MEMORANDUM for RECORD

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U.S. Air Force Subject Matter Expert Interview
Interviewees: Lt Col [redacted], USAF, Col [redacted], USAF
Date: December 2, 2015
Location: NTSB HQ (Room 5315)
Time: 0900 EST
Present were: Ralph Hicks, Dennis Diaz, Katherine Wilson – National Transportation Safety Board (NTSB)

During the interview, Lt Col [redacted] and/or Col [redacted] stated the following:

Interviewee Background and Experience

Lt Col [redacted] was the Chief of Standardization/Evaluation (Stan/Eval) for Air Combat Command (ACC). He began USAF Undergraduate Pilot Training (UPT) in May of 2000 and began flying the F-16 in August of 2001. He had been assigned to four different USAF commands, two overseas and two stateside. He was a 53rd Wing Flight Safety Officer (FSO) at Eglin AFB, FL and completed the USAF FSO Course at Kirtland, NM. He was an instructor pilot (IP) at Luke, AFB, AZ for four years. He had accumulated about 2,100 hours in the F-16, including 600-700 hours as an IP. He had about 100 hours in G/A (general aviation) aircraft, a commercial certificate and a CFII. He had not flown G/A in the past five years.

Col [redacted] was the ACC Director of Safety. He had been at the major commands level for two years. He began flying in 1990. He had primarily a rotorcraft background, including experience in H-60 and UH-1 helicopters. He had accrued about 3,400 hours total time, including about 100 hours in G/A aircraft.

Description of Operational Check Flight (OCF) Profile and General Planning

Typically, an OCF flight would be assigned the day prior (or longer) to the flight. The OCF usually did not take the entire mission, so the pilot would plan other activities, such as a low level route or practicing instrument approaches. “You can’t practice enough instruments.” Approaches would commonly be flown to airfields that were also F-16 divert options, such as Charleston AFB.

The flight plan process was explained. The pilot, once he determined where to fly, would use a page in his in-flight guide to assist in filling out the DD Form 175 (flight plan). The DD175 form was reviewed by an aviation resource manager in the squadron and then faxed to Base Ops, where it was filed.

The flight lead or squadron pilot (if single ship) would perform the "motherhood brief" that included mandatory briefing items for every flight, regardless of the mission. Mid-air collision avoidance (MACA) was part of the motherhood brief. If a formation (generally two or four ship) was planned, the lead would brief wingmen to search "in the notch." The radar slew switch would be centered, or in the notch, on the horizon, usually with a 40-mile range set. There were also maps displayed in the briefing rooms, showing where the areas of potential traffic may be (airfields, highways, etc.) and these conflict areas were briefed, based on the mission.

Lt Col Stan/Eval's personal assessment of the operational risk of a mid-air collision was higher when single ship and lowest with a four ship, due to the fact that there were wingmen providing support and clearing for traffic.

An example of a RM (risk management) sheet was provided. The RM sheet listed the operational risks and was completed before the flight. A numerical score determined the level of supervisory involvement in the decision to continue with the mission.

Mid-air Collision Avoidance Program (MACA)

Col Dir. Safety reported that the MACA program was run by the wing safety office and was "very robust." The program included civilian outreach and incorporated interaction with AOPA, FAA FSDOs and local airports and FBOs. MACA was primarily meant for use by the civilian community. The MACA program must be written and a MACA pamphlet must be developed. The ACC did an inspection of the wing and its program every 2 years. A copy of the Charleston AFB MACA program was provided as an example. AF Form 651, Hazardous Air Traffic Report (HATR) and AF Form 457, USAF Hazard Report, would be available and utilized. The unit safety offices would investigate the HAPs and HATRs. Investigations and trends would be briefed at safety meetings (quarterly at Shaw).

They had a proactive safety program. They had an ASAP program but it was not as robust as what the airlines had. There was no benefit to pilots to self-report an incident; it was branded as a learning tool. They used the HATRs tool to report near midairs by crew. Those incidents were handled at the wing level. Guidance was provided to the wings for aviation safety programs (AFI 91-225) but the safety programs developed were usually more restrictive than what was in the guidance and the ACC usually had a supplement to it.

He had only flown twice out of Shaw AFB and he had not had any issues with civilian aircraft. He had flown out of Luke AFB for 4 years and had no issues there either.

Use of F-16 Autopilot

The F-16 had a basic autopilot, utilizing attitude hold, heading select, and steering select in the roll axis and attitude hold and altitude hold in the pitch axis. There was no capability for coupled approaches. There were three bank settings – go to heading, selected steer point and hold bank angle. While autopilot was engaged, and a new heading was selected, the airplane would turn at standard rate (3 degrees/sec) and 30 degrees of bank. Manual inputs through the control stick would override autopilot functions. If specific limits were exceeded during manual override, the autopilot would disconnect. The airplane would also likely climb or descend in the turn because it would no longer be in altitude hold.

Use of F-16 Radar

The F-16 had a radar in the nose of the aircraft. This radar was used by the pilot to locate and "lock on" to other aircraft. The radar acquired by skin paint and not by a transponder code. It used closure rate rather than airspeed of the other aircraft. He did not think the radar would pick up a small Cessna aircraft at takeoff or climb speed. The radar was limited to forward looking and could only search 120 degrees directly in front of the aircraft (60 degrees either side). The F-16 radar was also limited by the size of target. It was normally used up to a 40 mile range. He may bump down to 20 mile range if he was on radar vectors to an airport. He would limit his wingman to a 10 mile range.

When operating in the typical range while search target acquisition mode, aircraft would appear on the radar display (5x5 inch MFD) as a white target. If a good target existed, a subsequent sweep of the radar would reveal a new target and the previous image would be lighter in intensity. There was no audio alert if a new target appeared.

A cursor could be placed over the target and the target could be “locked” on the radar. After lock on, the pilot could obtain the msl altitude of the target.

There was an auto acquire mode that would automatically acquire and lock on targets. This could be used in the event that ATC issued traffic within the radar scan area and the pilot did not see the target on the radar.

There was an IFF interrogator on the Shaw F-16s; it was not on all F-16s. The target will be displayed on the radar display but it was not an integral part of the radar. The IFF interrogator can be programed to request specific types of responses (1 to 4), with type 3 responses being the type that would be provided by most civil aircraft with an operating ATC transponder. The interrogation process must be manually initiated by the F-16 pilot. It took about 8-10 seconds to sweep and display all 4 modes, each being displayed about 2 seconds each.

Max number of targets at the same time: auto acquire mode (1), track while scan (TWS)(4), and range while search (RWS)(2). The radar was taught to be used tactically and not for traffic.

Lt Col Stan/Eval will provide a copy of the -34 that documents the capabilities of the radar and other avionics and weapons systems.

Scanning for Traffic (Procedures and Techniques)

Lt Col Stan/Eval reported that scanning procedures and techniques are extensively covered in T-38 and F-16 flight training programs. He stressed the "first look, then turn" philosophy, meaning that a turn should not be initiated without first clearing in that direction. Scanning was taught as a tactic, and can be employed in formation or single ship. Wingmen provided support by clearing for traffic.

He described the overall tactical scan pattern for aircraft operating in formation, and the specific pattern that was taught to F-16 pilots. This pattern included looking for hazards in front of the airplane that were near and far, checking the area around their wingman, checking aft of their aircraft, and checking the radar display inside the cockpit; radar was the last to be checked. He added that it is typical to scan the sky in sections, 10 degrees at a time. It helped to focus on a specific point of the ground, or a cloud in the sky, to calibrate the eyes. There is essentially no difference in scanning procedures between VFR and IFR rules, assuming VMC in both cases. Wingmen were admonished if the flight lead saw traffic before the wingman saw it. He was less comfortable when flying single ship and would have a heightened awareness of traffic.

He estimated that, if conducted properly, scanning should consist of looking outside 75% of the time and looking at radar 25% of the time. He reiterated that concern for traffic is higher while flying single ship.

The HUD did not get in the way of scanning for traffic at the 12 o'clock position.

Phraseology ("Turn Immediately")

Lt Col Stan/Eval was asked about the term "turn immediately" as issued by ATC and he stated that this was not standard ATC phraseology. He referred to it as "bubba comm." He indicate that, assuming there was a sense of urgency in the controller's voice and the traffic was close and not visually acquired, he would probably override the autopilot and turn more aggressively than a 30 degree bank, standard rate turn while simultaneously increasing engine power to maximum continuous thrust to maintain the airplane's energy state and avoid bleeding off airspeed. He would use the "(1) Aviate, (2) Navigate, and (3) Communicate" system. He did not think he would use afterburner to avoid traffic if given a "turn immediately" command.

He did not know what the standard terminology would be to indicate urgency. He had only heard controllers use "no delay" to initiate a climb or descent to aircraft.

Airspeed

Lt Col Stan/Eval reported that 300 knots was his minimum “comfort zone” that would give him the ability to move the airplane with up to 9G, depending on the airplane’s load out, unless he was in the traffic pattern. Below 300 knots, and especially below 250 knots, the airplane can become unstable and difficult to control during aggressive maneuvering. Operating at 250 knots required a lot more effort and focus by the pilot. He typically decreases airspeed to 250 kts (minimum) when abeam the airfield on radar downwind. Normal speeds for F-16 are: cruise: 300 kts, rejoin during departure: 400 kts max, climb: 350 kts (best climb speed).

The F-16 is difficult to slow down in a descent, especially when in a clean configuration. ATC does not exert pressure to maintain 250 kts or less below 10,000 feet.

Maneuvering may be limited based on the configuration of the 9 stations on the airplane; stations could be outfitted with fuel tanks, missiles or bombs. Lt. Col. Stan/Eval thought that even at its heaviest, the F-16 could still reach 5 Gs in a turn; it could be difficult to maintain but still possible. If maximum power was not used, 5 Gs would likely not be obtained. They had lift/drag charts in their briefing rooms.

Crew Duty Day and Rest Periods

Crew duty day and rest periods were addressed in AFI 11-202v3. Crew duty under daytime conditions was 12 hours maximum (10 hours at night) and begins when the pilot initially reports for duty. Crew rest is mandatory for pilots prior to performing any duties involving aircraft operations and was a minimum of 12 non-duty hours before the Flight Duty Period (FDP) begins. Crew rest was free time and included time for meals, transportation, and rest. This time must include an opportunity for at least 8 hours of uninterrupted sleep. Crew rest period cannot begin until after the completion of official duties.

Integration of ADS-B

The Air Force knows that is it coming; the other commands (heavy aircraft) are probably more likely to implement by 2020. Fighters older than the F-22 will probably need a waiver, more time. There are equipment issues and the priority is to use funds now to make the platform more lethal.

Check Ride Requirements

Pilots enter the “zone” for a check ride at the 12 month point. Overdue after 17 months. There were two checkrides, (1) Instrument/Qual (basic flying ability and instrument procedures) and (2) a Mission check (tactical evaluation).

Operating in NAS

He trained in the National Airspace System (NAS) since initial pilot training. The point when operating a military aircraft in the NAS was to be predictable.

Interview was concluded at 1215.

Products to be provided by USAF: F-16 -34 manual, blank copy of Shaw's risk management form, Shaw's written MACA program.