did not have wing flaps. I was still smoking when I came to the edge of the runway, doing about 200 knots. I reached up to my left and pulled the yellow handle that released the drag chute to slow the plane. But the chute was old and weathered; its panels tore and the chute collapsed into a streamer.

The F-100 was the first plane fitted with anti-skid brakes. But they were faulty, too. When I applied the brakes the anti-skid mechanism kept grabbing and then releasing the wheels too much, making the nose of the plane pitch back and forth like a porpoise moving through water. Finally, fast approaching the end of the runway, I engaged the "barrier" designed to catch and slow airplanes at this stage—the strut of the wheel at the front of the plane tripped a wire bringing up a thicker cable laced with heavy chain links. There were so many of these 40 odd-lb links that no plane was expected to drag them all. My plane not only dragged them all but dragged them with such force that the end link whipped up violently, tore loose, was hurled through the air and crashed into the roof of a house nearby.

The plane eventually slowed just as I came to the end of the runway and rolled forward into the mud. There were fire trucks racing along the runway toward me as I lifted the canopy and jumped to the ground, scrambling away as fast as I could in case what was left of the fuel exploded. Incidents and accidents like these are classed as minor or major according to how much damage is done to a plane. What happened that day was classed as minor, because my F-100 was virtually unscathed. It was a very close call all the same. That night in the bar most of the squadron came up to slap me on the back and buy me a drink.

Another time I was out over the North Sea "dragging the rag"—towing a banner used as a target for aerial gunnery. I had a new pilot with me in the back seat on orientation, a young second lieutenant who had just checked into the squadron. It was his first time flying outside the United States. After the target flight completed their practice, we were heading back to the Dutch coast dragging the target when the engine quit. So I called my friend Denny Kilroy who was leading the flight formation.

"Hey, Denny, I just had a flame-out."

"Aw, you're kidding me," he called back. "I'll see you at the bar."

"Nope, not kidding," I said.

"Uh-oh, then you gotta problem," Denny radioed back.

I looked in my mirror and I could see the young lieutenant in the back seat, his eyes like saucers.

"We're going to have to go through the bail-out procedures," I told him. It was winter. The North Sea was pretty darned cold. However, I managed to glide the plane down to reach a Dutch base on the coastline, just in time. But we barely made it.

Others weren't so lucky in emergency situations. I lost some good friends during my time in Europe. In my first six months with the 32nd Squadron we lost six planes and two pilots. In particular, we had a lot of problems with the F-100 Super Saber jets, which were being brought in to replace the F-86 Sabers. I had much affection for the F-86. That airplane had enabled me to join an exclusive club known as Machbusters—pilots who had broken the sound barrier at 750 mph—designated Mach 1 after Swiss mathematician Ernst Mach.

There was a technique in an F-86. If you applied the controls properly in a dive and let the plane roll the way it wanted to the drag would be reduced, whereby you could get her up to Mach 1 speed. Once you did that you would get a Mach 1 pin from North American, the manufacturer of the F-86. We all wanted that pin: it was a very big deal for a young fighter pilot. I got mine a few weeks after arriving in Holland.

By contrast the very early F-100s had a very poor reputation. They caught fire, or the engines quit; big problems. When we first started flying them our first squadron leader got everyone together in the officers' club, including the wives.

"We're going to go down to Africa to start learning to fly the F-100. It's really not such a bad airplane," he started matter-of-factly. Then he knocked us all out with his next comment, addressed to the wives. "I will guarantee to all you ladies that I will bring back as many of the men as I can."

I was still a bachelor when I arrived in Europe. By the time I finished my tour of duty I was a married man. I had met my wife-

to-be, Lurton, before I left the United States, while I was visiting my parents in Texas. My parents knew Lurton's parents. Her father was a general, as was mine. They had both been stationed in England during the war. When I went back to Texas the following Christmas we spent more time together. Then, one summer, Lurton came to Europe on a tour and we decided to tie the knot. In the winter of 1958 she moved to Holland and we got a little flat.

Fighter pilots didn't earn a lot of money, but our standard of living was quite high. The exchange rate was good. I remember driving down to Stuttgart to buy a convertible Mercedes 190 SL for cash. After that we traveled around quite a lot. We took off for the weekends to Paris, drove to Denmark, or Sweden or Spain. There was a very good social life in the squadron; a lot of mixing and camaraderie, a lot of parties. Lots of flying, too. I was looking forward to spending another thirty years flying fighters. Life was good. I was having a ball.

Alexei Leonov

Twenty-four hours after my wife flew to join me at Altenburg I was summoned back to Moscow. I had been an officer for only four months; but I had been chosen. I was to start my training for the space program in March 1960.

The beginning was inauspicious. Even though the pilots chosen for the space program were considered the cream of the Air Force, the practicalities of everyday life were tough. When Svetlana and I arrived in Moscow I had only ten rubles in my pocket with which to take a taxi to the Institute of Aviation and Space Medicine. As the meter clicked over the ten-ruble mark I started to get nervous. Laughing, I told the driver he would have to reverse, that I could pay him ten rubles and not a kopeck more. He opened the door and left us there on the spot. We had to walk the remaining blocks in thick snow. When we arrived I had to warm my wife's frozen feet with my woolen aviator gloves.

Initially we were given temporary accommodation at a gymnasium attached to Moscow's Central Aerodrome; bunk beds

in the corner of a volleyball court. We had to drape newspapers over the net in order to get some privacy, because another pilot and his wife were sleeping at the other end of the court. Later we were given a nicely furnished three-room apartment in the settlement of Chkalovskoye near the aerodrome. Slowly we were afforded some privileges regular pilots were not, such as access to a particularly well stocked grocery shop where we did not have to queue as most of the population did.

We had little opportunity to travel in those early days, certainly not abroad. Whenever we did travel as a group we were accompanied by an officer from the KGB. By the time we started training our initial group of eight pilots had grown to twenty, but still no more than four of us could fly together in one aircraft, in case there was an accident. Spare time was limited, too, but we did enjoy picnics in the countryside occasionally at weekends and a mandatory three or four weeks a year at special spa resorts.

We knew American pilots were also being vetted for that country's space program. We read press reports about the selection of seven astronauts for the Mercury program. We realized they were more experienced pilots than we were—older by an average of ten or fifteen years. We comforted ourselves with the thought that, though they were more experienced, they would never again be young and full of vigor as we were and that we had another fifteen years ahead of us.

David Scott

When NASA selected its first group of astronauts for the Mercury program, in April 1959, I remember reading their names and details of their Air Force and Navy credentials and turning to one of my flying buddies, amazed that these men had decided to join the space program.

"Oh boy. There go their careers. I wonder what those guys think they're going to do," was the general feeling among most of us military pilots at the time.

At that very early stage of America's space program there was no

actual flying involved. Essentially, those guys were being recruited to become passengers in capsules which would be carried into space by the sort of rockets we had read regularly blew up. The idea of a seasoned pilot being made to ride on the back of an unreliable rocket over which he would have no control seemed not only highly risky but incredibly frustrating. At least with an airplane you were in control and if something went wrong you stood some chance of bringing it in to land. Then, when they put a couple of monkeys in capsules on top of the rockets and launched them into space, amid fears about the effects of zero gravity on living organisms, we snickered at the prospects facing America's first astronauts.

"Would you want to follow in the footsteps of a couple of monkeys?" we would ask each other and our answer was always the same: "I don't think so."

But we were still pretty cut off from the outside world. We did not have a television set—not that we would have had much time to watch one if we had—and most radio stations were in Dutch. We had no idea of the immense excitement back home that surrounded the selection of these first astronauts—the "Original Seven," as they later became known. The media hysteria that surrounded their every move from the moment of their first press conference passed us by. Our main source of news was still *Stars and Stripes*, so I guess we had a rather narrow view of the outside world.

On Saturday nights we watched RKO newsreels in the movie hall before the feature films started. I do remember seeing footage of Khrushchev's so-called "kitchen debate" with Vice President Richard Nixon on the relative merits of American and Soviet washing machines. It was at a Moscow exhibition on the American way of life, in the summer of 1959, and was a brief attempt by both men to ease tensions between the USSR and the USA in the deepening Cold War.

The following year, however, the Soviets shot down one of our high-altitude U-2 spy planes, captured its CIA pilot, Gary Powers, and put him on trial. It wasn't clear at first who he was. Far less was known about the operations of the CIA back then. Even we as military pilots stationed in Europe didn't know a lot about the U-2s. We had just been told that if we did see a strange-looking

plane flying in our sectors we were to pay no attention to it—that it was classified. After serving two years of his ten-year sentence for spying, Powers was freed in exchange for the convicted Soviet spy Rudolf Abel. But the whole embarrassing affair caused a major international diplomatic row. All hope of easing tensions between the world's two superpowers faded once more.

But even the Gary Powers incident didn't feature much on my personal radar. I was much more concerned with making sure I took the next step up the flying ladder. That next step was very clear. It had to be test-pilot school and, as far as I was concerned, the best place to be was Edwards Air Force Base in California, home to the greatest test pilot of them all, the legendary Chuck Yeager.

This was way before Yeager had been immortalized by Tom Wolfe in the classic book *The Right Stuff*, but he was already a legend. Yeager was the test pilot at the top of the flying pyramid: he was where we all wanted to be. He had secured his place in history by becoming the first pilot to break the sound barrier, Mach 1, in an X-1 rocket airplane in 1947. Until his plane's supersonic boom echoed across the high Californian desert that day, there had been a fear that a plane would disintegrate under the pressure and stresses caused by excessive drag at supersonic speed. Test pilots had died trying to push their planes beyond Mach 1. Until Yeager beat it, Mach 1 was regarded as an insuperable barrier, which no human being could cross and emerge alive. Yeager opened up a whole new era of supersonic flight when he broke this taboo. Long before the Russians had put their little silvery Sputnik into space we were flying supersonic. As far as I was concerned, that was a more significant opening salvo in the technological race of the Cold War.

The best way to reach test-pilot school, I was counseled by the Air Force, was to get a graduate degree in aeronautics. So, while still stationed in Europe, I applied to, and was accepted by, the best engineering school in the country, Massachusetts Institute of Technology (MIT).

By the time Lurton and I got back to the United States, it was 1960 and John F. Kennedy was running for president. The country was on the brink of enormous change and social upheaval. The

Civil Rights movement was gathering pace in the South. Technology was evolving fast, too; most people, it seemed, had television sets in their homes when we got back, which was not the case when I left for Europe. Stereophonic sound had recently been invented. The music scene was changing fast, too. The hippie period was just round the corner.

However, the transition from military to civilian life and the world of academia had a greater impact than all the social changes going on around me. Our daughter Tracy was born in the spring of the following year, so I was caught up in my own world of the family and studying. And, man, oh man, was I unprepared for graduate school.

From the moment I arrived it was like trying to drink water from a high-pressure fire hydrant. I had to work flat out every day for two years. Compared to the hard grind of MIT, the five or six years I had spent flying fighter jets felt like playing. While the curriculum was extremely demanding, the teaching system was much more relaxed than I had ever experienced before. At West Point we had been graded every day in every subject, but at MIT there was no requirement to go to class and essentially only one grade, the final exam. Some of the professors could not have been more different from my teachers at West Point or flying school. Some of them had long hair. At first I thought they were weirdos. I had one math professor who wore shorts, carried a backpack and used to run down the corridor to class. Turned out he was brilliant, and I came to like him a lot.

Not only were the academics intense, but the course had recently been changed to include "astronautics." So instead of just aeronautics my degree turned into one in aeronautics and astronautics. Though I was familiar with the practical movement of an airplane through the atmosphere, I knew little of the theory of aeronautics and absolutely nothing of astronautics. In contrast to the long-established field of aeronautics, the course material for astronautics was only then being developed by some of the leaders in this new field.

It was my first exposure to space and it was both fascinating and exciting. Having stepped, temporarily, out of the military domain,

I gradually began to understand, if not yet share, the enthusiasm others felt about the future of space exploration. It was still very early days, but slowly my interest in the universe beyond our own planet began to grow. It was the most exhilarating time to be at MIT. The team of professors and teachers there at that time was quite outstanding. They included Charles S. Draper, Walter Rigley and Richard Battin, all of whom wrote bedrock textbooks on the three main areas of focus in astronautics: guidance, navigation and control. (MIT was later chosen to build the guidance and navigation system for Apollo spacecraft.) They were pioneers in their field, long remembered for their groundbreaking work.

The difference between aeronautics and astronautics at the most basic level, I soon discovered, was that, while aeronautics deals with the movement of an object through the Earth's atmosphere, astronautics deals with the movement of an object through the vacuum of space, 100 miles above the Earth's surface and beyond, where there is no "air." In each case, the major force on an object is gravity, but in aeronautics objects also have to contend with the effect of the Earth's atmosphere and its "air" particles of oxygen, nitrogen and water, which provide "lift" or drag to moving objects.

The way objects move between the two domains of the Earth's atmosphere and space was an important subject. It encompassed the study of booster rockets to launch objects into space and, on their return, how objects could be made to withstand the intense heating caused by the friction of the Earth's atmosphere as they slowed from the high velocity of spaceflight. Another important subject was orbital mechanics: how objects have to move at very high velocities in space to counter the force of gravity, which tends to pull them back to Earth, and how they "control" their movements using rocket engines.

My specialization and the subject on which I wrote my thesis, however, was the mathematical application of guidance techniques and celestial navigation—how many star fixes you would have to take, and when, to go to the Moon, or Mars. The framework for celestial navigation in Apollo consists of identifying and locating thirty-six stars roughly equally spaced in the celestial sphere located in different constellations—including well-known stars such as

Sirius, the brightest star visible to the naked eye (after the Sun) in the constellation of Canis Major, and Aldebaran in the constellation of Taurus—and using them to provide information for movement from one location to another by means of "inertial guidance." Little did I know then how important to me this would later be.

When I was at MIT three of those thirty-six stars were referenced, but unnamed. Years later they were named after three men whom I worked with closely, the three Apollo astronauts: Ed White, Gus Grissom and Roger Chaffee. The stars were named Regor (Roger Chaffee's first name spelled backward), Navi (Ivan backward, Ivan being Gus Grissom's middle name) and Dnoces (second backward) after Ed White II. All three men were to become my good friends. But that lay in the future, as did the tragedy of their deaths.

Alexei Leonov

Long before we met him, one man dominated much of our conversation in the early days of our training; Sergei Pavlovich Korolev, the mastermind behind the Soviet space program. He was only ever referred to by the initials of his first two names, SP, or by the mysterious title of "Chief Designer," or simply "Chief." For those on the space program there was no authority higher. Korolev had the reputation of being a man of the highest integrity, but also of being extremely demanding. Everyone around him was on tenterhooks, afraid of making a wrong move and invoking his wrath. He was treated like a god.

It was six months before we were permitted to meet Korolev. We spent most of our time training at the newly built Cosmonaut Training Center, a special military facility under construction on the outskirts of Moscow. Later it became known as Zvyozdny Gorodok (Star City). We were also flown regularly to Engels Aerodrome near the Volga river for intensive training in parachute jumping. During my training as a pilot I had been required to make only one jump a year. In the first month of training I made seventy. Within a short time I became an instructor of parachuting.

The reason there was such emphasis on parachute training soon became clear. The earliest Soviet spacecraft were designed in such a way that those within the craft were ejected from the module at an altitude of approximately 400 meters, as it returned to Earth, and from that height they had to descend by parachute. All Soviet spacecraft touched down on land, rather than in the sea as American versions did. But whereas later models incorporated small retro-rockets to slow the final stage of the capsule's descent, softening the impact on landing, early models did not.

The man in charge of our training on a day-to-day basis was General Nikolai Kamanin, assistant to the commander-in-chief of the Soviet Air Force. Kamanin was a legendary war veteran, a Hero of the Soviet Union. He came to know our families and us well, and was very approachable. He was a keen sportsman and particularly loved tennis. I used regularly to play doubles with him and his wife.

The Chief Designer was a far more shadowy figure. Yet it was he who ultimately had the greatest influence on our lives. At the end of the first six months we were summoned to the Institute of Aviation and Space Medicine in Moscow and told we were to meet the Chief. We were excited. I remember the first time I caught sight of him. I was looking out of the window when he arrived, stepping out of a black Zis 110 limousine. He was taller than average; I could not see his face, but he had a short neck and large head. He wore the collar of his dark-blue overcoat turned up and the brim of his hat pulled down.

"Sit down, my little eagles," he said as he strode into the room where we were waiting. He glanced down a list of our names and called on us in alphabetical order to introduce ourselves briefly and talk about our flying careers.

There had been lengthy discussions at the very beginning about who should be chosen to train for the space program. Eventually it was decided that fighter pilots were best suited to working in extreme conditions, because of their ability to react instantly in dangerous situations and their multifaceted skills—not only flying but also acting as navigator, radio-communicator, gunner and engineer. Sergei Pavlovich Korolev had been a test pilot in the 1930s. We knew that about him, but little more.

When Korolev came to Yuri Gagarin's name on the list he seemed to warm to him straight away. Yuri turned red in the face and got slightly flustered. Korolev seemed amused: crinkles started to appear at the corner of his piercing dark-brown eyes. He put aside his list, as if he had forgotten about the rest of us, and asked Yuri to talk about his childhood and career as a pilot. They spoke for maybe fifteen minutes. Eventually the meeting continued as before. When he came to me I said I had six sisters and three brothers. "Your mother and father did a very good job," he said, smiling. He seemed to like me, too.

After the Chief left we all gathered round Yuri. "You are the chosen one," I told my friend. Years later I discovered that I had been right. Korolev had left us, met other designers in the space program and confided, "This morning I met a handsome Russian man with lively blue eyes, sturdy and strong, an excellent pilot. He is the man we should send into space first."

It was not until the spring of the following year that Korolev was able to realize this ambition for his protégé. Before that, disaster struck the Soviet space program. Not once, but twice.

The first tragedy cast a heavy pall over the early days of the program. It happened on 23 October 1960 at the Baikonur launch complex, in the remote, barren steppes of the southern republic of Kazakhstan, where snow lies thick on the ground throughout the long winter and in summer intense heat and fierce sandstorms make it almost unbearable. The site was a restricted military zone, a top-secret facility. (The American CIA pilot Gary Powers was believed to have been attempting to take surveillance photographs of Baikonur when his U-2 spy plane was shot down over the Ural Mountains and he was put on trial in Moscow in May 1960. His mission was regarded as a great insult to the Soviet Union, provocation by the United States, a sign that the Cold War was accelerating.)

The first we knew of this early tragedy came when many planes were scrambled from our aerodrome in Moscow carrying emergency supplies of blood bound for Baikonur. General Kamanin quickly gathered us together and told us what had happened. A new R-16 rocket was being tested when it exploded. A hundred and

sixty-five people were killed, including Marshal Mitrofan Nedelin, head of Soviet Missile Deployment. The intensity of the explosion meant the dead were unrecognizable; Nedelin's remains were identifiable only by the academy headquarters badge he was wearing. The accident had no direct effect on our training—the rocket was being developed for military purposes—but it was a tragic event.

More shocking for us personally was the death of one of our own—the youngest member of our team, Valentin Bondarenko, several months later—on 5 March 1961. Preparations were almost complete for the first manned spaceflight scheduled for 12 April 1961. Yuri Gagarin and Gherman Titov had already been dispatched to Baikonur in preparation.

It was 23 March 1961 and the rest of us were continuing with a series of isolation-chamber tests at Star City. These were to last up to fifteen days to determine our physical and mental state under widely varying conditions. Medical sensor pads were attached to our bodies so that our heart rate, brain activity and blood pressure could be monitored. In Valentin's case the pressure in the chamber was lowered to simulate the Earth's atmosphere at a height of 5 km. To compensate, the oxygen content in the chamber was increased to a partial pressure of 430 mm. Like all of us, Valentin had a small electrical heating element in the chamber so that he could make himself tea and something to eat. He had been rubbing his skin with a pad soaked in alcohol, before reattaching a medical sensor, when he accidentally dropped the pad on to the heating element.

The resulting spark turned into an instant fireball in the oxygen-rich environment. Poor Valentin did not even have time to blink. His woolen clothes, soaked in oxygen, turned into an explosive device; he lived for four hours after he was dragged from the chamber. He was deeply mourned, for we were all close friends by then. Following Valentin's death all experiments with heightened partial pressure of oxygen were stopped. Some heads rolled.

The tragedy caused a major rethink of the space program. The system of using an oxygen-rich environment in our spacecraft was abandoned in favor of regenerating oxygen through a system of filters—a much safer but more bulky process. We knew the

Americans also used an oxygen-rich environment in their spacecraft, and it eventually cost three US astronauts their lives, too; even after those deaths the Americans did not change their system.

The Soviet Union did not alert those in charge of the US space program to our tragedy. In those days there was only a limited exchange of information between our two programs via international forums and congresses, and no bilateral mechanism for exchanging information of this sort. What had happened to Bondarenko was considered an internal matter, in any case; not something we wanted openly discussed. Like nearly every aspect of our space program, it became a closely guarded secret.

CHAPTER 3

Red Star, White Star

1961–5

Captain Alexei Leonov

Petropavlovsk-Kamchatsky, Kamchatka, Soviet Far East

Trained dogs were strapped into Sputnik capsules many times before it was considered safe to send a man into space. First Laika in Sputnik 2, then Strelka and Belka in Sputnik 5, Chernushka in Sputnik 9, and Zvezdochka in Sputnik 10. All were launched into orbit to prove it was possible for living beings to survive in zero gravity.

Engineers often had difficulty coaxing the dogs into the space modules. Sputnik 9's original dog, which had been trained to push buttons with its muzzle while in flight to obtain food and water, ran away. It had to be replaced at short notice, so the engineers used a stray they found wandering around the Baikonur complex. In fact, Chernushka, the stray, seemed to fare far better than some of the trained dogs. Whereas some of them got sick and disoriented in flight, Chernushka returned barking loudly and was so frisky that she ran off as soon as she was released from her harness, and had to be chased by technicians who wanted to test her heart and blood pressure.

In the final weeks before we were scheduled to put the first man into space a further test was conducted which led to wild