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DASSAULT FALCON 900LX

Technology meets beauty, and the result is … performance.

>>> BY ROBERT GOYER

THE FALCON 900LX, certified late last year, is the latest entry in Dassault's line-up of triengine, wide-body, long-range business jets. It is a popular choice for buyers looking for an ocean-hopping airplane with a big range — 4,750 nm — a fabulous cabin and all the latest safety features.

That kind of range is new for the 900 series, and what enables such numbers are new winglets, the first on a new Falcon jet. These, coupled with a greatly upgraded avionics suite and numerous cabin enhancements, constitute the LX in the name.

For Dassault, elegance is in the DNA. Dassault founder Marcel Dassault famously said that an airplane had to be beautiful to fly well. Surely he wasn't the first aircraft designer to equate aesthetics with performance, and just as surely he won't be the last. But one could make a compelling argument that his company's designs have embodied that ideal like no one else has.

In addition to high style, the Falcon name brings with it the reputation for performance and innovation. The company manufactures not just bizjets but fighter jets as well. It's also a pioneer in aviation manufacturing processes, it developed the process for computer aided aircraft design, and it has done much to advance the state of the art in avionics and aircraft-human interfaces.

The list of current Falcon jets is as elegant as it is short. In addition to the 900 series, Falcon fields just two other model types, the ultralong-range 7X with fly-by-wire flight controls and the widebody, twin-engine 2000EX. The light-large 2000S — a large airplane for a super-midsize price, says Falcon — is slated for certification next year.

900LX, Heritage and Design

The most recently certified model to carry the Falcon name into flight is the 900LX, which earned FAA and EASA certification just last year. It is also the first Falcon to earn certification with the new EASy II avionics system. We flew one of the first production models out of Dassault Falcon Jet's Teterboro, New Jersey, headquarters recently and got the chance to see how Dassault improved the model in a number of ingenious ways.

If you see a Falcon family resemblance in the 900, you're right. The 900 series airplanes are descended from the first trijet Falcon, the Falcon 50, which was certified in the mid-1970s. At the time the idea of three engines was well within the mainstream; the Boeing 727 and the McDonnell Douglas DC-10 were both in their prime. Times have changed, however, and nearly every commercial jet design has two engines instead of three — yes, a few very large models have four. The same trend has been the case with purpose-built bizjets. Even the ultralong-range jets of two of Falcon's competitors, Gulfstream and Bombardier, manage with two engines, but Dassault has stuck with three, even on its latest design, the 7X.

Is it sense or stubbornness? Dassault, not surprisingly, says it's the smart move. For the same reasons a three-engine airliner makes sense, a bizjet with three engines does as well. In addition to having added redundancy and safer engine-out handling manners, a three-engine airplane has better one-engine-out range characteristics, which is really important when that airplane is flying over the middle of an ocean — or somewhat before or after the middle — when it loses an engine. Having two-thirds of your engines left to "limp" home on is greatly preferable to having just half of your engines left to do that same job. Not to mention its noteworthy engine-out climb performance — again, the two-thirds rule — and its impressive hot-and-high and short-field takeoff performance. Finally, whereas an airliner can be counted on to fly to a handful of destinations throughout its air transport life, for bizjets, variety is the rule, and three engines, great short-field capability and exceptional hot-and-high performance all fit this profile perfectly.

Apart from its triengine design, the defining features of the new 900LX are its winglets, new to the 900 series, and its upgraded avionics suite, the EASy II cockpit. Based on Dassault's EASy cockpit take on Honeywell's Primus Epic suite, EASy II adds a great deal of capability while also improving upon the basic functionality of the system, which shows Dassault's interest not just in fielding a product but in constantly improving it as well.

The winglets were designed by Aviation Partners, which seems to have perfected the art of taking a wingtip and turning it upward. The idea behind winglets is compellingly simple. Winglets do two main things. First, they effectively extend the span of the wing and, hence, its lifting capacity, while not greatly extending the lateral span of it. The second is equally important. Winglets properly designed, and the proof is in the numbers, keep the better part of the spanwise flow from being lost over the tips, thereby cutting drag and improving range and/or fuel efficiency.

The net effect of the winglets on the 900LX is an increase in range of 200 nautical miles, which, in a world in which the ability to travel back and forth between important city pairs is a critical piece of the buying equation, is

>>> The three-zone cabin is a comfortable retreat for long-haul flights, permitting passengers to work, rest and stay in touch. Bottom: Three engines allow enhanced oceanic travel and improved hot-and-high operations, while helping slash direct operating costs.

a huge improvement. The model also comes with an increase in maximum takeoff weight and with some additional fuel capacity as well. The bottom line is that the 900LX can go farther on less fuel while carrying about the same load. As I said, it's a tough gift to pass up, and Dassault hasn't.

Even EASier

The other big improvement to the 900LX is the addition of the EASy II cockpit, which is a development logically enough of the EASy cockpit, which is Dassault's highly optimized version of Honeywell's Primus Epic digital flight deck, which after a lot of teething pains — this could be a story in and of itself — seems finally to be a mature and stable technology.

EASy II incorporates a number of changes into the avionics, including adding a number of capabilities, such as electronic charting and satellite weather, which were a must. The EASy interface, designed to be intuitive and easy to navigate, is based on drop-down menus. The pilot makes use of cursor control devices (CCDs), two of which are located on either side of the power levers, in order to locate that cursor in the desired place and execute a command, navigate further or access a menu option. Two alphanumeric FMS keypads, one for the pilot and one for the copilot, are located just above the CCDs within easy reach.

The cockpit is laid out in a remarkably clean way, much of this thanks to the fact that the integrated avionics system handles much of the work previously done by dedicated displays and switches. Even the way the screens are arrayed, with *just* three displays across the top — a PFD on either side and a shared MFD — is done not because of any real estate limitation but because it fits Dassault's philosophy of shared cockpit responsibilities. The MFD, in the view of the company's human factors experts, should be shared between the captain and the copilot.

>>> Winglets add span and greatly increase lift while cutting down on drag. They add some weight, but the numbers make clear that the trade-off is a no-brainer.

EASy II is designed, as its predecessor was, to allow the pilots great latitude in how they set up their displays. On either PFD or MFD they can create windows to show whatever utility they want. Different pilots will do it differently. Indeed, on two flights with EASy II, one with Honeywell in its 900EX from Dallas to Las Vegas and the other in Dassault's 900LX demonstrator, the pilots tutoring me showed me two very different ways to set up the screens.

One of the new selling points of EASy II is synthetic vision, and Honeywell's syn viz is a tour de force as it captures the outside world with striking realism, working in a variety of features, like superimposed range rings, dynamic pitch ladders that change depending on the phase of flight and enhanced color-coding consistency. The effect is a flight display that, despite featuring more data than ever, is easier to read and interpret.

EASy II also features a host of technological improvements, including an updated flight management system, improved takeoff/go-around capability, WAAS-LPV, XM Weather, ADS-B (automatic dependent surveillance – broadcast) and the advanced navigation package RNP-SAAAR. There's also

GADGETS AND FREE LUNCH

In many ways, winglets are the proverbial free lunch. When Dassault installed winglets for the first time (on its twin-engine 2000 model) a few years back, it seemed to fly in the face of company tradition, which has frowned on the use of aerodynamic "gadgets" such as vortex generators and stall strips to fix what in its view were problems that should have been addressed in the initial design. The company has noticeably softened its stance in this regard in recent years and has given its competitors their due, saying that "real talent is needed to develop these sometimes highly sophisticated devices" but concluding again that "this energy could have been put to better use on developing a satisfactory aerodynamic solution in the first place!" (The emphasis is theirs.) Winglets were seen either as an exception to the gadget clause or as just too good to pass up. I'm thinking it was most likely the latter.

Honeywell's remarkable RAAS runway safety utility, graphical flight planning and automatic descent mode (in case of an emergency depressurization).

The 900LX's cabin has standard configurations for between 12 and 19 passengers with three distinct seating areas. The cabin offers great light and all the latest cabin technology, including high-speed Internet and telephone, substantial work areas, convenient and capacious baggage compartments, a first-rate galley and a substantial lavatory. As you might expect, 900LX passengers get a five-star experience.

Falcon in Flight

It was a beautiful if chilly winter day at Dassault Falcon Jet's Teterboro headquarters on the day of my flight in the 900LX. The plan called for a long round-robin flight up through the Hudson Valley and west toward Syracuse and then a stop at Stewart, New York, for some pattern work before heading back home again. The out-and-back trip would take around an hour and a half and would give me the opportunity to see the 900LX's performance in a number of interesting flight regimes. Falcon Jet Capt. Paul Hansen was in the right seat and Dassault avionics expert and pilot training director Woody Saland was in back.

The 900LX is a tiller airplane, and it handles responsively and predictably on the ground, though it does take a bit to get used to how carefully you need to manipulate the control when taxiing. A little tiller goes a long way.

On takeoff I stood the power levers up (being sure to grab a handful of levers) and waited two beats for the beast to come alive. The 900LX requires tiller until 80 knots, which happens in a hurry with 15,000 pounds of total thrust on a sub-50,000-pound airplane. V1 and rotation speed come fast. The 900LX needs just 5,101 feet for a sea level max-weight takeoff, this for an airplane that, if we'd carried full fuel, could have proceeded to fly nonstop to Paris from there.

We, however, were light for a short flight and were, consequently, off the ground in a hurry and climbing fast. I had to come back on the power just moments after commanding "flaps up" in order to keep the speed down for our level-off at 2,000 feet. Learning to effectively use the trim, which runs in a leisurely fashion, requires some practice and some foresight. The autothrottles too come in very handy, because they remember (if you forget) to pull the power back, saving the pilot a possible bust for an airspeed and/or altitude deviation.

After our level-off and a few short vectors, we were quickly cleared up to Flight Level 200 and then all the way up to 34,000 feet. I hand-flew the airplane up to 180 and was delighted by its handling, the tight, precise control feel with exactly the right amount of force required for roll inputs at low and higher speeds. Falcons are much beloved by the pilots who fly them for a living for their honest and responsive flying manners. They also love the workplace. With infinitely adjustable

>>> The author flies the ILS Runway 6 to Teterboro, HUD down and eyes up. The shared MFD ensures that captain and first officer are literally on the same page.

seats, award-winning ergonomics and dual-zone environments, the cockpit is easy to love.

After cruising west for a while and consistently getting slightly better than book values on airspeed, climb and fuel consumption (another vaunted 900LX trait), we turned around and headed to Stewart (KSWF) to do some landings. Improved vertical nav capability on the FMS is part of the EASy II package, and with a little help from Paul, I was able to program in our crossing altitudes. As we descended below 10,000 feet using speedbrakes and the autothrottles while selecting the ATC-assigned airspeed, the synthetic vision showed its value. There, clearly depicted in living color, were the peaks of the Catskills, color-coded, no less, to show just how much threat, if any, they posed to the flight.

On downwind for Runway 9 at SWF, the HUD showed its value, allowing me to fly an ATP-quality pattern on my first try in the airplane. I know from experience that, without the HUD, I wouldn't have been close. It's also great for approach, since it shows the airspeed — our VREF was 110 knots — altitude and glideslope, allowing me, once again, to fly far better than I would have been able to, at least that day, without the HUD.

Another improvement on EASy II is its conformity with the primary display, so when you look down at the flight display, the layout of the symbols and tapes are identical to what you were seeing on the HUD.

Like all current Falcons, the 900LX features leading-edge slats coupled with the flaps, making descents all the easier. And with an approach speed of 110 knots that day, it would have been easy to get stopped in about a third of the available runway had we not elected to do a touch-and-go on the remaining 9,000 feet. After a couple of approaches at Stewart, we headed back to TEB for a full stop and a debriefing.

With the Falcon 900LX, Dassault has proved that its original mid-1970s three-engine design was indeed years ahead of its time, as the company has always proudly insisted. With the addition of winglets (as well as the added range they bring) and the impressively capable EASy II cockpit, the 900LX has reestablished itself as a formidable competitor in the large-cabin market.

>>> Rugged and beautiful, even such 900LX features as landing lights and gear doors abide by Marcel Dassault's philosophy of aesthetics and performance.

DASSAULT FALCON

Dassault Falcon 900LX

The Falcon 900LX we flew for this report was equipped with the new EASy II avionics system with synthetic vision, enhanced HUD, upgraded dual digital FMSs, TCAS II, EGPWS, Jeppesen Charts, XM Weather, WAAS LPV, RAAS runway safety utility, RNP SAAAR and pilot/controller datalink, as well as autothrottles, enhanced go-around capabilities and more.

Price as tested:	$42,400,000
Engines	3 Honeywell TFE-731-60 DEEC
Thrust rating	5,000 lbs each
Flat rating	ISA +17 degrees C
TBO	3,000 hrs/6,000 hrs
Seats	12-19 plus 2 crew
Cabin length	33.1 ft
Cabin width	7.7 ft
Cabin height	6.1 ft
Rear baggage	127 cu ft/2,866 lbs
Length	66.3 ft
Height	4.8 ft
Wingspan	70.1 ft
Wing area	527.4 sq ft
Wing loading	92.9 lbs/sq ft
Power loading	3.27 lbs
Max zero fuel weight	30,864 lbs
Max payload	5,049 lbs
Max useful load	23,385 lbs
Max usable fuel	3,120 gals (20,905 lbs)
Payload with max fuel	2,480 lbs
Max ramp weight	49,200 lbs
Max takeoff weight	49,000 lbs
Max landing weight	44,500 lbs
Climb to 39,000 feet	21 min
Max range	4,800 nm (w/ 4 passengers, IFR reserves)
Takeoff distance	5,040 ft (w/ 4 passengers, IFR reserves)
Landing runway	2,400 ft (w/ 4 passengers, IFR reserves)
Certified ceiling	51,000 ft
Pressurization	9.3 psi
High-speed cruise	Mach 0.84
Long-range cruise	Mach 0.75
MMO/VMO	350/370 kias/ Mach 0.87/0.84