

Hawker 800XP

Raytheon's mid-size jet holds true to its extended performance capabilities.

By Clay Lacy
ATP/CFII/Helo/Sea. Gulfstream II/III/IV, Learjet, Hawker, Boeing 747 and 25 misc. type ratings.

As Raytheon approaches delivery of the 1000th Hawker, Pro Pilot thought that it would be an opportune time to delve into exactly why this venerable bizjet is so enduringly popular. To learn more about the latest Hawker, the 800XP, Clay Lacy made his way to CCR (Buchanan Field, Concord CA) to put Raytheon's mid-size jet through its paces.

I'VE had a type-rating in Hawkers for more than 25 years but since most of my

flight experience is in older series models, I was looking forward to getting behind the controls of the 800XP. We started off the morning with a roundtable discussion with Raytheon VP of Domestic Business Jet Sales Ted Farid, Mgr of Hawker Product Marketing Ed Berger and Dir of Flight Management John Thomas. The folks from Raytheon brought charts and materials for the 800XP, providing a very good description and overview of the model as well as specific enhancements over the original Hawker 800.

Raytheon did not have a demonstrator aircraft available since they've all been sold, so arrangements were made for us to fly a customer aircraft

(N40PL), which had only 27 hours on the airframe. Farid explained that Raytheon was getting ready to deliver its 1000th Hawker, the largest number of any mid-size aircraft ever built and he mentioned that 800XP production is being more than doubled this year. With an order backlog currently running 14 months, this airplane certainly seems to be as desirable as ever.

A fine pedigree

Hawkers have always been popular aircraft right from the beginning and I believe this is because it probably has the nicest cabin of any mid-size jet. Coming from a fine de

Photo by Raytheon Aircraft/Paul Bowen



An elegant mid-size jet, the Hawker 800XP represents the refinement of the Hawker product line over 30 years.



(L-R): Clay Lacy and Raytheon Aircraft Dir of Flight Management John Thomas spent the morning flying the 800XP with several approaches into SCK (Stockton CA).

Hawker Series 1 in 1964, pilots have liked this airplane for its “little airliner” feel and its docile, stable flight characteristics. It’s the kind of plane you’d like to be in during a dark stormy night.

A total of 358 Viper-powered Hawker Series 1, 2, 3, 3RA, 400 and 600 aircraft were built before turbofan engines were introduced on the Hawker 700 in 1976. The first Hawker 800, powered by Garrett (now AlliedSignal) TFE731-5 engines, was delivered in 1984 and was the first of its kind capable of flying comfortably coast-to-coast in either direction. When the 800XP was launched in 1995, it took advantage of an additional 720 lbs of thrust from the AlliedSignal TFE731-5BR engines and assimilated many refinements gained from the longer-range Hawker 1000 that was introduced in 1990. When Raytheon acquired the Hawker program in 1993, the 33-inch stretched model 1000 was discontinued as its advantages over the 800 were not able to support the 1000’s higher price in the market.

Raytheon has elected to stick to one Hawker product model, the 800XP, and concentrate on making it the best mid-size jet it can be. Berger described some of the

enhancements of the 800XP over the straight 800, which includes strength improvements, Hawker 1000 aileron and trim tab gearing, thrust reversers, digital electronic engine control (DEEC) and the deletion of wing fences in favor of vortilons.

Preflight

The workaround was easy and I was impressed with the accessibility of everything. There’s a handy access door in the ventral fuel tank that you can stand up through for a visual inspection of the aft fuselage

equipment bay. A nice feature here is that the engine covers are neatly stored on this door. According to Thomas, single-point refueling takes about 15 to 20 min, the airplane has external lav service like larger aircraft and you’ve got visual access to engine oil levels within each nacelle.

The finishing inside the cabin was well appointed and included a roomy walk-in lav. Passengers will definitely like this spacious and comfortable cabin. The galley was adequate for the aircraft and three separate baggage areas are provided, which are all within pressurized areas and accessible during flight. I felt, however, that the airplane is a little skimpy on baggage space—the forward-storage area that is 33 cu ft in volume but very narrow. If you’re carrying six or more passengers, you’ll have to plan your baggage.

The increased thrust of the TFE731-5BR turbofans, at 4660 lbs each, is a real plus over the 800 powerplants and will give you much improved airfield performance under hot-and-high conditions. The AlliedSignal GTCP36-150 APU, which comes standard on the 800XP, went on-line nicely and it is approved for in-flight operation up to 30,000 ft.

If you’ve ever flown a Hawker, the 800XP flightdeck has a familiar



(L-R): Raytheon Aircraft Mgr of Hawker Product Marketing Ed Berger, VP of Domestic Business Jet Sales Ted Farid, Clay Lacy, Dir Flight Management John Thomas and Regional Sales Rep John Chandler review Hawker 800XP systems and performance charts prior to the flightcheck.

Photos by Jack Sykes



During the walkround Clay Lacy found the 800XP to be very accessible. A ventral access door that leads to the aft fuselage equipment bay (above L) and the easily accessible weather radar (above R) added to the ease of inspection.

feel to it. One of the nice features about the 800 series is that the windscreens were redesigned, making them more streamlined so it's quiet in the cockpit even at VNE. Our aircraft had a Honeywell SPZ-8000 digital EFIS package but Raytheon also gives you the choice of a Collins avionics suite.

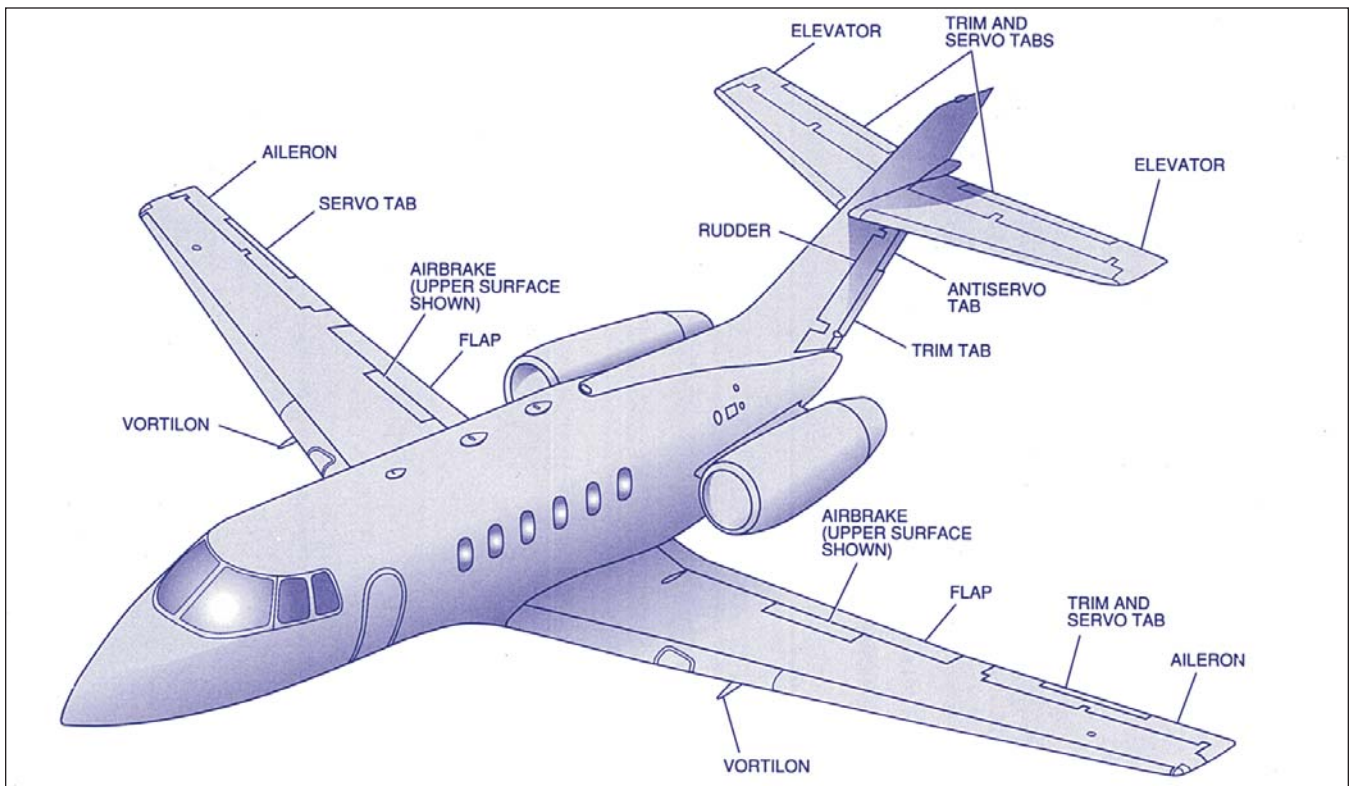
I found the flightdeck easy to get comfortable in—everything was well laid out and seat movement was adequate for any size of per-

son. A few systems and features looked dated but they've always worked well. Raytheon has retained the rams horn yoke, which I kind of like, although it's a bit surprising that a more modern yoke has not been put in.

The emergency hydraulic gear system is hand-pump actuated, which is pretty old technology going back to the DC-3 days. If you need to pump the gear down as a last-ditch effort, there's a handle

stowed behind the first officer's seat to get the gear down and locked. The flaps can be both pumped down and up as well. These systems are all very basic and there's nothing wrong with that.

The various owners of this aircraft program have stayed with some old proven methods of doing things—it keeps things simple but adds a little weight. You can fly this airplane without electricity because whenever you move a handle you're



Compared to the Hawker 800, the 800XP features Hawker 1000 ailerons and trim tab gearing, thrust reversers, digital electronic engine control and the deletion of wing fences in favor of vortilons. Aircraft systems on the Hawker are very straightforward and have manual reversion abilities.



(L-R): Clay Lacy and Dir of Flight Management John Thomas go through the preflight checklist at CCR. Engine starts are a snap thanks to the digital electronic engine computers, which are standard equipment.

actually moving a valve or a cable, unlike the electrical systems on most aircraft today. If you're ever so unlucky as to lose all electrical power, you'll be able to revert to flying this airplane like a Twin Beech.

Overall, the 800XP has the feel of a solidly built airplane both in the front and in the back—everything you touch feels like it's made out of steel. I'd say that this airplane is among the best aircraft today in terms of a solid and substantial feel.

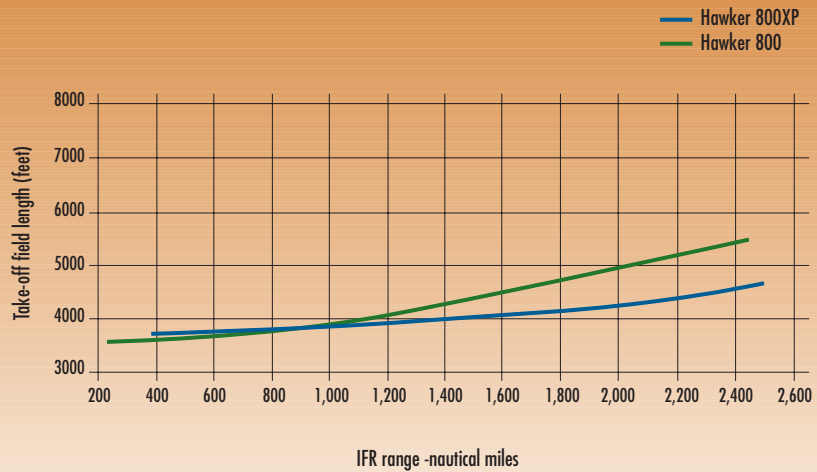
Flying the 800XP

As we taxied out, with Thomas in the right seat and me in the left, I was impressed with the nosewheel steering system—it's excellent and very smooth. The brakes are not assisted, however, so you don't have to worry about finesse when applying them—you can just put them on.

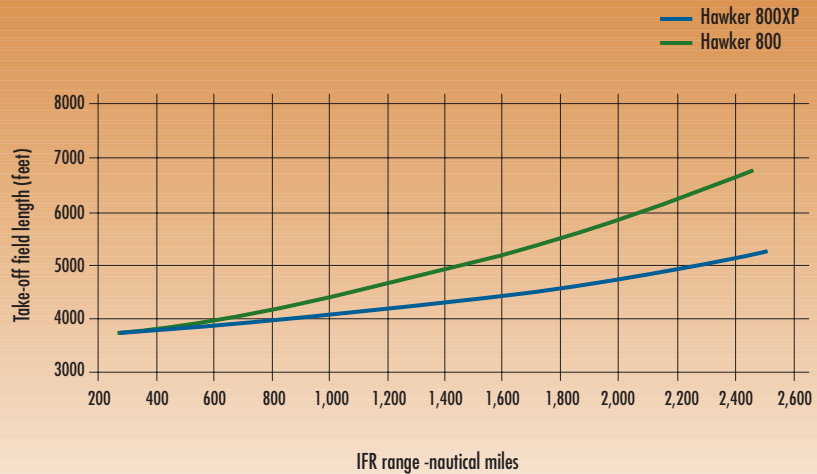
We climbed out at 280 kts to Mach .70, which we held to FL410. Using this enroute climb speed, we reached FL360 fairly quickly but our climb rate slowed quite a bit after that. With a takeoff weight of 26,000 lbs, it took 27 min to reach FL410, where we leveled off and

Takeoff Field Length vs Range Comparison

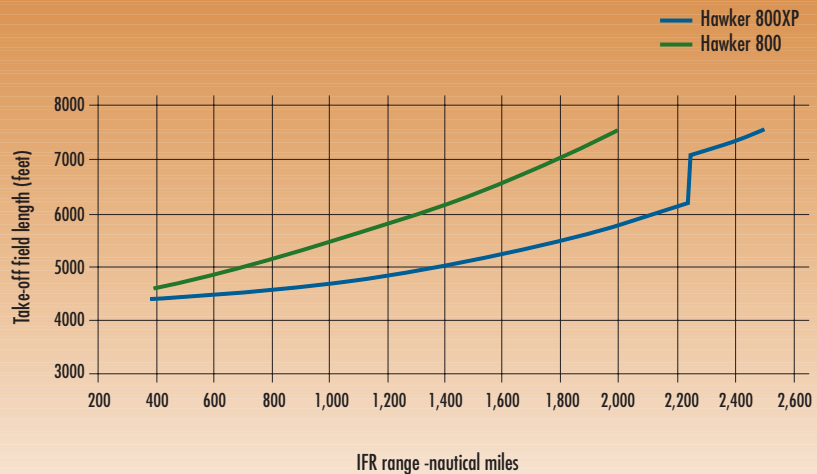
ISA, Sea level



ISA+15, Sea level



ISA+15, 5,000 ft



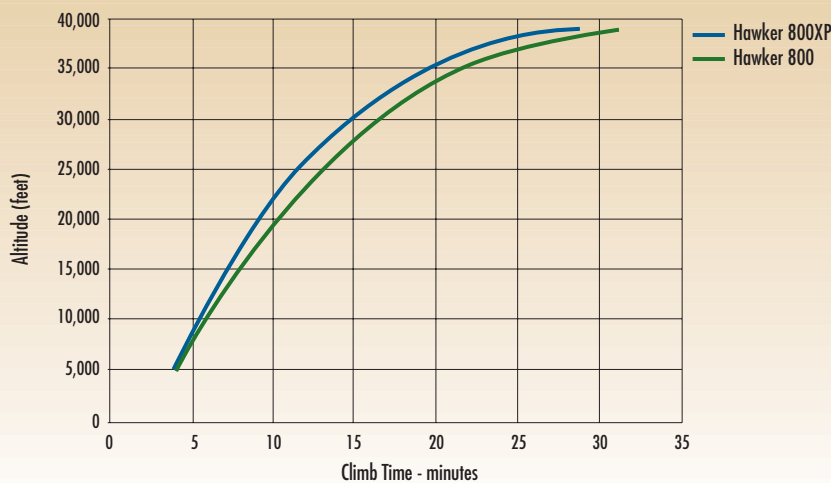
The Hawker 800XP can takeoff and land on shorter runways, making more destinations accessible. Payload capabilities are larger and range has been extended in hot-and-high conditions.



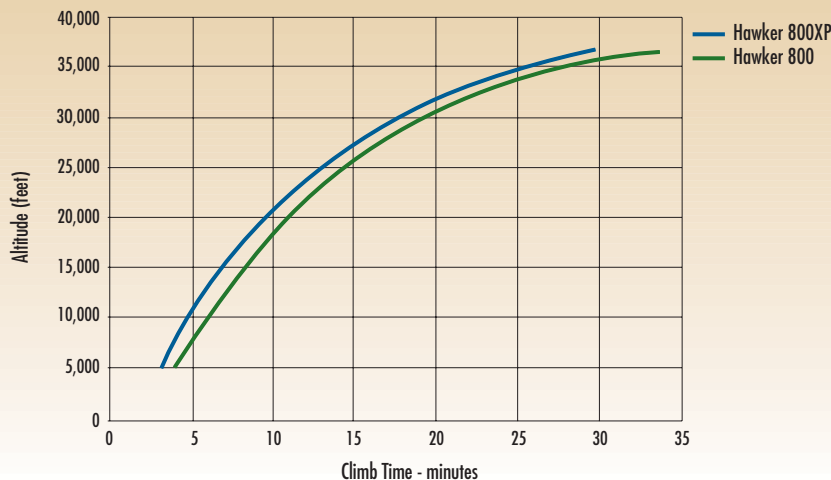
(L-R): Lacy and Thomas logged a number of touch-and-go's at SCK after completing high-altitude work. The distinctive ram-horn yoke is visible in this photo.

Time to Climb Comparisons

Climb Time to Height at Respective Max Take-off Weights, ISA



Climb Time to Height at Respective Max Take-off Weights, ISA+10



AlliedSignal TFE731-5BR turbofans have increased thrust by 720 lbs when compared to the Hawker 800, producing a 23% quicker time-to-climb and the ability to go direct to FL390.

accelerated to Mach .74 using climb power. After reducing power to a fuel flow of 1295 lbs/hour, we settled out at a speed of Mach .72, which is slightly better than the book figure at this fuel flow. Thomas pointed out, and it appeared to be true, that the book numbers are a little conservative. This airplane does at least what the book says and maybe a little more.

At FL410, the airplane was extremely stable with a wide margin between high- and low-speed buffet. I took the yaw damper off and tried to induce Dutch roll but there was practically none. While a yaw damper is nice for passengers it's certainly not necessary on this aircraft since you've got good, safe flight characteristics in all conditions.

After cruising for about 15 min, I entered into a modified emergency descent from FL410 to FL240. Just closing the throttles and pitching over to Mach .79, the decent rate started out at about 5500 fpm and then increased to 10,000 fpm when I deployed the speed brakes. This airplane has a fair amount of aerodynamic drag and you can come down in a hurry, which is a good feature if you ever have to make an emergency descent. The airbrakes are a little different than on most aircraft in that they're true air brakes rather than just lift killing devices.

We leveled out at FL240 and did some 45 and 50 banks. Altitude control is easy. I brought the speed down for some slow flight work and reached stick shaker at 117 kts clean, 109 kts at 15 flaps, 106 kts at 25 flaps and 101 kts at 40 flaps. At the point of stick shaker, the aircraft had excellent aileron control with no sign of wing drop off.

An autopilot approach was made to 200 ft followed by two VFR circuits, landing with 40 of flaps first followed by a 25 flap approach. It is an easy airplane to fly although elevator pressure in the flare gets fairly heavy. The Hawker, like the Gulfstream V, does not have a trimmable stabilizer and I'm a little surprised that any jet is flying around today without a trimmable stabilizer.

We climbed out of SCK and flew the short leg back to CCR. When arriving into CCR, we performed a



Photo courtesy Raytheon Aircraft

With an NBAA IFR range of 2513 nm (with six passengers), the 800XP makes a popular country-hopping transport. San Francisco to Honolulu, New York to Bogota and London to Cairo are easy

360 to lose speed and altitude as I had in mind a landing on Rwy 35 and in fact Rwy 17 was in use. This was a full-stop landing and I had the opportunity to use both the reversers and the flap-dump system. As with all Hawkers, if you pull the speed brake handle back and then raise it up, it dumps the flaps to 75°. This really puts on a lot of drag to help stop the airplane, which is a great feature that worked well on the original Hawkers that did not have reversers. The 800XP is definitely an easy aircraft to land on a 3000-ft

strip.

Systems

The 800XP is basically a DC-powered aircraft with very little AC power requirements. The aircraft has an extremely dependable electrical system with 300 amp generators and two static inverters plus a standby inverter for AC power. A smart feature of the AlliedSignal APU generator is that it is interchangeable with the engine generators. You could pull the APU generator off and put it

on an engine if you're halfway around the world where spares aren't readily available. The APU is approved for in-flight operation up to 30,000 ft and can be started up to 20,000 ft.

While the 800XP does not have a FADEC, the DEEC system works almost like a full FADEC. You push the throttles all the way up and it limits them and once you set climb power, it makes adjustments as you climb. The reversers are a Dee Howard-designed target type, similar to the Learjet 35, and they're extremely reliable.

Cruising Speed

Hawker 800XP/800 maximum speed comparison (KTAS/ISA)

Altitude (ft)	35,000		37,000		39,000		41,000	
Cruise Weight (lb)	800XP	800	800XP	800	800XP	800	800XP	800
22,000	452	446	447	442	441	437	432	425
24,000	449	444	443	438	434	428	419	399
25,000	447	439	440	431	429	408	411	N/A

Cruise speeds on the 800XP are about 10 kts faster than the 800. The performance gains are due mostly to the improved TFE731-5BR engines.

Hawker 800XP Specifications

Price

Basic equipped (\$MIL US) \$10.8

Powerplants (2)

AlliedSignal
TFE731-5BR-1H
turbofans

Total power (SL, ISA) 4660 lb static each

Dimensions

Wingspan (ft)	51.4
Length	51.1
Height	17.0
Cabin length	21.3
Width	6.0
Height	5.8
Volume (cu ft)	604
Normal seating crew/pax	2/8

Weights and loading

Wing loading (lb/sq ft)	74.9
MTOW (lbs)	28,000
Zero fuel weight	18,450
Operating empty weight	16,100
Max payload	2350
Max fuel (lbs)	10,000

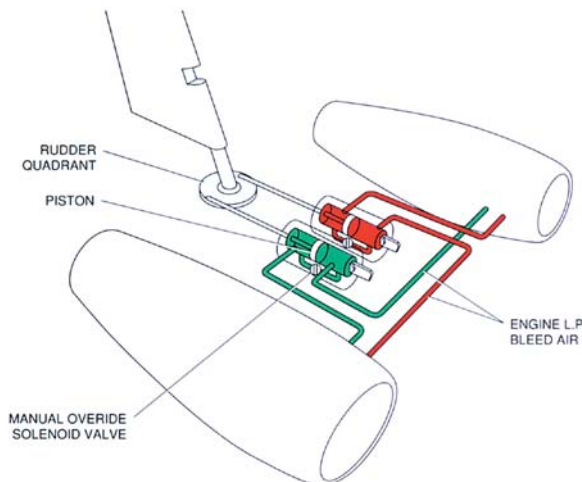
Performance

T/O SL/ISA @MTOW (BFL in ft)	5030
Max rate climb (fpm) all engines	3415
one engine out	862
Certificated ceiling (ft)	41,000
Pressurization Delta P	8.55
Normal cruise (KTAS) @ altitude	443
	37,000
Fuel flow (lb/hr total)	1818
Range (nm) NBAA IFR	2513
M _{MO}	.80
V _{SO}	95
V _{MO}	335

Figures supplied by Raytheon Aircraft.



The owner of the flightcheck aircraft had a Honeywell SPZ-8000 digital EFIS package installed in the aircraft (above). However, purchasers of the Hawker 800XP also have the choice of a Collins avionics suite. The TFE731-5BR-1H turbofan engine (below) provides 4660 lbs of thrust per side and comes standard with thrust reversers.



The nosewheel steering on the Hawker 800XP is considered to be excellent (far L). The tiller is able to turn the nosewheel 45° left or right and a steering disconnect is installed in the torque link. This allows the nosewheel to be turned in any direction for towing. The 800 XP incorporates an innovative rudder-bias system (L) that adds rudder to counteract asymmetric thrust during an engine-out situation. The system incorporates two struts pressurized by engine bleed air and connected between the fuselage and the rudder.



One of the most popular features of the Hawker 800XP is its expansive cabin which, in standard configuration, accommodates eight passengers with a full galley and a walk-in lav.

This airplane uses a TKS anti-ice system that runs fluid out on the wing and can do this continuously for up to 1.5 hours. While it works fine, it's an old system that's uncommon to find on jet aircraft these days. Engine nacelle inlets are deiced with bleed air while the windshields are anti-iced electrically.

Hawkers have always had some unique features and one I like a lot, and I'm surprised more manufacturers don't use it because it works so well, is the rudder bias system that feeds in rudder if you lose an engine, keeping the airplane straight.

I found the flight characteristics of the 800XP to be very good and the performance is a definite improvement over the 800. You can takeoff at MTOW (28,000 lbs)

and climb to FL390 immediately. On a standard day at sea level, you'll need 5030 ft of runway at MTOW. You can operate out of Aspen (ISA+15) at a weight up to 24,000 lbs, which accommodates four passengers and 7000 lbs of fuel. From Toluca, Mexico (ISA+15), you can do a zero-flap takeoff at up to 27,000 lbs, which is very close to MTOW. Berger told me that the 800XP will make the West Coast to Hawaii against 60-kt headwinds—that's nice performance.

More for your money

Operating costs on the 800XP are listed as only \$5 more per hour than the straight 800 but a lot of this has to do with an excellent five-year MSP deal from

AlliedSignal, which runs \$183 an hour for both engines. That's a heck of a good deal and one reason why the 800XP's DOCs are only \$840 per hour.

Raytheon has made some significant improvements to Hawker maintenance schedules to minimize downtime and accommodate high-use operators flying more than 600 hours a year. New progressive maintenance programs minimize downtime. In addition to these new inspection schedules, there's been progress in reducing overall required maintenance.

Berger explained that structural task maintenance alone has been reduced by about 34%. Raytheon is looking at increasing intervals between tasks with the potential of eliminating 150-hour, 6-month, 600-hour/12-month and 1200-hour/24-month inspections to reduce costs of operation by \$30 or more per hour. This is all very positive since operators would like nothing more than to reduce maintenance downtime.

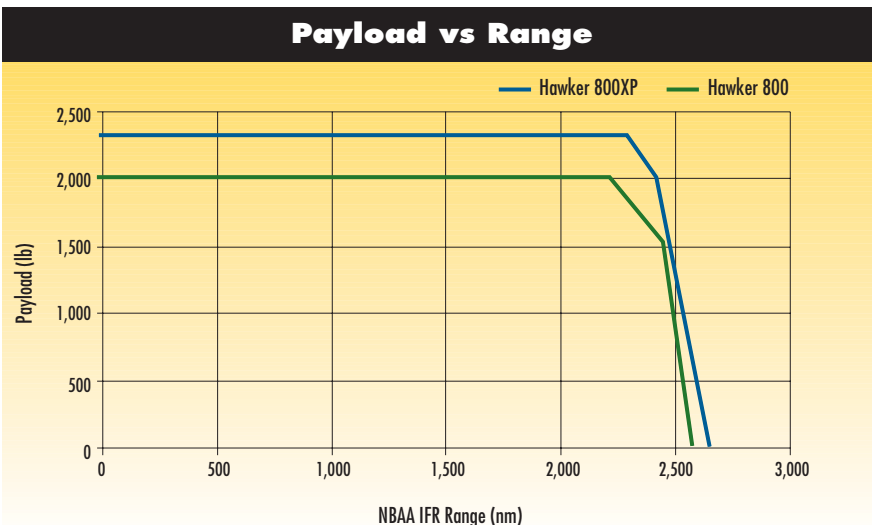
The best Hawker yet

The Hawker 800XP has exceptional handling characteristics overall and offers the best capabilities, and the most bang for your dollar, of any previous Hawker series. Some refer to this airplane as a "gentleman's aircraft" and that's not a bad description because everything about it is comfortable, rugged and proven. And it's always been known among pilots as a good flying aircraft. ✈️

There's nothing that pilots will



dislike about this airplane because it's easy to fly with well laid-out basic technology. While the Hawker 800XP is not a particularly high-performance aircraft, it combines a wonderful cabin with good performance, range and speed. Passengers do love Hawkets and this is probably one of the best mid-



The Hawker 800XP can handle a 2300-nm trip with eight passengers, baggage and full fuel.

size cabin aircraft you can currently buy.

Clay Lacy has more than 46,000 hours of flying experience in various aircraft, including DC-3s, B747-400s and nearly every model of corporate aircraft. His Van Nuys-based facility, Clay Lacy Aviation, is home base for Lacy's charter and managed fleets. His charter operation includes five Gulfstreams and eight Learjets and will soon include a Boeing 727 and a DC-3.