

# **COLD WARRIOR**

*THE STORY OF A STARFIGHTER MISSION*



**BY JACK PARTINGTON  
BGEN CF (RET)**



# Foreword



*“Cold Warrior” puts the reader into the cockpit with the fighter pilot, looking over his shoulder and experiencing the thrills and challenges of high speed, low level flight during a critical period in world history. It is a story that needs to be told.*



*The Royal Canadian Air Force's nuclear role had its genesis in a question posed by the late Lubor Zink, a World War II veteran and respected Canadian investigative journalist, to US General Lauris Norstad, former Supreme Allied Commander, Europe, during his visit to Ottawa in January 1963. Zink's question and Norstad's reply triggered a House of Commons*

*debate leading to the fall of John Diefenbaker's Conservative government, the election of Lester B Pearson's Liberal Party and Canada's entry into the nuclear club.*

*Set in West Germany during the Cold War, it is an account of a Combat Profile Mission (CPM) flown in a Canadair built CF104 Starfighter. CPMs were training sorties flown routinely throughout western Europe, preparing Royal Canadian Air Force and allied pilots to strike assigned Warsaw Pact military targets in response to a Soviet attack on NATO or one of its constituent states.*

*This story also describes some of the measures taken by the Soviet Union to enslave its subjects and to promote its aim of world domination. It centres on the actions taken by one small slice of NATO's strategic forces to ensure that it didn't happen on their watch.*

*The Cold War was a clash of ideologies of almost Biblical proportions between Western democracy and Soviet communism, backed by weapons of incredible destructive power. East-West encounters and their converging interests throughout the world invariably raised tensions of regional, continental or intercontinental magnitude. “Mutually Assured Destruction” became an accepted and oft-quoted term used to describe the outcome of a nuclear war between the superpowers.*

*Thirty-seven Canadian CF-104 pilots gave their lives for this noble purpose, unsung heroes of the Cold War; known and remembered only by their wives and families, their friends and their God.*

*Jack Partington,  
Brigadier General, CF (Ret)  
Ottawa 2010*

*Few people today understand just how close the world did come to an exchange of nuclear weapons, notably during the Cuban Missile Crisis in 1962 and the Invasion of Czechoslovakia in 1968. The Cold War lasted from 1946 until the Soviet Union collapsed forty-five years later.*

*Allied Armies and Navies performed outstandingly during the Cold War, but this is an Air Force story. It describes the era in which Canadians in light blue uniforms dealt with the tensions of the times and describes the aircraft they flew to help maintain peace and stability in an uncertain world.*

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Cover and foreword by the author. The photographs on pages 1 and 4 were found in the 427 Squadron History, 1942-1970. The photos on pages 2, 3, 5, 6, 11, 24, 26 and 27 are from the Old Bold Pilot Productions DVD about the CF104, used with permission. Page 19 is a photo of Neuschwanstein Castle and page 29 shows the official badge of 427 Squadron, Royal Canadian Air Force.

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# Cold Warrior

## *The Squadron*

A more bucolic setting was hard to imagine.

The flock of sheep slowly grazed their way along the side of the taxiway that separated the Squadron building from the fortified enclosures or “marguerites” where the aircraft stood, poised and ready. Guarding the flock was a black and white Border Collie. He crouched flat on the tarmac, his eyes fixed on the lead sheep. At the tail end of the flock, wearing an old forest green loden coat and a felt Bavarian hat, the shepherd leaned on his staff, puffing on his pipe and releasing an occasional cloud of smoke into the cool morning air.

The shepherd, his dog and the sheep were among the few locals who had unrestricted access to the fighter assembly areas, the runways and their surroundings. The shepherd's job was to ensure the grass was nipped short enough by the sheep to discourage large rodents from making their home in the grass adjacent to the taxiways and runways.



It wasn't the rodents that posed the danger, however, but the hawks that hunted them. A bird strike on landing or take-off could smash through the brittle intake guide vanes of a jet engine, cause a fire or explosion and bring the aircraft down. A good-sized raptor could penetrate the windscreen, seriously injuring or blinding the pilot, with equally disastrous consequences. This unhappy mix of nature and technology had already cost the Wing one Starfighter in the past year and another had been saved from destruction only by the skill and courage of the pilot.

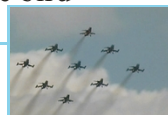
The use of grazing sheep to keep the grass short proved to be a more harmonious solution to the bird

strike problem than hiring the local Jaegers to hunt down both the birds and the rodents, although this had

been tried. The present arrangement was a win-win solution for both the shepherd and the Wing. And at the Squadron, the fighter pilots could identify with the collie's unwavering vigilance, his rapid reactions and the training he must have undergone to be entrusted with the security of the flock.

A discreet number in tone-down grey identified, for those who could interpret the code, the home of 427 Strike/Attack Squadron, 3 Fighter Wing, Royal Canadian Air Force, Zweibrücken, West Germany. The word “Strike” in the title implied that the Squadron was equipped with nuclear weapons. “Attack” meant a tactical capability using conventional armament, such as guns and various kinds of bombs. 427 Squadron, like similar units based in Zweibrücken and Baden Söllingen, was proud of its capability with both weapons systems.

It was early October, 1968. Soviet and Warsaw Pact forces had invaded Czechoslovakia on the 16th of August, causing much political and social tension throughout Europe. Orders for NATO were to continue with routine peacetime activities and to avoid any appearance of heightened readiness. Any activity that might give the Soviet Union cause to implement its strategic plans to invade Western Europe was to be avoided. Although nothing was apparent outside of the hangars and dispersal areas of 3 Fighter Wing, special attention was being paid to operational readiness. Newly-arrived fighter pilots flew extra missions to accelerate their training, while those with category checks approaching hustled to complete them. Overall Wing security had been increased and the pace of aircraft maintenance had accelerated to ensure all the CF104 Starfighters on inventory were serviceable, well beyond the established NATO criteria.



## *The First Mission*

With the 0600 hrs operations and weather briefings completed, the pilots for the first 4-plane formation of the day departed the Squadron building to begin their journey to a bombing range in Belgium. The metal “spurs” attached to their boots amplified their footsteps. The spurs would be attached to cables in the front of the rocket-equipped seat, to prevent legs from flailing about in the event of a high-speed ejection. Although the groundcrew could not see them through the mist, they recognized the clatter of the spurs, and knew the pilots were coming to claim the CF104s that had just been prepared for flight.

On a signal from the Crew Chief, four starting units roared into life, supplying the electrical services and compressed air that the aircraft needed to fire up the J79 turbojet engines. The pre-flight checks had gone well, and the aircraft taxied in sequence out to the arming point, where the red-flagged safety pins were removed from the practice weapons dispensers. Each pilot then removed a similar pin from the ejection seat handle and showed it to the groundcrew, confirming an armed ejection seat and a fighter ready to go. With the tower’s approval, the Starfighters lined up on the runway, in “finger left” formation – lead in front, number two on his right and three and four staggered on his left, like the fingers of the left hand when viewed from above.

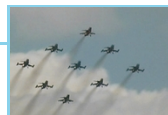
The four birds perched expectantly on the button of Zweibrücken's runway 21, awaiting their clearance for the low-level route that would take them over four countries, terminating with practice bombing attacks on the manned and calibrated NATO range. All such trips had to be coordinated with and approved by French, Luxembourg, Belgian and West German air traffic control authorities. In spite of the sour political relationship between France and the rest of NATO, approvals for the mission came through quickly.

Once cleared for take-off, the four Starfighter pilots ran up their engines to full power in unison, slowly reduced the power to eighty percent, chopped to idle and then burst to full throttle again. Howling like furies, the noise of the engines was deafening. Pilots

in the Operations room stopped talking and listened to the signature sounds of the J79s. The shrill pitch of each one indicated how well it was performing under stress: fourteen stages of inlet guide vanes compressing air and directing it into the burner section, the fuel-air mixture exploding, the hot gasses ramming through the turbine and out the variable nozzle, the latter puckering as it automatically controlled exhaust temperatures and the amount of thrust available. Every pilot on the Squadron knew by heart the checks which were underway in the cockpits. They also knew that any deviation in the volume or rhythm of the noise would signify a problem.



Four nosewheel tires flattened with the increase in thrust, the pilots releasing foot brakes simultaneously at a signal from the leader. Then the unique sound of four afterburners cutting in with an ear-splitting roar, adding an extra sixty percent to the ten thousand pounds of thrust blasting out the end of each aircraft. Four massive blowtorches funneling out from the nozzles, circular shock waves defining the cones, the flames red, blue and yellow, almost too bright to watch. The aircraft leaped ahead like racers out of their starting blocks, accelerating down the runway and pressing the pilots back in their ejection seats. For the ground crew, the screaming quartet meant that the birds



were serviceable and they could move on to their next assignment. The pilots listened a few more seconds for a crash bell. There was none – all were safely airborne. The engine noise drifted away and life at 427 Strike/Attack Squadron returned to normal.

### ***The Mission***

The tension felt throughout Europe was the result of the Soviet invasion of Czechoslovakia in August, 1968. For NATO Air Forces it was imperative that combat ready strike pilots be up-to-date on their assigned wartime targets and on their weapons qualifications. The young pilot had been on the Squadron for a year now, and even without the crisis in Czechoslovakia he was due for his annual re-qualification on his primary operational mission to strike an assigned target with a nuclear weapon.

However the weapon for this training mission was a dud – a two thousand pound aluminum and concrete bomb that looked as deadly as the real thing but without an explosive warhead. It contained the necessary electronic arming systems, and would perform aerodynamically when released, just like its more dangerous twin. In the jargon of the fighter pilots and the weapons technicians, it was referred to as a “shape”. Although expensive for a one-time use, it was well worth the price. It involved all the critical elements of a highly complex activity and provided the highest level of training value to those entrusted with the security, assembly, loading and delivery of a nuclear weapon.



### ***Canada's Nuclear Role***

Most Canadians were unaware of how or why the Royal Canadian Air Force had acquired a strategic nuclear retaliatory role within the North Atlantic Treaty Organization. It was a costly undertaking

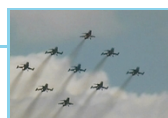
politically because the issue of nuclear weapons for Canada had caused the sitting government to fall, and militarily because of the expensive aircraft, weapons, training and personnel involved. But it had been a vital necessity.

By late 1963 the impact of the Cuban Missile crisis and the imbalance of power in Europe, notably the overwhelming superiority of the Soviet's conventional forces, had escalated tensions to an alarming degree. Moreover, a senior officer in Soviet military intelligence had passed classified documents to NATO that confirmed hostile Soviet intentions as well as the urgency felt by the Soviet high command to perform or perish. This intelligence would be later validated by reports from a highly placed Polish staff officer who was working details of the Soviet Union's plans to invade western Europe. The deterrent effect of NATO's nuclear weapons capability had thus become the critical factor in maintaining the balance of power between the East and the West.

With this calibre of intelligence, the former SACEUR US General Lauris Norstad traveled to Canada in January, 1963, to persuade the sitting government to join other members of NATO in equipping their forces with nuclear weapons. Prime Minister John Diefenbaker's Conservative government refused. Later, when asked by Lubor Zink of the Toronto Telegram if the Canadians could be of any use to NATO without the nuclear capability, General Norstad replied “Absolutely not!” Depending on your view, this was either a slap in the face to Canada, or a wake-up call. It turned out to be both.

In the course of a Parliamentary debate on the issue, the Conservative Government was defeated and, following a national election, was replaced by Lester B. Pearson's Liberal government. The new government grasped the strategic implications of a strong, united and nuclear-tipped Western alliance and had included in its defence policy a nuclear capability for Canadian forces, at home and abroad.

On the home front, the RCAF was equipped with nuclear-capable Bomarc surface-to-air missiles and



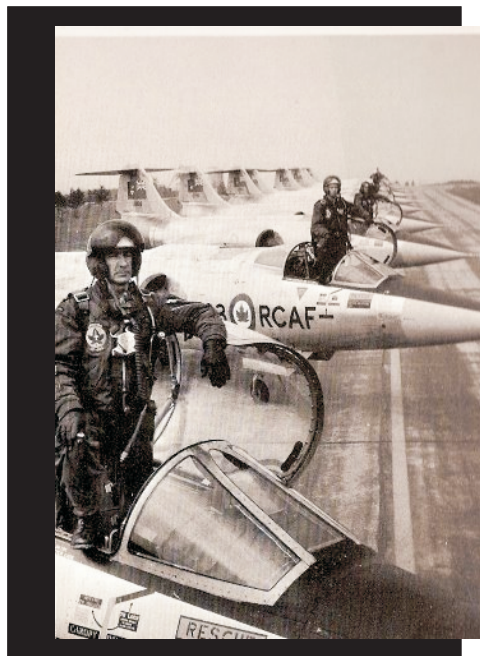
CF101 Voodoo interceptors to counter the Soviet bomber threat.

Overseas, the RCAF fielded nine squadrons of CF-104 Starfighter aircraft, including three with a primary role of photo reconnaissance.

The new strategic weapons capability was the most carefully managed program in the history of the RCAF. Given the awesome power of the weapon, there was no room for accidents or incidents, and although the warheads themselves remained under US control, the Canadians quickly reached and maintained the standards required to employ them. The nuclear mission was one of surgical correctness, with layer upon layer of oversight by supervisors, standards officers and security personnel. This vigilance extended to the selection, training and conduct of everyone connected with the mission – there could be no tolerance for error where nuclear weapons were concerned. The combat readiness of Canada's strike/attack pilots, and others like them in NATO's fifteen countries, was a significant if not overriding factor in the balance-of-power equation on which the peace and security of the free world relied.

### *The Training System*

The Canadian pilot's journey to 3 Wing, Zweibrücken, had not been an easy one. The pilot training system was only the first of many hurdles. All pilot candidates had to pass rigorous physical examinations and meet officer selection standards. However, 40 percent wouldn't make it to

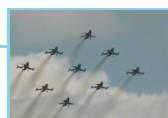


wings graduation. In addition to fatal training accidents, human factors such as airsickness, depth perception problems and health issues that emerged in the two year training cycle caused some to drop out. Others ceased flying training for reasons of aptitude and performance and were streamed to other occupations.

To receive the coveted wings, pilot trainees had to qualify on a series of aircraft, building in complexity as the training progressed from the primary Chipmunk aircraft and the basic Harvard to the T-33 advanced jet trainer. In addition to engineering, operating, and emergency procedures courses for each aircraft, they had to pass navigation, meteorology, flight planning and procedures, weapons, safety systems and survival courses. They underwent officer development, studying service law, history, effective expression, military writing, and customs of the service, etiquette, physical education and drill. Taken together, the system grew officers who were also pilots, producing in them a blend of leadership skills, aviation knowledge and a military ethos unique to the Air Force.

### *Special Clearances*

There had also been the critical issue of individual security clearances. It was not enough to be approved for access to Secret or even Top Secret materials. For use of the kind of intelligence and mission planning information on a nuclear capable Squadron, a new, even higher clearance level was introduced, called "ZED". To achieve that level, and as a condition of working on or near nuclear weapons each service man or woman had to be investigated through a "Human Reliability Program". HRP clearance included background checks right back to the womb. The investigation would cover interviews with responsible people at every stage of the candidate's life and development, and all these third party assessments and comments had to be positive. If there was one negative report in the HRP file, the process stopped and the candidate would not be employed anywhere near a nuclear weapon. This was only the first of many





safeguards in the nuclear weapons program and was probably one of the reasons why there hadn't been a "Broken Arrow" accident or incident on CF104s from the time Canada joined the nuclear club in 1963 until it left in 1985. The added bonus of this selection process was that the successful airman or airwoman would be working with others who were similarly cleared, who shared the same convictions and beliefs, who had answered to a calling and not just a job, who believed in the mission and who would fight to ensure that the horrors of the last war would not be repeated. In the final analysis, they would have no hesitation in carrying out their missions in retaliation for the Soviet Union launching a first strike against the West.

### *Single Seat Fighters*

A new wings graduate with no operational flying experience was nicknamed a "pipeliner" and his had been one of the first courses of pipeliners selected to fly the newly acquired CF104 Starfighter. According to the older, more seasoned pilots the idea of posting youngsters, barely into their twenties, to a sophisticated twice-the-speed-of-sound fighter was ill-advised. Without a solid foundation of operational flying on a less demanding aircraft there was concern that the pipeliners would not be able to handle the demands of high performance low level flight and that the accident rate would skyrocket. This would prove not to be the case, thanks to a wise and home-grown solution.

To recognize the technical complexity of the Starfighter and the demands of the low level role, the Air Force organized a short course on the F-86 Sabre jet, aiming to better equip newly minted pilots to succeed. The course provided training in low level weapons delivery techniques, formation flying and navigation on a more forgiving and user-

friendly platform than the CF104. The Sabre was the legendary Korean War fighter and it had been a privilege for the pipeliners to get a taste of it before graduating to the more sophisticated 104. Since no dual control Sabres had been manufactured by Canadair, the pilot's first trip in one was solo. This had the double effect of adding to the challenge and, providing the first flight was successful, enhancing the self-confidence of the pilot.

Confidence would be an essential ingredient for future mission success,

especially on the Starfighter, where one pilot was expected to deliver more devastation than the combined might of a thousand bomber raid in World War II. Fighter pilots were trained to fly the Starfighter alone, and the only company out there would be the enemy.

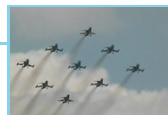
But the truth about flying a single seat fighter was that you were never really

alone. You had with you the

imprint of every technician who had ever worked on that aircraft. You brought with you the hard-won advice of every instructor who had passed his craft on to you. Your fellow pilots all left their mark on you through endless flying stories,

discussions and debates, how they managed crises, their successes and their failures, the thrust of their personalities. The cockpit was crowded with ghosts and they were all on your side. If they hadn't been, you wouldn't have made it this far.

*The cockpit was crowded with ghosts - and they were all on your side*



## 6 Strike Attack Operational Training Unit

The pilot's CF104 course had commenced at RCAF Station Cold Lake, Alberta, affectionately known as "The Cool Pool." It was late in the fall and the temperature dipped below freezing each night, prompting the pilots to dig out their longjohns, winter flying suits and mukluks, the preferred footwear for cold weather operations. Mukluks were cozy and warm, with ankle straps designed to prevent them from falling off in the event of an ejection. Actually, the ejection sequence was one of the first lessons taught in ground school and for good reason. The Starfighter was a notoriously unforgiving aircraft and the only way to solve certain emergencies was to part company with it as quickly as possible.

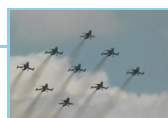
The ejection sequence began when the pilot yanked free a black-and-yellow striped D-shaped handle between his knees, igniting a rocket that blasted the seat up the rails and away from the doomed aircraft. At the same time, cables attached to "spurs" on the pilot's boots would reel his legs back into slots under the seat, preventing his legs from flailing about and possibly breaking. Sidebars with nets attached would rotate forward to contain his arms. Once clear of the aircraft tail, a guillotine would slice through all restraining cables, and a "butt snapper" would forcefully propel the pilot away from his seat, starting the parachute-opening sequence. The tumbling body would then snap from horizontal flight at some 400 knots to vertical flight at zero, with the shock of the opened parachute. All this happened in about two seconds, and since the action would just be a blur to the pilot, he needed to be equipped with an intellectual understanding of the ejection process to have confidence that it would save his life.

Eighty-seven CF104 pilots would prove the reliability of Lockheed's C2 ejection seat by the time the aircraft retired from service.

Winter at the "Cool Pool" regularly saw the temperature drop below -20F, and the pilots completed their preflight checks in the hangars. At the scheduled door openings the aircraft were towed

outside for startup, the groundcrew rushing through the procedures to get back inside before contracting frostbite on exposed flesh. Once the engine had spooled up to idle operating speed, the cockpit became a warm and familiar cocoon, with everything in its place, lights blinking their messages, dials indicating the health of the mechanical systems, flight and navigation instruments each with vital information to contribute, the rhythm of the oxygen regulator clicking away, the smell of leather, oil and jet exhaust and the hiss of the radio in the earphones.

The first flight aimed to familiarize new pilots with the Starfighter to demonstrate some of its awesome capabilities, and to register a lesson or two that would not be forgotten. The power of the engine in full afterburner on a cold day, for example, would slam the pilot back in his seat as the aircraft accelerated rapidly to speeds of over the 230 knots needed for take-off. Once airborne, the landing gear had to be up and locked before 260 knots, otherwise an overspeed could occur that might damage the landing gear or the doors that closed them in. By holding the aircraft level as it accelerated, the speed of sound could easily be exceeded before reaching the end of the 12,000 foot runway. If speed wasn't dramatically reduced, a supersonic shock wave would be dropped on a village just a few miles away, causing much damage and upset. For this first flight, however, the instructors usually decided not to slow down, but rather pulled the stick back, stood the aircraft on its tail and pointed the Starfighter straight up. The trainee in the rear cockpit would hold on for dear life, glancing back over his shoulder to see the runway far below and getting smaller with altitude. It was a breathtaking performance.



## *Pre-flight Planning*

In 3 Wing, Zweibrücken, the 427 Squadron Operations Officer for the day was a seasoned fighter pilot who had accompanied the pipeliners' course through the Sabre and CF104 phases and become a mentor to all in the process. He never said much but when he did, close attention was paid to his words. His technique was usually challenging. "Have you done this yet?" or "Why would you do something like that?" When the feeble reply was given he would skillfully dissect it until the novice felt really dumb. Then he would reveal knowledge from years of flying experience that one could never find in books, and provide a soft psychological landing that both humbled and enriched the young pilots. They never forgot those nuggets of wisdom, and like rules of thumb, could recall them in a heartbeat when the situation required.

The Operations Room was walled with backlit schedule boards that matched each pilot's name and callsign with his programmed activities for the forthcoming day, week and month. It contained a battery of radios and telephones to communicate with other Wing agencies as necessary – the tower, aircraft servicing and so on. The room was enclosed by a raised podium on which the flight authorization documents were presented, awaiting the assignment of aircraft tail numbers, mission to be performed and approval signatures. In this way the chain of command and responsibility was clearly recorded prior to uniting the pilot with his aircraft. The Ops Officer came out from behind the podium and approached the table where the young pilot was doing his pre-flight planning.

"Got your take-off numbers figured out?" he asked. "Sure have – it's going to be warm out there. I'll need a lot of thrust to get airborne" the pilot replied.

"That's not all, said the Ops Officer, they just switched runways to 03. You'll need it all for a tanker on a "shape" drop. And don't forget about that concrete bunker on the hill."

The concrete bunker was a remnant of the Siegfried Line, Germany's answer to the Maginot Line, both

of which reflected the trench mentality of WWI as applied to the defensive strategies of WWII. When the Allies advanced through the Zweibrücken area in 1945 they had filled these fortresses with water and explosives, and then blew them up so they could never be used again. The hydraulic forces blasted the 15-foot reinforced concrete roofs from their equally thick foundations. Some, like the one off the end of the runway 03, had simply tilted vertically, and remained standing like a huge monument to the waste and futility of war. It was also something to run into if you couldn't climb high enough after takeoff.

The pilot glanced down at his worksheet. "It shouldn't be a problem if the charts are right." "That's right – you have to be on the numbers, but there's going to be a lot more happening," replied the Ops Officer. "Watch you don't over-rotate on lift-off. You might be in shaker too. What did you use for a temperature?"

"20 degrees".

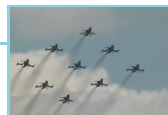
"It'll be a lot hotter by the time you go. I'd figure for 25 – give yourself some wiggle room."

"OK. Hate to stagger off the end and run into the roof of that bunker".

"You won't do that. That's what the Panic Button is for. Just make sure you're airborne if you have to use it."

The Ops Officer turned back into his room.

His comments had summed up, very neatly, the essence of the risks embedded in a heavy weight, hot day takeoff. But you had to listen carefully. If your figures were right at the check speed markers beside the runway, you could count on the engine to get you airborne. But the figures had to be right and the hot day would seriously degrade engine performance. So add a safety factor. Next, the aircraft would be at its maximum take-off weight of over thirteen tons with four external fuel tanks and a two thousand pound practice bomb on the centreline pylon. The runway at Zweibrücken had been built on a hill, of all things, and at the moment of rotation you would be going down the far side. So you had to bring the nose to the horizontal, and then a good ten degrees or so more to get the aircraft into a climbing attitude. But you had to be gentle – an



abrupt change in angle of attack would trigger a stick “shaker” that warned you the aerodynamic angle of attack was about to be exceeded – a “stall”. The shaker might then be followed by a “kicker”, an automatic and instant application of fifty pounds of hydraulic pressure on the control column, forcing it forward to reduce the angle of attack and prevent a stall – and dropping the nose dramatically. If you did get into an aerodynamic stall, at best you would lose altitude and pancake into the bunker, at worst you would pitch up out of control – neither of them great choices. You could forget about the ejection seat to save you if you bailed out so close to the ground and descending.

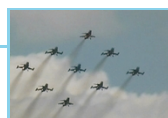
Your ace-in-the-hole was called the Panic Button – a little red button handy on the instrument panel that when pressed would immediately shed all external stores – about six thousand pounds – and you would literally leap up into the air, the afterburner alone gave that much in raw thrust. But, and this was the Ops Officer's final tip, if you pressed the Panic Button on the runway, the four fuel tanks, each with a thousand pounds of JP4 fuel, would drop off under your wings, then bounce up and explode beside you. So it was best to get the numbers right in the first place – then be sure you were airborne if you had to jettison your tanks.

### *Mission Planning*

A dog barked outside. He looked up from his books and out through the bars on the window. The Border Collie was just a few yards away with his sheep, which were slowly munching their way towards the runway. The shepherd was trailing behind them on the edge of the taxiway, his loden cloak brushing the grass, crook in one hand, a pipe in the other, still smoking. They were part of the team, too, and a feeling he couldn't quite name flooded through him. The contrast of this biblical scene against the background of shining silver Starfighters poised on their hardstands, perhaps. Or the joy of the moment. He looked back at the dog. The dog looked at him. Both doing their jobs. The moment of reflection passed and he returned to his task.

The take-off figures were checked and rechecked. All turning points checked out on the station storage unit, the SSU. About the size of a thick chocolate bar, this little package held the coordinates of all geographical turning points in the mission, including the target, alternate airports and home base. The information, programmed by the operations staff into the SSU, had come from a huge library of parameters manually fed into it using a tiny screwdriver and an electrical potentiometer device the size of a briefcase. It had taken hours to compute but it gave the inertial navigation system of the Starfighter the mission data needed to navigate to the target and back. The system measured the forces of acceleration acting on a sensor floating in a magnetic field, measured the time involved and computed the vectors traveled. However, what it couldn't do was tell you where you actually were, just where the inertial navigation system thought you were. Your actual position was what you were paid to figure out with your radar, map, rules of thumb, your Mark I eyeball, and all those ghosts in the cockpit with you.

The map folder had been studied thoroughly, and prominent radar and ground features were marked with a grease pencil. Danger areas were circled and the radio frequencies of nearby airports, ground radars and range control written down on the appropriate pages. The colour of grease pencil was important too – red for danger, black for information, green for tree patterns. The trouble was you couldn't always read what you had written under various lighting conditions. The red almost disappeared under red lights at night and green was hard to see when the green sun visor on the helmet was rotated down over your face. Sometimes you could barely tell there was a map underneath the writing, with all the info penciled in, the compass headings, distances to go, fuel remaining, weapons checks and so on. And a lot of information had to be memorized – there simply wasn't enough time at those speeds to consult books, charts or checklists, or enough room in the cockpit to store them all. Once you had these and all the other critical cockpit duties sorted out, you really felt as if you were on top of your game. They said it took about five



hundred hours of continuous flying on type for most fighter pilots to master the craft – those who hadn't got it by then weren't flying fighters any more.

The Ops Officer approached with the latest weather report in his hand.

“Have a look at this. You should be OK but watch out for thunderstorms to the east.”

“What did you use for your take-off temperature?”

“25” he replied.

“Good. Your aircraft's ready to go. Let me know when you're dressed and I'll call the bus. You're plane's parked over on the north marguerite.”

“Thanks. Never mind the bus, I'll walk out in twenty minutes”

### *Timing*

This timing of activities, such as walking out the door, had been calculated precisely, starting with the time of day or night of desired impact of the weapon on the target and working backwards. The minutes and seconds for every event preceding bomb impact were subtracted, the most important being the total time to the target. The idea was to be within three seconds of the planned time of day for weapons impact and the pilots worked hard to keep within this standard for a number of reasons, not the least of which was to avoid conflicting with others flying similar missions.

The pilots also knew within seconds how much time was involved with a final pit stop in the washroom, putting on flying suits, survival gear, and Mae West inflatable life vests, picking up parachutes and helmets, gathering together mission materials, strapping on spurs, signing out the aircraft, walking to the aircraft, climbing up and down the ladder, stowing the helmet, map case and SSU, doing preflight inspections, starting, taxiing out, running up and taking off. And how long it took to fly to the “Hack Point” where the critical timing and enroute navigation began.

Any wrinkle in this routine was bound to cause problems and could sometimes result in hasty actions, mistakes in judgment or worse. The importance of timing sometimes carried over to private life and was usually not well

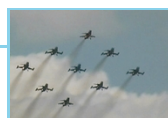
received by wives, and even less so by offspring, who today would refer to this preoccupation with precision as “anal”. But on Squadron the process worked well and was a normal part of the fighter pilot's routine. On strike missions, as with flypasts on Air Force Day, timing was everything.

### *Pre-flight Inspection*

Today all had gone like clockwork. The aircraft shone in the sunlight – a thing of absolute beauty. Its aluminum fuselage was polished and buffed to perfection – not only to reduce drag and conserve fuel in flight but also to reflect the deadly flash of high intensity light, heat and radiation from a nuclear explosion – his own or someone else's. Even as he approached he could see the airman giving the windscreen a last wipe with a chamois.

The level of trust and respect between the Starfighter pilots and groundcrew was typically Air Force, transcending the ranks they wore on their uniforms. While the individual pilots were trained to take the fight to the enemy, it was the airmen and airwomen who enabled them to get there and back successfully. Their best was expected, not demanded, and they delivered every time. This notion of a covenant, rather than a contract, between aircrew and groundcrew had been forged over the trenches of the First World War, refined during the Battle of Britain in the Second, and now composed the ethos that prevailed among most, if not all, Allied Air Forces. It was unshakeable - and it worked.

*...a covenant,  
rather than a  
contract,  
between  
aircrew and  
groundcrew*



The airman accompanying him on the inspection was equally vigilant, watching for puddles of fuel and oil dripping from unseen leaks in the engine, for hydraulic fluid the colour of blood seeping down from the speed brake wells, or under the flaps and control surfaces, or pooling in the large hydraulic bay door which was open and hanging down for inspection. When they reached the cockpit ladder after circling the aircraft they were joined by a weapons technician to assist with the inspection and setup of the “shape”. The drill for this part of the preflight was almost identical to that required for the actual weapon in the Quick Reaction Alert (QRA) area. The exception was that for a practice mission, there were no military policemen present to ensure the “no-lone zone” rules were being followed. Within the no-lone zone, a minimum of two HRP-qualified persons had to be present, with everyone's hands visible to at least one other when switch selections and maintenance actions were underway in the cockpit and on the weapon.

The weapons tech asked the pilot if he could open the nose of the “shape” and, once approved, he quickly unscrewed two clips holding it in place. It rotated down and away from the body of the bomb, exposing several switches and dials that were set to conform to target parameters. The pilot checked his mission folder and made the necessary adjustments to ensure that the simulated detonation and height of burst were correct. As the tech closed the nose the pilot checked the sway braces holding the weapon to the belly of the aircraft. Both confirmed that the explosive charges which ejected the “shape” away from the aircraft were properly installed. He signed for the weapon.

### *Start-up*

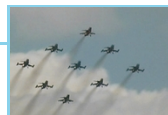
The pilot then quickly donned his Mae West life preserver and parachute, climbed up the ladder, snapped the spurs protruding from the heels of his boots into their fittings under the ejection seat, sat down and began to strap himself into the tight cockpit. This was another well-oiled routine, practiced over the years so that most pilots could do it in their sleep. They had to fasten themselves to

their personal equipment in a deliberate sequence, so as not to become entangled in the event of an ejection or cockpit evacuation.

The drill was logical and its overriding purpose was safety. Two clips on the side of the parachute were first fastened to the survival pack in the seat pan of the ejection seat. Next, a maritime lanyard attached to a one-man life raft in the survival pack was routed under the parachute leg straps and secured to the Mae West life vest. If routed incorrectly, the lanyard could become fouled in the parachute during water entry, with disastrous consequences. Proper water entry procedures were practiced annually under controlled condition during weapons training camps in Sardinia. These exercises included rough water entry procedures, simulated by being dragged after a speedboat, and how best to exit safely from under a waterlogged parachute. Sea survival was not every pilot's favourite exercise, but it had saved lives.

Next came the ejection seat shoulder straps and lapbelt, not forgetting to insert the automatic parachute opening key into the harness quick release assembly. The helmet and mask assembly was then donned, with the oxygen hose, emergency oxygen bottle and radio cord plugged in and tucked out of the way. The airman who would oversee the start-up was perched on the canopy rail critically observing all of these actions, passing the straps and helping with adjustments in a timely way. None of the airmen was ever shy about calling attention to an incorrect routing of straps or an overlooked procedure – another part of the Air Force covenant between groundcrew and their pilots.

Now he was ready to start the mighty J79 engine. He got the “all clear” signal from the groundcrew, and made a rotation motion with his forefinger to start the process. He heard the compressed air shooting into the engine, watched the instrument panel gauges as they slowly rotated, and counted off the percentages of full engine RPM using hand signals to the groundcrew. At forty percent he made an oblique cutting motion to stop the compressed air as the engine took on a life of its own: fuel igniting, temperatures rising, cockpit lights blinking



as generators came on-line, gauges showing hydraulic pressures rising, oil temperature and pressure, rumbles and vibrations, the acrid smell of burning fuel – the awakening of a giant.

Once the engine had stabilized, he signaled the groundcrew to remove the external power, and moved on to the post-start checks: speedbrakes, controls, trim, Automatic Pitch Control, flaps and boundary layer control – five systems with hand signals for each one. The noise of the engine drowned out regular speech within a fifty foot radius. Hand signals were now the only mode of communications with the groundcrew, with ultra high frequency radio for the tower and controlling agencies. Checks complete, he signaled “wheel chocks away” with an outward motion of both thumbs, confirmed the airmen were standing well clear and called ground control for taxi clearance.

## *Taxi*

It took a burst of full power to urge the heavy fighter forward from its position, the thrust from the tailpipe deflected upwards by the concrete ramp at the back of the marguerite. As the aircraft swung left onto the taxiway, blasting dust and hot exhaust gasses in its wake, the groundcrew ducked and covered their eyes. At the front end, the air intake acted like a powerful vacuum cleaner – the risk of foreign objects being sucked into and damaging the engine was a perpetual concern. Aware of the danger zones fore and aft, the pilot throttled back to maintain a slow taxi speed, rounded the corner onto the main taxiway and started his pre-take-off checks.

He had finished them by the time he taxied up the hill and past the tower. The effort had required a prolonged burst of power and he pondered who in hell would ever build a runway and a parallel taxiway on the top of a hill? He released the control column and tipped a salute to the tower controller who was standing on the balcony looking down at him. The controller gave him a "thumbs up" and stepped back into his tinted glass refuge. Without waiting for a request, he cleared the Starfighter to



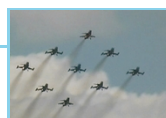
“backtrack” runway 03 and to call when ready for take-off.

The weapons tech was

waiting by the armament point where the taxiway joined the runway. The designated area for removing the safety pins from the weapon, the fuel tanks and the landing gear was defined in red to signal the danger inherent in the weapons tech's next activity. He made sure the pilot's hands were visible on top of the windscreen before he ducked under the wings and out of sight. When he emerged he was holding a mass of red-flagged pins and clamps which he held up for the pilot to see and gave a "thumbs up". The pilot reached down and removed the safety pin from the ejection seat and showed it to the tech. Thus fully armed and ready, the aircraft slowly moved ahead.

The “backtrack” procedure ensured that the maximum amount of runway was available for a heavy-weight takeoff. It involved taxiing onto the overrun portion of the runway – a paved surface beyond the arrestor cable that was not normally used except in landing emergencies from the other direction. Such crises occurred when the drag chute or the brakes failed, causing the pilot to drop the arrestor hook and engage the cable, bringing the aircraft to an abrupt stop if all went well.

When used for takeoff, however, the overrun added almost an extra thousand feet of insurance to the distance required for launch. He turned the aircraft around, lined up on the painted centerline and braked to a stop. Reaching up, he grabbed the canopy handle, guided the Plexiglas dome into its fittings on the starboard rail, and brought the canopy locking lever smoothly aft to the fully closed and locked position. All lights on the Warning Panel were now out. He checked the two compass headings and his watch and called for takeoff clearance.



“Tower, Atlas 27, ready for takeoff.”  
“Atlas 27, cleared takeoff, wind 040 at 8, call leaving the control zone.”  
“Roger, Atlas 27 cleared for takeoff.”

## *Take-off*

Taking a deep breath, he advanced the throttle to full military power, extending his feet to the top of the rudder pedals, literally standing on the brakes to prevent creeping forward. The nose of the aircraft dipped with the engine's thrust, flattening the nosewheel and creating the signature howl of the J79. All the dials checked out: RPM 100%, exhaust gas temperature 577-599°, nozzle 1-3 units, fuel flow, oil pressure, all within limits. He slowly retarded the throttle to 80%, and snapped it to idle to check for manual scheduling of the variable compressor blades, then pushed it back up to full military power again. This was the moment of truth.

He released the brakes, moved the throttle around the stop, out of military power and into the afterburner range. He heard, or rather felt, the first stage of the afterburner light off as raw kerosene was pumped into the aft section of the engine, exploding and throwing the variable nozzle on the tailpipe wide open. This was good. He pushed the throttle further along until it reached the end of its travel. The sound of the huge blowtorch behind him increased, but nothing seemed to be happening! Where was the massive thrust that usually slammed the pilot back in the seat and launched the aircraft forward? What was this pathetic creeping? Had his wheels sunk through the hot tarmac, a flat tire, perhaps? His mind was racing, well ahead of the aircraft.

Then, almost at the same instant, it dawned on him that the engine, whose performance on such a hot day was already degraded, required a bit of time to overcome the inertia of a fully loaded aircraft plus a 2000 lb “shape”. He was just going to have to be patient and wait for the speed to pick up. He felt the bump as the nosewheel rode over the arrestor cable, and a stronger clunk as the two main wheels followed. He had an eerie feeling that this might not

be his day. But almost instantly he recalled Lesson One of the art of flying the 104: trust the numbers! He glanced down to check the reference speed he had written in grease pencil on his kneepad, then looked for the 2000 foot marker down the runway. With the backtrack, it was still a good half mile or so away.

OK, he thought, so he had got a bit ahead of his aircraft in the excitement. Cool it. He breathed in deeply and waited for the marker to reach him. It did, 118 knots on the dot, the same as he had calculated. He was going flying!

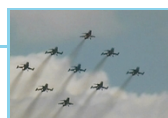
The aircraft continued to accelerate. At 200 knots he had reached the point where the runway started its downhill slope. He restrained an impulse to bring the stick back – not yet! Too early and the elevator slab at the top of the fin could stall and he'd never get airborne. The end of the runway was coming up fast, and there, looming in the distance, stood the dreaded bunker, still a valley away but growing larger by the second. Trust the numbers!

He eased the stick slowly back at 230 knots, felt the weight come off the nosewheel and saw the pitot boom rising. More aft stick now, up past the level and further up for a positive climb. Gently, now, he could feel the speed accelerating. But the aircraft was still sitting on the runway. He could sense the drumming of the tires on the cracks in the pavement. When would it lift off? Would he have to abort the takeoff? He could now see the end of the runway clearly, the overrun and the arrestor cable – no good for a cable engagement at this speed. His heart was racing and he glanced down at the panic button – would this be the day?

Then, suddenly, he was airborne, climbing away slowly but surely, flashing over the bunker and into the clear air beyond.

## *Airborne*

When he reached forward to select gear up at 260 knots, he realized how tense he had become, shook himself, and breathed in deeply. So far, so good. “What a great airplane!” he thought, “ Kelly





Johnson and those guys at the Lockheed Skunk works really knew how to build them”.

Relishing this happy thought, he realized that he'd better get out of afterburner before he used up too much fuel. He retarded the throttle, felt the instant deceleration and was almost tempted to plug the burner back in. But he was well past 400 knots by now, and leaving the throttle at full power, he dropped his hand to the flap lever and selected flaps up. The speed continued to rise, slowly, toward the desired groundspeed of 450 knots. He leveled off at about two hundred feet above ground, cleared the area ahead and to the right and turned to the planned heading that would take him to the starting point of the CPM, known as the “Hack”. He called the tower to advise he was departing the Zweibrücken control zone and settled down to business.

He knew he would arrive a few seconds late at the hack, but that wasn't serious – there was a rule-of-thumb correction that always worked. Rules-of-thumb were neat things to memorize, and there were hundreds of them: how far you would glide with a dead engine, how much altitude you would lose in a spin or forced landing pattern with different aircraft configurations, how much you should lead a turn inbound to roll out on course when making an instrument approach to a runway, and many more.

Numbers were the lubricant of flying. They rolled through your mind continuously, triggered by what you heard, felt, or what you saw, each verified or referenced to the chorus of dials and lights on the instrument panel. You adjusted the flight controls unconsciously in synchronization with the numbers streaming through your brain, while watching the ground whipping past and below at 450 knots, looking out ahead for the next turn point and scanning for other aircraft, towers, wires, birds and obstacles. You became one with the airplane, totally immersed in the art of flying.

### ***Hack Point***

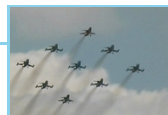
The key to a successful CPM was a good start, namely arriving at the hack on time and pointed in

the right direction. The hack point was where the real navigating began: nailing the heading, zeroing out the errors in the inertial navigation system, setting the programmed speed and altitude, recording time in grease pencil on the plastic-coated map. The hack point was chosen to be obvious – both visually and on radar. The pilot wanted to be lined up some distance back from it, if possible, and on the right heading so when he looked ahead he could instantly see the track that matched the detail on the map. Features such as a deep valley, a bend in the river, a line of hills, or a tree pattern were best. And when he crossed over the hack point, he wanted to see something precise by which to start his timing – a bridge, a church steeple, a highway crossing.

*Numbers  
were the  
lubricant  
of flying*

He knew that if he missed the hack, chances are he wouldn't regain the first leg of the trip, at least not for some time. That kind of mistake opened a whole different set of variables that he didn't want to deal with if he didn't have to – such as getting lost, running into weather that didn't fit the briefing, or restricted areas that didn't show on the map. A few months earlier, one of the new pilots became lost just after take-off. He turned right when he should have turned left to fly to the hack, continued on the wrong heading and flew right over a US Army artillery range during a live fire exercise. He told some of his buddies afterward that he wondered what those explosions were on the ground. Actually they had been shells fired up through his altitude by the gunners below, then descending through his flight path on the way to their own target. Blissfully unaware of the danger, he never did regain his track until he crossed the Rhine River and found an equally prominent checkpoint. Everybody had missed the hack at one time or another, but the smart ones had learned to get it right the first time or circle until they did and then apply the rule-of-thumb to get back on time.

He was also keenly aware that timing was everything on a strike mission. His time-on-target at the range had been provided by the range authorities



and they expected him to be there as scheduled. During pre-mission planning he had taken that time and worked backwards until he had calculated a time-of-day for the hack point, and, glancing at his watch, he saw that it was coming up fast. As the sweep second hand passed the correct moment he let go of the control column, held it with his knees and started the Big Ben stopwatch fixed to the top of the instrument panel. At the same time he lifted his left hand from the throttle and flexed his wrist inward to start the elapsed time button on his wristwatch, and in a smooth motion pointed his index finger forward to press the aircraft stopclock button on the left instrument subpanel. With this cockpit ballet, he now had three clocks running, each counting off the elapsed seconds, minutes and hours, accurate within a second of each other – close enough for government work.

Today's hack point was a railway crossing over a paved road, both nestled in a valley running more or less across the flight path. He was well lined up with it and on his planned heading. As it flashed by, he noted that he had been 12 seconds late at the hack. The rule-of-thumb for making up the time was an increase of ten percent of the airspeed for ten times the number of seconds late. Therefore bump the speed up 45 knots for two minutes to get back on time. It always worked like a charm. He nudged the throttle forward and watched as the speed picked up, throttling back to hold the new airspeed. Thus established on track, time hacked and speed set, he settled back in the seat to attend to some housekeeping business.

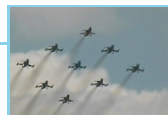
### *En Route*

It was time to do some checks: fuel consumption according to plan, engine instruments “in the green.” These were small strips of green tape on the dials, outlining the normal operating ranges. Abnormal readings were outlined in red. These readings meant something was wrong, and were usually followed by the flashing lights and urgent tones of a major systems emergency. Oil, hydraulics, temperatures and pressures all OK.

He made a slight correction to his heading to bring himself back to track. Apparently a crosswind was pushing him off course – more wind speed than planned but at least it was coming from the right direction. Another slight correction, and then time was up for the rule-of-thumb speed correction. He throttled back, regained his planned speed and set the RPM – on time, on track.

The countryside below rolled by beneath him: green hills, farms, the odd village. The CPM was designed to avoid built-up areas as much as possible. The loud and sudden noise of the aircraft was enough to terrify children and stampede animals. So, to conform to low level safety orders and to foster good relations with the public, most pilots made the effort to keep to approved routes and to avoid low flying over villages. Some who didn't, or couldn't, were caught and disciplined – the locals had a phone number to call to report the time of day, type of aircraft, direction of flight and estimated altitude. It wasn't that difficult for authorities to figure out which aircraft had violated the rules.

He recalled briefly that, back at the Cool Pool, one of the pilots had scorched over a turkey farm in the middle of the prairies, trying to find his position after a rocky start. The turkeys had stampeded into a corner of their pen and half of the flock had smothered. The Squadron Commander had been waiting for him when he landed, tore a strip off and directed he go personally back to the farmer, apologize, and settle the damage on behalf of the Crown. But the pilot didn't want to put a lot of miles on his new car, particularly on dirt roads in the middle of a wet spring, so he talked the Base Rescue helicopter pilot into flying him out to the location. When the helicopter landed at the farm, the rest of the turkeys stampeded into a corner and the casualty rate doubled. Always resourceful, the pilots decided to buy the dead turkeys for cash from the farmer, in exchange for his silence about the second transgression. They loaded up the choppers and brought the feathered corpses home with the aim of selling them to their neighbours at bargain prices, unplucked, and later claimed to have made money on the deal.



He smiled at the memory, then returned to his routine. The constant checking of flight and engine instruments required a sweep of the eyes across the instrument panel, then outside to clear the way ahead, a glance at the map where the thumb was placed abeam the last confirmed checkpoint, verification of the elapsed time – stopwatch, wrist, clock. All were within tolerance. After a two-hour mission you were expected to arrive over the target, release your weapon and have it detonate within three seconds. That was NATO competition time for full marks, with points lost for each second early or late, and there was good reason for it. If and when “the balloon went up”, jargon for World War III, you were probably not the first or only aircraft delivering a bomb to that target. The mission planners had to allow for unforeseen situations in order to guarantee up to an eighty percent chance that the target would be neutralized. So timing was important to avoid conflicting with some other pilot with a different time on target - TOT. And you hoped that he was on time too. It would spoil your day to have someone else's nuclear weapon go off in your face just as you began your run-in to the target. Most worked hard to achieve a TOT that was bang on.

### ***First Leg***

The first leg had been uneventful. The Starfighter had flown across the corner of France that juts eastward into Germany. Alsace had been fought over and changed hands several times throughout history. The signs were still there, medieval fortresses guarding the entrance to valleys, walled villages, remains of the Maginot line designed to hold the Germans at bay while funneling them into tight killing ground where French artillery could decimate them. This turned out to be a bankrupt

*They rose  
out of the  
smog  
like a  
Lawren  
Harris  
painting*

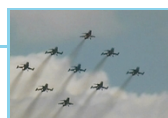
strategy – German tactics and technology had defeated the Maginot Line simply by going around it. The southern end of the line only came into play in the closing months of the war, when the Nazis were retreating. But they had left their calling card. He looked for and spotted the remains of the Natzwiller-Struthof concentration camp

hidden deep in the hills, the foundations of old buildings outlined around the central square, a lone gallows standing in the centre, its shadow extended to the far corner. It was one of the many visible reminders of the wars that had punctuated the history of Europe. Here we were again, he reflected, getting ready for the next one.

As if cued to his thoughts, a flash of sunlight glinted off the missiles of a Hawk battery, poised on the brow of a hill running down into the Rhine valley south of Strasbourg, their sharp snouts pointing eastwards. They probably had painted him on radar as he sped by. He hoped they would recognize his unique Identification Friend or Foe (IFF) transmission,

confirming him as a “friend” should the balloon ever go up – not only on the outbound mission but also and most important, on the recovery, when he would be coming from the east at high speed.

The weather in the valley below was typical, and rather than descending into the brownish smog, he held his altitude, rolled the aircraft on its wingtip to get a good time fix on the Rhine, snapped back to a level attitude and aimed for the distinctive outline of the Black Forest hills that he'd marked on his map. They rose out of the smog like a Lawren Harris painting, with patches of snow still visible among the trees. A glance at the ground mapping radar confirmed that it was operating properly, and he adjusted the gain slightly to break out the ridge ahead. The shape of the radar returns on the scope matched the outline of the hills. The radar cursor sliced through the returns at the right place, identical to the courseline drawn on his map. All was well.



Approaching the first turning point, he flipped the page of his CPM folder to the next leg, looked left to clear the area, and rolled on the bank. Just a bit over fifty degrees would give a rate one turn of 3 degrees per second, allowing for the wind. As the turn to the new heading was initiated, he had flicked the biscuit switch on the situation indicator of his inertial navigation system over to the dead reckoning (DR) mode. It showed where the aircraft would have been had he not compensated for the wind on the first leg. The bearing and distance of that imaginary point from the actual turning point was the wind vector, and using another rule-of-thumb he calculated its actual speed and direction. He wrote down the details in grease pencil on the map, rolled out of the turn, and steadied down on the new track. He quickly programmed the wind vector into the DR computer and updated the system. It would now give greater accuracy on future legs and for the bomb run, provided the wind remained relatively constant. He was now heading east, with the foothills of the Alps on his right and the snowcapped mountains in the distance.

### *The Buffer Zone*

Glancing down at his map, he noticed that some 200 miles ahead was the “buffer zone” – outlined in red. This was a region of West Germany that followed the outline of the border between NATO territory and the Warsaw Pact, the so-called “Iron Curtain” that divided West from East, freedom from tyranny, prosperity from privation. At 450 knots, he would reach the red line in about 26 minutes.

Strict flying rules applied in the Central European Buffer Zone – entry in and out required special clearance from an allied military radar control agency. Violations were severely dealt with, and notice of an intruder began with a broadcast over all radio frequencies that a “Brass Monkey” was identified at a certain altitude – Angels 10, for example, or 10,000 feet. This declaration was followed by a scramble of fighters from the air defence bases along the border, and a rapid intercept, identification and what amounted to an

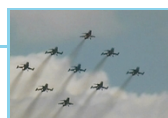
airborne arrest. Soviet fighters on the other side of the border usually scrambled as well, hoping that the NATO intercept activity might trespass across the thin dividing line and create opportunities for an engagement. It was anybody's guess what might follow – the risk of somebody being shot down was not that remote.

Unscheduled buffer zone activity would invariably prompt a diplomatic protest from the Soviets, accusations of spying and harassment, charges flying back and forth, investigations launched, hell to pay at the Squadron and, for the offending pilot, possible grounding. There were serious consequences to anything that could possibly affect the delicate nuclear balance of power between East and West, especially where the two sides touched.

But there was plenty of time before he would have to worry about the buffer zone and its implications. His mission had been pre-cleared through the Fourth Allied Tactical Air Force HQ with Moletrap ground control radar, the German Air Force sentinel that watched the air defence sector closest to his route and provided close control to any allied fighters scrambled to intercept an intruder. Besides, he would be flying too low for the radar to pick him up, except when he popped up in the course of his bomb delivery, and then only for a few seconds. In all likelihood the radar controller would recognize that the pop-up return was the Canadian Starfighter “shape” drop planned for that time on Grafenwoehr Range, record the event as such and save the fighter crews a fruitless scramble.

### *Into Bavaria*

He completed another cockpit check and adjusted the polarized sunshade on the radar scope to better see the returns. There was nothing that painted on radar more clearly than a lakeshore, and the Bodensee was no disappointment. Lying east-west along his track, its features were outlined precisely on the scope well before he could see it visually. Flying out of the Black Forest region and down onto the Bavarian plain usually meant entering a low lying layer of haze, with the forward visibility



reduced accordingly. Today was no exception. Haze obscured other aircraft flying at low levels. His pre-flight study had alerted him to the small but busy airport at Friedrichshafen on the north shore of the lake as well as the large training base at Memmingen, farther north. His course took him between them. He decided to monitor Memmingen tower to get a sense of the traffic landing and taking off. He dialed in the frequency and listened. It sounded fairly busy – he would have to keep an eye out for the hordes of training aircraft based there. He couldn't receive on the Friedrichshafen radio frequency – another one of the many military and civilian air traffic complications. He'd keep an eye out for their traffic as well.

By now the two underwing fuel tanks were empty and the warning lights on the external stores panel began to blink. On an actual combat mission these tanks would be jettisoned to reduce drag – selectively arming the tanks on the external stores jettison panel, a touch of the “pickle” button on the control stick grip and off they'd go. His remaining fuel was an internal fuel load of 5750 pounds plus two full tanks on the wing tips – more than enough for the mission as planned, provided the drop went well and the 2000 pound “shape” on the centreline pylon didn't hang up.

A hung bomb – one that failed to separate from the aircraft as planned – was a serious emergency. You could never be sure when it might release, if at all. And dragging that kind of weight around cost fuel, hence the extra tanks required to get it to the target. But there was no provision for its weight if you had to lug it home.

Sweeping east across Bavaria was a smooth ride compared with the bumpy conditions over the Black Forest hills. The J79 engine was cooking along just fine, its high-pitched whine transmitting through the airframe so the power could be felt, rather than heard. The only sound was a slight hiss in the earphones, interrupted by the click of the oxygen mask non-return valve as it opened and shut in cadence with his breathing.

The haze was thickening and he knew it would get worse as he approached the urban and industrial

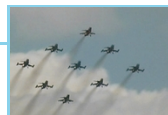
sprawl of Munich. However this was nothing compared with the Ruhr area to the north. The coal-fired hydroelectric plants and the factories spewed smoke that lowered the visibility below limits even on clear weather days. Missions were often flown on special visual flight rules rules designed for low level operations when the weather was bad. The rules had been written with older propeller-type aircraft in mind and hadn't taken into account the high speed of Century series jets like the Starfighter.

Consequently there were a few near misses, and more could be expected as air traffic increased throughout central Europe. And there would be a mid-air collision, in which one of the world's fastest aircraft collided with one of the world's slowest. The pilots never saw each other and the Cessna 150 driver never knew what hit him. In the few seconds available to him, the fighter pilot managed to eject. His parachute blossomed just before he hit the ground, the chute breaking his descent and the ground breaking his ankle. The high speed low-level role would claim many more aircraft and lives before the CF104 retired from service.

His instinct told him that thickening haze and the possibility of light aircraft in the vicinity were too risky a combination, and he responded instantly. Easing back on the stick, he climbed up to the radar altitude printed on the side of his map, leveled off, and without looking down at the switches, engaged the altitude hold feature of his autopilot. This would enable him to pay even closer attention to possible traffic in reduced visibility and to the radar if it didn't improve, without worrying about losing altitude and running into the ground. The prescribed altitude would assure him of at least 1000 feet of clearance above the highest obstacle within five miles of his track, so the trick was to be on track at all times. Outside these limits the published altitudes were meaningless, and straying off course in bad weather or at night could be fatal.

### *Striving for Excellence*

Such a demanding environment was one of the reasons why so many different types of training



flights were required of the fighter pilots. If they didn't fly the specified missions they would quickly lose their qualifications to fly at all. Lapsed qualifications meant the pilot had to fly a prescribed number of supervised dual trips where an instructor or a check pilot occupied the back seat of a dual 104, assessing and coaching the candidate until he was certified once again. Absences from the squadron for sickness, career courses or extended vacations usually triggered the requalification process, and the younger pilots, in particular, tried to avoid any absences that would jeopardize their combat ready status.

To improve radar navigation capabilities, for example, the Squadron training officers had evaluated a procedure in which a chase pilot flew as number two and cleared the area ahead while the lead pilot concentrated his full attention on the radar. This was producing good results and was adding to the proficiency of strike pilots that neither the simulator nor the use of dual aircraft could accomplish.

Some of the pilots had taken the quest for realistic training a step further and suggested closing the flash hood in the cockpit during chase missions, but this was promptly forbidden by Squadron supervisors as being too risky. The flash hood had been installed to shut out the blinding glare and heat of a nuclear blast. It was a much better solution to flash blindness than the eye patch that had been proposed. The idea of flying a weapons delivery procedure with one eye was not especially popular among strike aircrew. However the flash hood had no application in routine training – it was unsafe use no matter how many aircraft were chasing and looking out for you.

With so many risks and regulations to limit the opportunity for realistic combat readiness training, pilots had to derive the maximum value from each approved mission. Modest changes in the weather such as declining visibility, usually unnoticed by those on the ground, meant the pilot had to abort the mission, file a flight plan with the nearest control agency, fit in with the commercial air traffic and return to base. Nobody liked having to scrub a

mission and more than one pilot had found himself in a tight situation because of pressing the limits.

As he considered his options, he noticed that the haze layer had thinned out at the higher altitudes, and once on top of it, the forward visibility was unlimited. He could see some heavy cumulus clouds building up in the distance, toward the north-east. To the south lay Switzerland and Austria, the Alps majestic against the dark blue of the sky. His route would take him into the hills and past the beautiful castles of Hohenschwangau and Neuschwanstein; with any luck he would be able to see them while passing.

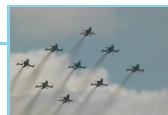
He decided to complete his weapons checks at radar altitude and on autopilot – just to make sure that nothing was overlooked. The excitement of the run-in to target was always tense enough, without having to do or re-do a critical series of checks. His concerns over the weather were dismissed as he sped on.

### *Weapon Checks*

Rooting his checklist out of the zipper pocket on the leg of his flight suit, he placed it up on the instrument panel console, beside the stopwatch. The checks had already been committed to memory, but following the checklist provided an extra level of accuracy that ensured nothing would be missed in the heat of the moment.

Also committed to memory had been the topographic details of the last 50 miles of the run-in to target. Like the actual wartime mission he studied every time he was assigned to Quick Reaction Alert (QRA), today's "shape" drop had required much diligent pre-mission study. The lesson was simply this: the last thing he wanted to be doing zapping along at 540 knots a mere 50 feet above ground, was trying to find out his position by looking down at a map.

He completed the checks from memory and cross checked again with the checklist. First he set the run-in timer to the number of seconds calculated back at the Squadron. Activating this first timer would start a delivery process which, when expired,



would sound a tone in the earphones of his helmet and flash a red light on the instrument panel – right in front of his eyes. He would then have two seconds in which to pull back on the stick and achieve a nose up attitude of exactly 45 degrees and hold it there, steady, until the ten-second release timer ran out. This was the final stage of weapon delivery over which he would have some control – he could still release the pickle button and abort the drop.

When the release timer expired, the explosive squibs would fire, breaking the bolts holding the “shape” in place, releasing it and pushing it away from the aircraft. Early in the development of this delivery procedure, the engineers had discovered that if the weapon wasn't jettisoned forcefully, it tended to stay in close formation with the aircraft for a couple of seconds of ballistic flight. At this moment, a snap roll into an escape maneuver might cause the aircraft's wing to hit the weapon with devastating consequences. Thus the explosive bolt and a second or two delay on starting the escape maneuver provided a measure of safety for the pilot. After the weapon had cleared the aircraft, the tail cone was ejected and a small parachute deployed, breaking the “shape's” upward trajectory, slowing it down and allowing it to drift toward the earth until it impaled itself, predictably, near the target.

On an actual wartime mission, the weapon would be programmed to detonate at a preset height above ground. This achieved the maximum blast effect on the target, and reduced the amount of earth and debris contaminating the downwind areas with radioactive fallout. The whole maneuver was called a low- angle drogue delivery, LADD for short, and the idea of the parachute was to provide the pilot with a supersonic escape opportunity in the 25 seconds or so it took for the weapon to fall to its burst height. It was uncanny how accurate the procedure could be when the right parameters were fed into the system and the weapon was precisely delivered.

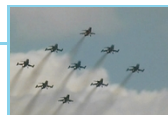
To finish the weapon checks he selected warm-up switches on, got a flashing green light in response, inserted the proper codes that the USAF custodian had provided, waited five seconds, switched to

“Enable”, got a steady green, and the “shape” was armed. He then selected the correct station on the external stores panel and checked that the light was also green. Carefully, he raised the protective cover on the master arming switch, breaking the wire and seal that confirmed its integrity, and selected the switch to the armed position. Delivery parameters were set, weapon was enabled and armed, external stores were selected, and the master arm switch was “ON”. All that remained, at the proper moment and position, was to press the “pickle button” on the control stick grip to start the timers, go full afterburner, and up the hill into the delivery. Just like clockwork.

The next leg after the *Bodensee* required a slight heading adjustment. But before doing so he extended the leg slightly, looked back over his right shoulder, and there was the fairytale castle, Neuschwanstein, built by the mad King Ludwig but made world famous by Disney. Whoever laid out this route must have been fond of Germany's rich architectural heritage, because the next turning point featured yet another castle, on an island in a lake, dead ahead.

### ***Run-in Leg***

*Herrenchiemsee* was coming up fast. He snapped the paddle switch on the stick to release the autopilot and lowered the nose with a gentle forward pressure. He would lose about 800 feet in the descent, taking him down to 200feet above ground, just in time to start the turn onto his attack heading.



There would be a couple of German Air Force bases nearby, and he dialed in the common tower frequency to monitor the traffic. The weather was clear ahead, except for some fairly high cumulus buildups in the far distance. He wondered if the base of cloud would allow enough room for his popup delivery, or would he enter cloud. No matter. The escape maneuver was pretty much an instrument exercise anyway, and he'd fly out the bottom of the clouds, inverted, in plenty of time to roll upright and level off at his escape altitude.

He was a little early at the checkpoint, and as he started his left turn it occurred to him that the wind had picked up and was blowing stronger than forecast from the west. Sure enough there was a significant difference in the inertial navigation system when he compared the computed mode with the dead reckoning. If the wind had been estimated correctly back at the first turn point, the difference would have been zero. So he mentally added another 100 feet to the offset calculated for the weapons delivery, and applied another rule-of-thumb for drift in the pull-up: three degrees of bank should do it.

Now things were happening fast. A speed correction would get him back on time by the Danube River at Regensburg. His tip tanks were now emptying and the red lights were blinking at him. He dimmed them and checked again that the center pylon station was showing green, all set for the "shape" drop. Once past Regensburg he would "push up power" – PUP – to 540 groundspeed, and watch for the road and railway crossing that would permit him to drop down even closer to the ground.

It was time to call range control to confirm that the area was clear and the drop approved. Obviously this added task would not be required for the real thing, but without range clearance there could be no drop today. He selected the preset frequency for the range control officer.

"Graffenwoehr Range Control, Atlas 27, inbound for a "shape" drop."

The reply was immediate: "Roger Atlas 27, You are cleared in hot. Range is clear. We do not have you visual. Call the IP"

'Roger that, Graffenwoehr. Atlas 27 cleared in hot. I'll call the IP". The IP – initial point – was where the navigating portion of the mission ended and the weapon delivery phase commenced. The pickle button would be pressed a few seconds later at the timer reference point – TRP – starting the bomb delivery sequence. After that things would really get exciting.

### *The Iron Curtain*

As he flew on, he was keenly aware of the political borders to the east, parallel to his direction of flight. What was now the border with Czechoslovakia would soon become the border with East Germany, curving around to the west to block his route just after he was off the target. That corner of the border was always considered a bit of a trap – if you became lost or disoriented in that area you could find yourself in hostile airspace in seconds, and could only clear out to the south-west, if you knew where that was. This was among the myriad of thoughts passing through his mind as he approached the city of Regensburg, and he checked the dime-sized window of the standby compass against the reading on his main heading indicator and noted they were, as expected, within a couple of degrees of each other. If your navigation system failed, the little standby compass could become your only "get out of jail free" card.

Whether located in East Germany or Czechoslovakia, the Iron Curtain was built to the same precise Soviet standards. Only the language of the border guards differed. The Curtain followed the line of demarcation between the Soviet and Allied forces at the end of WWII, beginning at the Baltic Sea near Lübeck and extending 865 miles across Germany to Hof and the Fichtel Mountains, where it joined the historic frontiers of Saxony, Bohemia and Bavaria. Once the border had been established and the Allies had withdrawn to the west, the Soviets shut it off, and by 1952 had expelled the residents, relocated villages, demolished bridges, constructed the "Iron Curtain" that included the Berlin Wall, and built a chain of watchtowers along its length. From the air, the border between the East and the





West appeared like a scar across the continent. Its width was a five kilometer zone forbidden to all but a few documented residents and the border police. It consisted of a 500 metre protective strip that was cleared of vegetation, with all buildings razed or bricked up. Next was a control strip of freshly ploughed ground covered by fire positions where intruders could be shot on sight, then a double fence of razor wire and quarter inch steel mesh. It was planted with land mines and, where the ground was too rocky to dig, was patrolled by dogs. Finally, another control strip of 20 to 200 metres, adjacent to West Germany, Austria and Italy, was cleared and covered by machine gunners.

The construction of the Iron Curtain only made sense when viewed from the East. Soviet propaganda described it as protection from “agents and saboteurs” of the West. In reality it was an elaborate cage to keep the people of the Warsaw Pact, Poland, East Germany, Czechoslovakia, Hungary, Albania, Bulgaria and Romania inside, under the fist of the Soviet Union.

Once, as guests of the *Bundesgrenzschutz* – the West German Federal Border Police – and as part of their combat survival training, the Squadron pilots had viewed its effectiveness from several vantage points near Fulda. It seemed to be fairly impregnable, yet thousands of people managed to escape each year from the occupied countries, with hundreds killed or captured in the attempts. The pilots on the Squadron, and in particular their Combat Survival Officers, regularly pondered the challenge of crossing the

*...the Iron  
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East*

border east to west on foot, how best to evade capture if your luck ran out and you had to eject on the other side.

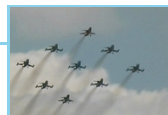
### ***Weapon Delivery***

He dismissed the trend of his thoughts. There was plenty of space between his route and the border and the IP was coming up fast. He was right on time. The weapons checks were complete. Now flip the map to the one-in-50 scale for greater accuracy - even the houses were plotted, along with the patterns of the forests that hadn't changed since Napoleonic times. His mind was racing. Touch right to center on the rail crossing then back on heading plus a little bit. The IP flashed by. Now! Full throttle and drop the nose. Speed coming up 470, 490, 500, 510, 540 back the throttle off and set the RPM to about 90 per cent. Too much! Back a hair. Airspeed holding. Line up on the run-in track. TRP coming up on the right. As he flew on, He pressed the radio transmit button on the throttle.

“Graffenwoehr Range, Atlas 27, by the IP, Hot.”  
“Atlas 27, Cleared in hot.”  
“Roger”

This was the crux. Nudge the nose down further. TRP in sight. Run-in cues lined up. Level off at 50 feet. Snap the head full right and lock onto the TRP to ensure precise timing. NOW! Thumb down on the “pickle” button. Look ahead! Instrument panel indicator light on. Target in sight! Rack on five degrees left offset for wind, snap wings level and hold for the run-in timer to expire. The rapid clicking of the non-return valve in his oxygen mask got his attention – slow down, take it cool, all is well. Count the seconds, “Thousand one, thousand two ...”.

At six seconds the pull-up tone sounded shrill in his ears, and the indicator light on the instrument panel started blinking. Pull Up! Throttle jammed forward! Click it left for afterburner, then nudge it forward as the raw fuel in the tailpipe explodes and the extra thrust kicks in. Two G's in two seconds: he was counting again, sinking in his seat with the “G”



“thousand one, thousand two” - get the nose up 45 degrees, touch of left wing down to correct for wind. Check forward on the stick to lock the attitude at 45 and hold it there. Absolute attention to the instrument panel. Count off the seconds to release get ready to drop manually if the “shape” does not release on time. “thousand-eight, thousand-nine – thousand ten!” CLUNK! The explosive squibs fired, severing the steel locking lugs and thrusting the 2000 pound “shape” away from the aircraft. Hold wings level for a second or two of separation, then flick roll inverted. So far, so good, he told himself, the bomb's away.

### *The Escape Maneuver*

Suddenly the lights went out and he was in cloud, dark and turbulent.

The puffy white cumulus seen earlier had grown into a CB, code for a thunderstorm, its anvil head hidden by clouds stretching south along his inbound track. He uttered a mild profanity at the situation: upside down in the middle of a CB, rain splattering the windscreen, still screaming upwards at 500 knots and accelerating, the burner thrusting the aircraft forward, streamlined now with the “shape” gone. He pulled the throttle back sharply, snuffing out the burner, slowing his speed instantly and causing a great howl as the exhaust nozzle cycled to control the tailpipe temperatures. He could see the engine instruments flickering with his peripheral vision, but the master attitude indicator centered on his instrument panel was his world now, the little airplane symbol poised over the globe as he pulled the stick straight back, seeing it travel downward from blue to black, through the horizon line, and heading down.

He continued to pull until the indicator was 45 degrees below the horizon, buried in the black, hurling earthward with increasing speed as gravity kicked in. He brought back the throttle some more, nailing his inverted attitude at the 45 line on the indicator, experienced a touch of negative G as he passed through a sudden updraft. Rolling left with full aileron, he snapped the aircraft upright.

In an instant he was clear of cloud, and saw the brown earth coming up at him rapidly. The altimeter was unwinding predictably as he approached the escape altitude, the height above ground selected during pre-flight planning to coincide with the simulated burst height of the weapon and to providing ample clearance from surrounding hills. It was coming up quickly, pull up, pull up, 1, 2, 3G, level off, set throttle up for cruise, about 82 per cent. Less than 30 seconds had elapsed since the weapon had deployed, but it seemed like forever. “Breathe deeply”, he told himself, “relax”.

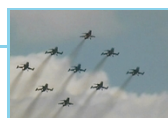
### *Emergency*

It was just at this instant, almost on cue, when the bolt of lightning struck. He heard a loud snap through his earphones and was dazzled by a bright flash of light, and in the centre of the image burned on his retina, a jagged line of fire reaching up.

It bridged the gap between the highly charged cloud above and the ground below by attaching itself to the tip of the pitot boom that extended four feet out in front of the Starfighter's nose cone. Millions of volts of electricity burned its way up the boom, melting the welds holding the tip to the shaft and vaporizing the various attachment screws for the pitot system along the way. It travelled up through the instrument panel to the cockpit, entered the electronics bay behind the pilot, toppled the inertial navigation system and blew out every fuze in the radar.

A strong ozone smell filled the cockpit, and every light on the emergency warning panel lit up and began flashing. “What the hell...?” he thought. He checked the engine instruments steady and normal. Still flying and that's good. He was surprised that he hadn't felt a thing, not even a tingle, and no fear. Only the momentary surprise of the strike.

Fortunately the aerospace engineers had recently fixed the main problem caused by Starfighter lightning strikes. Earlier, lightning bolts entered the cockpit through the throttle quadrant and exited through the control column, both of which were



gripped by the pilot, who completed the circuit with his own body and experienced a mini-electrocution in the process. After several gripping emergencies, they had installed a kind of lightning rod – a strip of metal that routed the energy from the front of the aircraft to the fuselage behind the pilot. Naturally, this fix had been well-received by the Starfighter pilots.

Thus the lightning bolt sizzled back along the spine of the aircraft, up through the rudder, and blew a pie-sized hole in the horizontal stabilizer as it continued on down to the ground. And all of this in a fraction of a second.

He contemplated the situation, first selecting 100 percent oxygen and then running rapidly through “Smoke in the cockpit” and “Fire in the Air” checks. Except for the electrics, things seemed remarkably normal. He switched off the radar that was pulsating and slightly smoking, picked up his map and looked ahead for the next turning point. The distraction had interrupted his navigation and it took a few seconds to realize that nothing ahead looked familiar. There was a gnawing suspicion that he might already be heading into East Germany.

### *Clearing the Buffer Zone*

The options were to turn onto the next heading, roughly south-west, and try to pick out a prominent landmark, say the city of Regensburg. Or the Danube river. But the thickening clouds in that sector meant an eventual climb to radar altitudes and the radar had just been fried by lightning. The Squadron standard operating procedure for this situation was to climb straight ahead to a safe altitude, refile a flight plan with an air traffic control agency and recover to base. Whoever thought that one up had not considered high speed flight under the Buffer Zone, with the Iron Curtain on the nose and any number of East German fighters more than happy to try to intercept a NATO aircraft.

Another choice was to turn back 180 degrees, retrace his route following weapon delivery and overfly the Graffenwoehr Range, keeping to one

side in case another fighter was using it. This was the very thing, given the visibility and flight conditions had been good thus far - except for the lightning strike. “What were the chances of that happening again”, he asked himself.

He glanced over his left shoulder to clear the area and rolled into a hard port turn. By this time he'd calculated the reciprocal of his inbound track by using another rule-of-thumb: adding and subtracting two from the first and second number of his compass heading. It was at this moment that he noticed his compass card on the Horizontal Situation Indicator had frozen. There was no way of knowing how many degrees he had turned or where the reciprocal track lay. Things were getting worse and now he was totally unsure of his position.

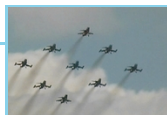
He snapped the aircraft out of its turn and glanced down at the standby compass. As usual it was spinning in its pool of oil and would take a few seconds to settle down. Time seemed to stand still and he reflected briefly that a perfect mission had just gone to hell – typical for flying operations when things became unglued. The trick was not to let them get any worse, bearing in mind that Murphy's Law dictated that they almost certainly would.

Still cruising at seven plus miles a minute he was aware that the clouds ahead were descending and darkening, forcing him to fly lower than was comfortable, given that he was now unsure of his position. He reduced his power to slow down to 300 knots and thought about his options. The first thing to do was to let someone know that all was not well. He pressed the radio transmit button on the throttle and called the range controller:

“Graffenwoehr Range, Atlas 27, over.”

Nothing.

Clearly the lightning strike had also affected the radio – another emergency to keep in mind. There was no way of knowing if his SIF/IFF system was still serviceable, but he selected the “Emergency” setting just in case. This would transmit his unique callsign and an enhanced radar return to all ground



radar units in the area – a standard procedure for distressed aircraft. But whether or not they were receiving his “Emergency” squawk, the Air Defence folks were about to get a wakeup call.

With a glance at his standby compass, now reading between 210 and 240 degrees, roughly southwest, and his standby artificial horizon, straight and level, he clicked the throttle outboard into afterburner, felt the kick as the burner lit and saw the airspeed increase rapidly beyond 400 knots. With a deep breath, he pulled the stick back and shot upwards, into the dark cloud above.

At about 45 degrees nose up on the standby artificial horizon he checked forward on the stick and felt the aircraft continue to accelerate. The altimeter was winding up rapidly: four, five, six thousand feet and climbing. Just past nine thousand feet he burst through the tops of the cloud and into the dazzling bright sunlight, looked quickly around, rolled inverted to break the rate of ascent and selected afterburner out. He slowly brought the nose to the horizon, rolled upright and leveled off.

He knew he was headed west – there was a line of snow capped mountains off to his left, just where the Alps should be, it was past noon and he was steering in the direction of the sun. He found it somewhat reassuring to resort to these crude but

*...the Air Defence folks were about to get a wake-up call*

reliable navigating techniques in such a sophisticated machine, now crippled by Mother Nature. In the heat of the moment, with mind racing and cluttered with details, it was sometimes easy to miss the obvious.

Aircraft on westerly headings were required to fly at even altitudes to avoid conflicting with other traffic heading east, so he continued a climb to 20,000 feet and levelled off. He figured he would cross the Rhine River in about fifteen minutes. Then he would be able to pick out the familiar terrain around Zweibrücken, carry out a visual descent and set up for a no radio 'nordo' approach and landing.

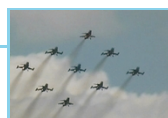


Things might turn out okay in spite of the lightning strike after all. He wondered if his “shape” drop had qualified. He was confident it had, and would find out once back in the Squadron dispersal. He started to breath easier now that the turbulence of the last few frantic moments was behind him.

### *Intercepted*

At the Air Defence Operations Center ADOC in Kinsbach, however, the situation was anything but calm. As soon as the radar return from the Starfighter had painted on the scope, an irritating bell had sounded in the ADOC and the controllers suddenly leaned forward at their consoles: an unidentified aircraft had just penetrated the Buffer Zone! Thirty-six miles west of the Czechoslovakian border and climbing on a westerly heading! And no SIF/IFF squawk! The Senior Director- SD- immediately pushed the “Scramble” button on his console, initiating an intercept order to a flight of USAF F-102 Delta Dagger fighters holding “Quick Reaction Alert” at Ramstein Air Force Base, West Germany.

The Soviet invasion of Czechoslovakia had put everyone in the ADOC on edge, and the military staffs were especially alert to activity in that area. Scenarios were constantly being discussed and



responses reviewed. Although it was more likely that they were being held under close arrest by their Soviet masters, it was possible that one of the Czech fighter pilots had decided to defect with his aircraft. Moreover, with Soviet belligerence at an all-time high, it was also possible that the intruder could be a decoy, provoking an armed reaction from NATO and giving the Soviets an excuse to launch an invasion of Western Europe in accordance with their war plans. Either way, the SD was taking no chances. Ordering the controller to declare a "Brass Monkey" above Angels 3, he picked up the direct line to the 4 ATAF Commander in Ramstein and made his report.

The Starfighter met the pair of USAF fighters head on just east of the Rhine. Cooking along nicely some four miles up, the pilot could see the flashes from their delta-shaped wing as they broke left to work their way into a stern position. Once situated, the lead aircraft would pull up alongside for a visual identification pass while number two stayed back covering the target with his guns and missiles. For a brief moment he considered making a hard right turn, breaking into the Americans and spoiling their perfect set-up. But this might degenerate into a hassle which, given the tension of the times, might have more serious consequences. Like he might get shot down by friendly fire. The intercept confirmed that he had indeed precipitated a "Brass Monkey" and a scramble. Well, he was doing his job and they were doing theirs.

The F-102 pulled up alongside him, the 526 Fighter Interceptor Squadron markings prominent on its vertical stabilizer. The 102 was a beautifully built aircraft, sleek and deadly, although not quite as fast as the Starfighter. In fact it had done yeoman service for more than 20 years and was at the end of its service life. The speed of today's intercept proved that it could still mount a credible defence against an intruder. Within a year it would retire and the Wing would replace it with the F-4 Phantom. The Starfighter pilot gave a "thumbs up" and the Dagger pilot moved closer into formation, line abreast with the 104.

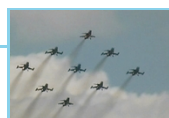
The F-102 pilot had already called the ADOC to report that the target was identified as a Canadian

F-104 with 427 Squadron markings. The SD immediately cancelled the Brass Monkey and waited for further information.

Looking directly at his new wingman, the Starfighter pilot pointed at his oxygen mask and made a "thumbs down" gesture. This was the international signal for "no radio". The Dagger pilot responded with a "thumbs up" "I understand". Next the Starfighter pilot held his clenched fist up to the top of the canopy – the sign for a system failure, then displayed two fingers the sign for "electrical". The Dagger pilot acknowledged, and using his right hand, patted his left shoulder "Do you wish to land on my wing?" The Starfighter pilot shook his head and gave a "thumbs down". He pointed straight ahead, made a sliding gesture with his hand and gave another "thumbs up". The hand signals effectively communicated all that the American fighter pilot needed to report to the ADOC, that the Starfighter had suffered an electrical failure and would be recovering visually to his home base. Since no assistance was required, the pair of 102s decided to break off their intercept. They had plenty of fuel on board, enough to run a couple of practice intercepts on each other for training purposes. The SD was only too happy to cooperate, given the extra training that would also be gained by his radar controllers. His report made, and with a salute to the Starfighter, the Dagger pilot broke hard right, flashing the underside of the triangular shaped fighter, lit his afterburner to complete the effect and disappeared off toward the far horizon

## *Recovery*

By now the Starfighter was crossing the Rhine River, which could be seen snaking its way north and merging in the distance with the smog surrounding Frankfurt and the industrial heartland beyond. It was clear ahead, however, and by following the familiar terrain the pilot could just make out the Zweibrücken runway about 30 miles away.



He completed his cockpit checks, eased the throttle back and started his descent, making sweeping turns left and right to clear the area below. He would set himself up for a straight-in approach and landing, counting on the vigilance of the tower controller to notice an aircraft on final that had not checked in or asked for landing instructions. Otherwise he would maintain altitude and fly down the runway, keeping a lookout for others taking off or landing.

*...covering  
the target  
with his  
guns and  
missiles*

On reaching circuit altitude of 1500 feet above ground, he turned right to parallel the runway and further reduced speed to 260 knots, lowering his flaps to the take-off position in the process. The flaps provided a curved shape – a camber to the laminar flow cross-section of the stubby wings, permitting the additional lift needed to support the aircraft's weight at lower airspeeds. The next selection would be to the land flap position, setting the leading edge flap to 30 degrees and the trailing edge all the way down to 45. This was not much lifting surface for a wing only seven feet long, but the engineers had figured out the physics involved and added a “blower” device to the trailing edge flap, taking high pressure air from the engine compressor and blowing it out over the flaps to streamline the airflow and add even more lift. And they gave it one powerful engine to provide the thrust necessary to hold everything together.

He turned left onto base leg, lowered the landing gear and checked the indicators showing “down and locked”. This was a good sign – not all his electrics had been fried by the lightning. He hoped that the landing lights were also working, and rolling out to line up with the runway, flashed them on and off to alert the tower of his “nordo” situation.

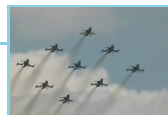
He increased power to maintain his altitude – there was no point in descending further until he got a green light from the tower. And there it was: a steady green light from the tower advising him that he was cleared for landing. A red would have meant give way to other aircraft, circle around and try again. Flashing lights and flares all had their own special meaning but today the way was clear. He reduced his power slightly, locked on to his final approach speed of 170 knots and started down a 2 ½ degree glide slope toward the button of the runway.

This was a another critical phase of flight for the Starfighter. If the engine quit now it was going almost straight into the ground and only a fast tug on the ejection handle would fire the rocket seat to overcome the downward trajectory of the aircraft. Once out, the pilot could hope for a rapid deployment of the parachute and a wind to carry him away from the fireball of the crashing aircraft



Most pilots carried a few knots of extra airspeed “for the wife and kids” against this unlikely event.

All of that aside, the approach and landing phases were as exciting as things could get in a Starfighter. First of all the stubby wings didn't allow for much wiggle room if you were off the numbers. Once the correct airspeed was acquired, the throttle was adjusted for a rate of descent about seven hundred



feet per minute. From the ground, the aircraft appeared to be perched on the hot gasses that blasted out of the tailpipe, providing the thrust needed to keep it airborne.

Increasing the rate of descent took only a slight aft movement of the throttle, reducing the RPM and fuel flow to the mighty J-79. Moving the throttle forward had the opposite effect, reducing the rate of descent and flattening out the approach angle. Raising or lowering the nose of the aircraft by control stick movements simply disrupted the approach geometry, changing the airspeed and the angle of attack and increasing the sink rate. This could have serious consequences: landing short of the runway, a hard touchdown, a blown tire. The setup for landing was counterintuitive and had been a critical, indeed vital, part of initial training. Summed up, when landing the Starfighter, the throttle was king.

### ***Touchdown***

The runway was coming up fast. He flashed over the approach lights at a mere five feet or so, checked back on the stick slightly and retarded the throttle to idle, feeling for the ground effect as the ambient air compressed over the pavement. The airspeed bled back rapidly as he held the nose of the aircraft up and, still descending, he felt the main wheels meet the runway with the slight tug of a touchdown. He checked forward on the stick, allowed the nose wheel to touch, then reached forward to pull the T-shaped drag chute handle on the lower left sub-console, aware without looking that it was located only inches from the “Panic” button. If accidentally pressed, it would jettison his four external tanks.

The drag chute blossomed out behind the aircraft, further slowing its landing speed without the use

of the wheel brakes, which on a hot day would overheat and possibly blow a tire, if not catch fire. The nosewheel now took the forward weight of the aircraft, compressing the nosewheel strut. This in turn triggered a microswitch on the nosewheel assembly, permitting him to engage nosewheel steering, the lowest button of the stick grip. He breathed a sigh of relief and relaxed with an instant of self-congratulation at the “greaser” of a landing. Some pilots were only too happy to land “rubber side down”, but most liked to grease it on, regardless of the harping of maintenance officers that slick landings accelerated tire wear.

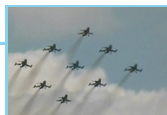
He turned off the main runway opposite the maintenance hangar. The aircraft was going to need a lot of repair: airframe, electrical, radar – probably most of the 14 air maintenance trades would be involved. Might as well save them the trouble of towing the aircraft from the Squadron marguerite on such a hot day, he thought as he taxied toward the massive structure. He could see the ground crew already running to find pins for the gear, fuel tanks and wheel chocks for the unexpected arrival.

Meanwhile, in the hour and forty minutes he had been airborne, the resident flock of sheep had nibbled their way up to the edge of the runway. The sheep didn't even raise their heads from their work as he taxied by, giving the engine a shot of power and releasing the drag chute with a twist of the handle. The Border Collie looked up at him as he opened the canopy and the shepherd nodded in response to his wave. He released his oxygen mask and drank in the fresh air,

and realized his body was drenched with sweat. He was home again.

### **Post-flight**

The groundcrew gathered around the scorched pitot boom as the pilot climbed down the ladder from the cockpit.



“What happened?” one of them asked.  
“Lightning strike” he replied,  
“Radar's out and all the electrics. Everything else seems to be OK.”  
“Jeez, look at the tail. There's a huge chunk missing!”  
They closed in on him as he filled out the L-14 Maintenance Logbook.  
“What was it like?”  
“Did you feel anything?” They were all talking at once. A lightning strike was a lot more exciting than a hydraulic leak or a blown tire. They wanted to know all the details. The Crew Chief cut in “Are you OK, sir?”  
“Yes, I didn't feel a thing when it struck, but there was a strong smell of burning electrics. And the trip home was a bit unusual without some of the nav instruments and radios. There might be other systems affected...”

The debrief was going to take some time, with various technicians asking questions pertinent to their trades.

When he arrived back at the Squadron, the Operations Officer and a few of the other pilots were clustered around the Ops desk. It was a usual gathering place, with the single pilots trying to squeeze in extra missions and lobby for weekend training trips away. More senior pilots, especially those with young families, monitored the scheduling board to ensure their fair share of holidays and days off that fit the school year. It was amazing how the scheduling system worked so that each felt he got the best of the deal.

He elbowed his way to the front and signed in the aircraft, noting the times of take-off and landing, flight time and aircraft state.

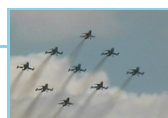
“Well, how did it go?” the Ops Officer asked.  
“Pretty much okay. Had a bit of a problem, though. Got struck by lightning just after the target”, he replied.  
The Ops O scoffed, “Lightning! That's a likely story! You got lost in the Buffer Zone and triggered

a Brass Monkey! 4ATAF's been on the phone all afternoon.”  
“What? No, really, I dropped the “shape” fine and then got struck during my escape maneuver. It fried the radar and toppled the MAI – the radios were knocked out too. By the time I got things sorted out I was kind of off track...” he paused. This was not going well.  
“And those Deuces from Ramstein had to find you and bring you home,” said someone else.  
“Get some time in!”  
Then it dawned on him that he was being taken for a ride. “All right, you guys, funny, ha, ha...”  
The group broke up, chuckling.  
“Any idea of the score on the “shape” drop?” he asked.  
“The range called it in,” the Ops Officer said,  
“100 feet at four o'clock. And the TOT was just about bang on. That's not bad for a sprog. By the way, now that you're legal again, we've scheduled you for QRA on the weekend. And don't forget to write up a report on the Brass Monkey before you take off. There's a form for that somewhere. We'll need three copies of it.”

## *Epilogue*

*At six o'clock Saturday morning he signed into the Quick Reaction Alert area. It was a world unto itself, double-fenced, guarded and patrolled by dogs. Each alert aircraft was parked in its own hardened shelter, armed with a nuclear weapon, watched continuously by Canadian and American guards.*

*After accepting responsibility for the aircraft and the weapon, and releasing the previous pilot from duty, he reviewed the target folder. He noted that the route would take him in the same direction as the CPM he had flown the day before. But instead of turning north to Graffenwoehr he would be continuing east, across the Iron Curtain and deep into Warsaw Pact territory to the military airfield that was his assigned target. But that mission would never be flown.*





*The 1968 invasion of Czechoslovakia by approximately 200,000 soldiers and 2,000 tanks of the Soviet Union, including non-Czech Warsaw Pact forces, clearly demonstrated the Brezhnev Doctrine in action: the interests of the Soviet Union would trump those of its satellite countries, and Soviet military power would be used to ensure obedience. To the people of Poland, Hungary, Albania, Romania, Bulgaria and East Germany, as well as Czechoslovakia, it was proof positive that their own armed forces were powerless to provide for their national defence and security. And it was clear that in the event of an East-West confrontation, the satellite countries would become the nuclear battlefields. Those in leadership*

*positions in the Warsaw Pact knew only too well that NATO, and its strike pilots, would see to that.*

*NATO continued unwavering in its preparedness to engage the Soviets should they follow through with their war plans to conquer western Europe. But the invasion of Czechoslovakia in 1968 turned out to be one of the last convulsions of a dying empire. Serious reform movements were already at work within the Warsaw Pact countries, notably Poland's Solidarnosc. In 1989, in response to President Reagan's earlier challenge, the Berlin Wall was torn down, the Iron Curtain punctured. Two years later the Warsaw Pact was dissolved and the Soviet Union itself collapsed. The Cold War was over.*

