

## **CF – 104G “Starfighter”**

### **“Flush Riveted ...&... Speed of Heat”**

#### **Captain A B (Art) Cameron**

The “104” was a 2<sup>nd</sup> generation jet fighter aircraft that had a wide range of useful roles. During its time with the RCAF/CAF, its primary role was in fulfilling Canada's commitment to NATO during the Cold War period. I was privileged to fly the “One Oh Four” from 1966 to 1969 as a member of 422 Strike/Attack Squadron, 4 Wing, Baden-Soellingen, West Germany. This was a Strike (Nuclear Weapon) Attack (Conventional Weapons) Squadron, one of six. There were also two Photo Reconnaissance Squadrons that had weapons training but did not have a “QRA” (Quick Reaction Alert) status which the St/A Squadrons maintained on a 24/7 basis, two aircraft per Squadron on 10 minute alert to being airborne with a nuke tucked under the belly of the 104.

The “One Oh Four” was very stable and an exceedingly fast low level platform in the European skies, in fact the fastest. It flew through ground turbulence like a hot knife through butter, was going exactly where it was pointed and would arrive there about 3 times faster than one would guesstimate. One had to adjust ones thinking accordingly. There was no looking back to see where you were nor much in the way of gliding time should the trusty General Electric J-79 power plant decide to pack it in. Thinking ahead of the aircraft was essential for completion of a successful flight in the 104. Some might call that an unforgiving aircraft but I would disagree. You simply had to be ahead of the game or you were counted out and became a statistic. It also had excellent cockpit visibility which in addition to its low level high speed, added to its suitability as a Reconnaissance aircraft.

The “G” model of the 104 had a beefed up airframe to withstand the ground turbulence fatigue factor and a Litton 3 INS (Inertial Navigation System) that was gyro driven and worked in a square grid pattern of “X” & “Y” coordinates. Its acceptable hourly error rate was about 1.6 NM/hr and was difficult for pilots to reset should they land other than back at home base. However, it did a pretty good job of providing stabilization for the AHI ( Artificial Horizon Indicator) and the Radar. The radar was optimized for ground mapping and had a horizontal line on each side of the radar screen that displayed bank angle but not pitch. The main AHI was a 360 sphere with the compass displayed around the equator and the 30 degree longitudes running to either poles. Very useful to do aerobatics with...or part and parcel of the LADD (Low Angle Drogue Delivery) nuclear weapons attack procedure. Please see: [www.laddweaponsdelivery.com](http://www.laddweaponsdelivery.com)

With only about 7 feet of very thin wing, the 104 was not a turning aircraft such as many other 2<sup>nd</sup> generation fighters were. These included the MiG -21, Mirage 3, Lightning, F -4, etc. but it had tremendous climb capabilities and held the world record for many years. So if caught in a fighting situation, you could simply go full A/B (After Burner) or as the Brits would say Reheat, and go vertical, disengage and come back in out of the stratosphere...and preferably the sun and win the fight. The other option was to simply run away as it was the fastest low level aircraft around. In place of the M-61 Gatling gun, which was replaced when the Nuke role was abandoned, it had an extra fuel tank to allow for deeper penetration into enemy territory.

While the 104 could go a little bit beyond Mac 2.0 at altitude, the limitation was a function of skin temperature on the engine intakes and compressor and not a function of thrust from the J-79 engine. There was a temp probe in the fiberglass intake shock cone that turned on a red "SLOW" light in the cockpit when the probe reached 141 C due to friction heating of the air. At low level, the 104 was restricted by airframe loading in the much denser air. Although still supersonic, this limitation occurred at 750 KEAS which approximated M 1.135 on a standard 15C day. At sea level or close to 900 mph.

Near the end of the 104's time in the RCAF in NATO, the Litton 3 was replaced with a digital LNS (Laser Navigation System i.e. laser ringed gyros versus inertial gyros) that operated with a spherical map using Longitude & Latitude coordinates that were global. This made the Conventional Weapons role a lot easier and allowed for mission planning in the air versus the manually intensive preplanning that the LN - 3 required. This made the aircraft much more responsive in Close Air Support requirements of the troops on the ground. A mid air refueling capability would have added to loiter time and/or range of operation but was not needed in the European theater of operations.

To sum up, one "One Oh Four" with a Nuke equated to 1,000 Bombers of WW 11 in terms of fire power and it had 100% accuracy and was unstoppable in all weather conditions. In visual conditions, targets were approached at less than 50' above ground and at M0.85 or in case of larger weapons M0.90 to allow sufficient escape distance from the heat wave coming from the atomic burst. In instrument weather conditions and nighttime, 500' was the upper limit of approach altitude so well within ground radar clutter but it required using the onboard mapping radar for target acquisition which could attract some enemy attention.

It is a thrilling aircraft to watch flying and beautiful to fly. The airspeed was directly connected to the throttle and was exceptionally responsive. It was not an easy aircraft to perform an airshow with due to its wide turning radius primarily due to the higher speeds at which it best flew. For example, doing a loop would take over 5,500' of altitude. You simply can't stay in front of a crowd with it so it was not often displayed in airshows. However, the noise of the J-79 was very distinctive and will always remain dear to the hearts of "One Oh Four Pilots" and many Ground Crew who performed late night engine run-ups in the test facilities at the air bases from where it was flown. It was said to have caused high birth rates among St Squadron so equipped...but this has not been proven.