PILOT REPORT: DASSAULT FALCON 7X

Backlogs are long, but the FBW trijet is worth the wait

by Robert P. Mark

This year’s Paris Air Show at Le Bourget provided an opportunity for me to see Dassault’s new Falcon 7X up close before I got my chance at the left seat, alongside Dassault 26-year veteran senior test pilot Yves (Bill) Kerherve, who has since retired from the company. A former French Navy fighter pilot, Kerherve flew the ultra-quiet 7X through a series of maneuvers for the crowd on the opening day of the show. Although the 7X is a large-cabin business aircraft, its maneuverability made it clear that Dassault designers had not forgotten the Mirage and Rafale fighters that came before.

While the flight demonstration itself would probably not convince anyone to write a check on the spot for a 7X, my guess is that after watching those 86-foot-span wings carry the 7X through some incredibly tight turns with ease, people would take a closer look. Dassault currently has orders for more than 165 copies of the recently certified, $40.6 million aircraft. The company is currently building three a month, and the next delivery slot is late 2011 or early 2012.

Kerherve said most of the initial orders for the 7X are from current Falcon customers, with just a few from Gulfstream and Challenger owners. Pilots new to the 7X complete a 26-day course before being awarded a type rating. I did not have the luxury of those weeks of book and simulator time before the flight, which had been arranged just a few days before my arrival in Paris. Nonetheless, I jumped at the chance to fly the airplane the 387 nm from Le Bourget to the flight-test facility at Marseilles on the opening afternoon of the show, especially since there was the possibility of some en route airwork.

I flew airframe number 1, registered as F-WFBW, which was not a production airplane. The cabin was unfinished and cluttered with a variety of test equipment and ballast tanks that would prevent a true check of cabin noise level at altitude. From an avionics and flying standpoint, however, airframe number 1 was as representative of the 7X as S/N 4, the aircraft that sat on the static line at Le Bourget awaiting delivery to Dassault chairman emeritus Serge Dassault.

I approached the flight with some personal perspectives that bear mentioning as well. I have not flown competing aircraft such as the $29.85 million G350, which offers approximately the same payload, or the $37 million Global 5000. Before the June 18 flight in the 7X, I had never flown an aircraft with a sidestick or fly-by-wire controls. I also had no experience with the Primus Epic EASy flight deck, which, as it turned out, was actually an advantage since there was relatively little to unlearn.

From a technical aspect, I was curious about flying an airplane that had no pilot-controlled trim option—no wheel, no switch. All trim is handled by the computers, which means the stick would essentially not show or feed back any movement to the pilot during flight.

Dimensionally, the 7X resembles the Gulfstream G350 and Global 5000. Gulfstream says...
the G350’s maximum payload is 6,300 pounds, and Bombardier publishes 5,170 pounds for the Global 5000. Dassault pegs the 7X’s max payload at 6,000 pounds. The interior of the 7X cabin is 39 feet long, compared with the Global 5000’s 42.5 feet and the G350’s 45 feet.

Certainly any aircraft is a blend of capabilities, but range is one area where the 7X surpasses its competitors; the French airplane can fly a shade under 6,000 nm with eight people in the back. You’d need a G550 (which costs $47.59 million) to fly a similar distance nonstop. The G350’s range is 3,800 nm with a similar load. The Global XRS has roughly the same range as a 7X and a larger cabin but retails for about the same price as the G550.

The issue really becomes how far do you need to carry how many people? And how much are you willing to pay for speed? The 7X is fast. Dassault calls it a Mach 0.90 aircraft, which means the airplane offers performance similar to that of the Citation X but with a much larger cabin and far greater range. But the Globals and the Gulfstreams are no slowpokes either. The Global 5000 and the G550 offer a top speed of Mach 0.89, while the Gulfstream G350 can fly at Mach 0.88.

**Simplifying the Walkaround**

Approaching the 7X at Le Bourget, I conducted a preflight with Dassault pilot and senior examiner David Bronn. He mentioned that 7X pilots need be concerned about only a few items during the walkaround, which can easily be accomplished in less than 10 minutes.

Bronn explained there is no tolerance for any sort of hydraulic fluid leaks—no matter how tiny—during the preflight, just as there is zero tolerance for any tire wear that appears somewhat uneven. The 7X is also the first Falcon to have gear pins, three of them, that must be removed before flight.

Another distinction relates to the airplane’s fly-by-wire controls. There is no need to flop the control surfaces during the preflight. Dassault recommends that pilots inspect them and not move them at all during the walkaround. Static wicks are always an issue on high-altitude airplanes, and the 7X is no different in that respect. No more than two can be missing around the entire airplane and no more than one on any control surface.

A quick look in the hellhole shows pilots the steam-gauge redundancies of everything they see in the cockpit once on board. The only reason anyone might stand up in there is to disconnect the battery when the aircraft is parked, something Dassault highly recommends. The pilot will quickly find himself staring at something that appears to have been left over from the dark ages, the door to a ram-air turbine (RAT). If all three alternators on the 7X should fail, the RAT door opens to spin up enough juice to run many of the onboard systems. The APU alternator is not available in flight. The 7X also employs two separate independent power sources to supply the fly-by-wire system in an emergency.

**Smart Avionics**

The APU was already running as the ground crew prepared for our afternoon departure from the Dassault Falcon Service ramp at Le Bourget. Dominique Chenevier, another senior Dassault pilot, was in the jumpseat. The avionics were already on as Kerherve offered me the left seat and explained the Epic EASy trackball system and the 7X’s complete lack of steering tiller. The cockpit seats seemed comfortable, and Kerherve said the seats in the production model are considerably more plush.

The four 10- by 13-inch screens of the Epic EASy system aboard the 7X allow for only one single FMS at a time to be used to prevent one pilot from programming something about which the other pilot has no knowledge. In addition, the Epic EASy system does not allow one pilot to make changes to the flight display of the other without confirmation from the other pilot.

Each pilot has a primary flight display that also includes all engine operating dynamics. The display sits just beneath the visor, requiring only a minor tilt of the head downward to see. The center panel just below the visor is the primary navigation display, and the screen beneath that is for systems.

Although I did not have an opportunity to evaluate the head-up display on this flight, all of the HUD guidance vector symbology was available on the primary flight display, including flight path in green and thrust vectors in red, a layout designed to minimize reaction time about where the thrust levers need to be positioned for any given configuration.

The trackball allows either pilot to update all portions of the displays—the primary flight display, central navigation panel or systems panel—for information in what appears to be a Windows-like environment. The trackball housing was positioned exactly under the head-up display on this flight, all of the HUD guidance vector symbology was available on the primary flight display, including flight path in green and thrust vectors in red, a layout designed to minimize reaction time about where the thrust levers need to be positioned for any given configuration.

Before-start checks and programming the FMS were traditional, as were the engine starts themselves. All three of the 6,400-pound-thrust Pratt & Whitney Canada PW307As are fade-controlled, which means pilot interaction is minimal, requiring only that the pilot move a fuel lever during spool-up. Pitot heat and windshield heat come on automatically once two engines are running, which makes for essentially no items at takeoff.
pointed east after the engine starts, I pushed the left rudder to the floor and released the parking brake. As light as the airplane was, it began to roll ahead with no advance in the throttles. The rudders are sensitive at first but more so if the pilot does not keep his feet high enough on the pedals. The 7X soon became a docile airplane to taxi.

There are no memory items in the 7X except to don an oxygen mask in case of decompression or fire. The only confirmation needed before the takeoff roll was to verify that all sensor information was coming from the left side.

**FBW Makes for a Smooth Flight**

On takeoff we’d be restricted to 7,000 feet headed southwest out of Paris. We experienced no delay in takeoff as we reached the runway. The takeoff run was short—12 seconds to reach V1 and less than 10 seconds to pave the way ahead. Climbing through 18,000 feet at 300 knots, I was reminded of that French pilot charm on the controllers while taxiing at Le Bourget. “Controllers here speak a sort of Franglish, a French-English combination,” Kerherve said, trying to set my mind at ease about a flight he’d probably made a thousand times.

The sidestick is a revolutionary style of flying an airplane unless, of course, the pilot has considerable experience with Microsoft Flight Simulator. This flight made it clear that Flight Simulator time would not be wasted. Sidesticks allow a pilot to rest his left forearm comfortably on a cushioned pad and quickly learn to control the aircraft with minor movements of the wrist. As I would later see, flying the aircraft in a very nose-high attitude becomes clearly more difficult, with the strain on the pilot’s wrist sending a clearer signal of trouble than the ache of a bicep pulling back on a control wheel.

All attitude restrictions fell before we ever reached them, and I wondered if Kerherve had used some of that French pilot charm on the controllers to pave the way ahead. Climbing through 18,000 feet at 300 knots, I was reminded how much difficulty I had had understanding the French controllers while taxiing at Le Bourget. “Controllers here speak a sort of Franglish, a French-English combination,” Kerherve said, trying to set my mind at ease about a flight he’d probably made a thousand times.

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were soon beginning our descent. There was no descent checklist to perform for the 7X as we approached. Destination weather was VFR with some light rain. The plan was to try some slow flight, steep turns and configuration changes before landing.

Kerherve explained that in slow flight, the 7X would not let the pilot fly into a stall. We would first see the amber low-speed cue and finally the red tape, but we would not be able to fly into the red. The pilot can bypass the computer in roll but not in pitch.

Low-speed Airwork

With the autothrottle now off, I retarded the power and extended the speed brakes to slow the airplane, which now weighed in at about 46,000 pounds. The 7X’s response to my switching off the autopilot was interesting. The sidestick vibrated, a cue that I was now flying the airplane. The 7X responded quickly and we soon slowed through 180 knots hand flying the airplane. I took no action anywhere in the process because there was no noticeable pitch change.

Once I began my first steep turn, I put the flightpath vector on the horizon and released the stick as the bank reached the 30-degree mark. The Falcon held the turn perfectly all by itself and with the autopilot turned off. I pulled the power back to idle and listened as the warning system yelled again in a way that was impossible to miss, “Increase speed.” There were no pitch changes as I applied power and climbed out of the approaching stall.

I tried another with flaps at the first notch and slats down again with the power at idle. As the aircraft neared 102 knots, the system again yelled at me. Noticeable back pressure was required to hold the 7X in an attitude nose-high enough to slow it to this speed, something I also believe would be difficult to ignore. We tried it again at full flaps and with the gear down. The airplane was still controllable down to 83 knots, at which I put it into a succession of 30-degree banks.

After stowing the gear and flaps, I accelerated the aircraft to 250 knots to try some steeper turns. At 250 knots and less than 35 degrees I again was able to release the stick and the 7X would hold the bank. At more than a 35-degree bank I needed to hold the stick back. If I released the sidestick in a 50-degree bank, the aircraft righted itself to 35 degrees. There is no limit to the bank angle in the 7X–pitch yes, bank angle no.

Approaching Istres, we descended through 4,000 feet and had an opportunity to see the TCAS in action as VFR traffic appeared out of nowhere. Initially at 400 below us, it climbed to our altitude as we began to search. The “traffic” announcement quickly switched to “descend, descend.” I complied quickly and turned away as the traffic disappeared over us unseen. Without TCAS, it would have been close despite the good visibility outside.

We eventually headed back to Istres, and the tower sequenced us behind a landing C-130. With 185 knots still on the airspeed indicator, I reduced the power to idle as Kerherve lowered the gear and flaps and I was quickly down to 120 and easily slowing behind the C-130. Ref speed would be 111 knots. The 7X seemed to find a landing power slot easily, and I made small changes with the throttles until the flare.

I retarded the throttles at 40 feet and increased nose pitch only slightly. On touchdown, the trailing-link gear made me look good, with an incredibly smooth landing as I pulled the center reverser handle back. We were so slow at touchdown, however, that by the time the bucket came out—probably six seconds—we were already slowing through 70 knots. The brake-by-wire on the 7X is highly effective and I easily used no more than about 2,500 feet to the turnoff.

We taxied to the Dassault ramp and shut down. We had used about 4,000 pounds of fuel during the 1.6-hour flight. Kerherve said that with the 3,900 pounds of fuel remaining, we could easily have landed in Rome or returned to Paris with a reserve since the 7X burns about 2,000 pounds per hour total when it’s light. With full fuel on board, the 7X can routinely fly from Paris to Cape Town, South Africa; or Paris to Tokyo; or New York to Dubai nonstop.

For a large aircraft, the 7X is incredibly easy to fly. The sidestick was something I quickly learned to enjoy, as well. A strong point on this aircraft is how light on the controls. Indeed, the pilots of the 7X will learn quickly to fly with their fingertips rather than with their hands because the aircraft is that light on the controls. Indeed, the systems that control the 7X may be technologically complex, but from a control input perspective they are as light as on a small aircraft.

The immediate question might well be whether or not the 7X is worth the wait. From the perspective of a pilot who had only a few hours of exposure to the aircraft, I’d have to say absolutely.

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**Falcon 7X Specifications**

**Engines:** Three P&W PW307A turbofans, 6,402 lb thrust each (SL ISA+17ºC)

**Interior dimensions:**
- Cabin length: 39 ft 1 in
- Cabin width: 7 ft 8 in
- Cabin height: 6 ft 2 in
- Cabin volume: 1,552 cu ft
- Baggage volume: 140 cu ft

**Performance:**
- Max. ramp weight: 69,200 lb
- Max. takeoff weight: 69,000 lb
- Max. landing weight: 62,400 lb
- Zero fuel weight: 41,000 lb
- Basic operating weight: 34,272 lb
- Fuel capacity (usable): 31,940 lb
- Takeoff distance (balanced field length): 5,505 ft
- Approach speed: 104 kias
- Landing distance: 2,262 ft
- Range: 5,950 nm

**Price:** $40.6 million

Source: Dassault

Airwork in the Falcon 7X revealed just how receptive the airplane is to minor pilot inputs. This is an airplane to be flown with one’s fingertips.