

## **CF-104G“Starfighter”“Flush Riveted...&...Speed of Heat”** **by Captain (Ret’d) A B (Art) Cameron**

The “104” was a 2nd 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 Strike/Attack 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 CF-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, 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 it 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 longitude lines 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: https://en.wikipedia.org/wiki/Toss\\_bombing](https://en.wikipedia.org/wiki/Toss_bombing) .

With only about 7 feet of very thin wing, the CF-104 was not a turning aircraft such as many other 2nd generation fighters were. These included the MiG-21, Mirage 3, Lightning and F-4 Phantom, 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 midair refueling capability would have added to loiter time and/or range of operation but was not needed in the European theatre of operations. To sum up, one "One Oh Four" with a Nuke equated to 1,000 Bombers of the Second World War in terms of fire power and it had 100% accuracy and was unstoppable in all weather conditions.