





# 731 Falcon 20

It's got a super midsize cabin, 450-plus knot cruise speed and a sticker south of \$7.5 million. But it's getting harder to maintain.

By Fred George  
Photography by Chris Sorensen

**F**rom its introduction in 1965 until production ceased in the mid-1980s, Dassault's Falcon 20 was a great airplane awaiting suitable engines. That seems to be the consensus of operators of TFE731-powered Falcon 20 aircraft contacted by B/CA for this evaluation.

Starting in March 1989, Garrett Aviation, among other modification centers, began removing the Falcon 20's original General Electric CF700 engines and retrofitting them with 4,500-pound-thrust TFE731-5AR engines in accordance with a Dassault Falcon Jet service bulletin developed in concert with Garrett. The upgrade increased range by nearly 50 percent and at the same time enabled the aircraft to meet FAR Part 36 Stage III noise limits.

But the powerplant change didn't significantly improve every measure. For example, high-altitude climb performance was only marginally better. And hot-and-high takeoff performance provided by the -5AR engines actually fell short of that furnished by the CF700s. In late 1991, the modification was upgraded with 4,750-pound-thrust -5BR engines, substantially improving the 731 Falcon 20's hot-and-high airport numbers, as well as its high-altitude climb and cruise performance.

According to operators, the resulting 731 Falcon 20 is a great engine/airframe combination. Passengers can spread out in a 700-cubic-foot cabin, a space with one-sixth more volume than the next largest midsize aircraft, the Hawker 800. Normal cruise speeds range from 450 to 460 KTAS. Operators say they can fill the tanks, fill the seats and then comfortably fly the aircraft 2,000 nm and land with NBAA IFR reserves. On average work-a-day missions, operators can use airports with 4,000-foot runways.

Want performance and cabin comfort to match the 731 Falcon 20 in a new aircraft?

Plan on spending \$15 million to \$18 million, if you're stepping up into a new super midsize jet.

"It's the fastest, largest cabin, longest-range aircraft with such runway performance for the price," Volker Dempel, Dollar General's chief pilot, tells B/CA.

"It takes the prize for interior volume and passenger comfort," says Hallie McGonigal, flight department manager for J. M. Smuckers. "Besides," she adds, "it's beautiful."

"It's too bad Dassault doesn't still build the aircraft," Rich Aviation's Gordon Czelusta reflects.

"Where else could you find an airplane with this cabin size, speed and range for this price?" asks Donald Kuskie, head of AT&T Broadband's flight department. "It runs circles around anything else in its price range."

Of the 486 Falcon 20C (or "Standard"), D, E and F models Dassault built, Don Sterling, Honeywell's manager of marketing and sales for retrofit programs, says 121 of them have been converted to the 731 Falcon 20 configuration. Most operators tell B/CA they have \$6.5 million to \$8.0 million invested in their 731-powered

Falcon 20s. A few invested as little as \$5 million in their aircraft, but some late model conversions sold for as much as \$11 million with extensive avionics upgrades, new paint and refurbished interiors.

However, demand for the 731 Falcon 20s has slowed in recent years as new, competitive midsize aircraft have become available. In addition, operators are starting to replace their 731 Falcon 20s with aircraft that have larger cabins and longer range, albeit at considerably higher prices. As a result, there were 28 731 Falcon 20s on the market by early this year. And, as a rule, any time there is more than 10 percent of a model fleet for sale, asking prices start to soften, according to Fletcher Aldredge, editor of *Vref Aircraft Value Reference*. With nearly one-quarter of the fleet for sale, this creates the best buyer's market for 731 Falcon 20s in more than a decade.

Does this mean a \$4.5- to \$7.5-million 731 Falcon 20 is a bargain? It can be, according to operators. It also can cost an unwary buyer several hundred thousand dollars in unexpected maintenance, overhaul and repair costs. Some of these hazards can be avoided. Others are inescapa-



The 731 Falcon 20 has ramp appeal. The larger TFE731 engines make the classic Dassault design appear more muscular.





Garrett Aviation

The interiors of most Falcon 20 aircraft are completely redone during the 12- to 16-week engine conversion process, thereby providing Falcon 50EX-class cabin comfort and passenger amenities. Garrett Aviation's Springfield, Ill., facility fitted the aircraft below with high-gloss wood-veneer cabinetry, a completely redone aft lavatory and a space-efficient forward galley with microwave oven.



ble when operating a 20- or 30-year-old business aircraft whose systems were designed in the 1960s.

Here's what operators, suppliers and maintainers told us about how well the 731 Falcon performs its intended mission. They also told us how much it costs to fly, support and maintain.

#### Operator Profile

Most 731 Falcon 20 operators acquired their aircraft five or more years ago, thereby enabling them to gain plenty of experience. A large majority are single-aircraft operators. A dozen operate two or more 731 Falcon 20s. Some have as many as four.

When deciding on the 731 Falcon 20, operators frequently evaluated other mid-size aircraft, such as the Raytheon Hawker 800, Citation III, IAI 1125/1125 SP Astra

and Learjet 60. The decision to stay with or purchase the 731 Falcon 20 boiled down to its having the largest cabin volume, 0.78 to 0.80 Mach cruise speed, full tanks/full seats loading flexibility and nonstop range on most missions.

The average BOW is 18,600 pounds, according to most operators, although a few weigh only 18,100 pounds. Some weigh as much as 19,200 pounds with optional avionics, APU and interior upgrades. Apparently most aircraft can carry full fuel and full seats. The heaviest ones are limited to five to six passengers with full fuel, unless certified for the optional 30,325-pound MTOW. Notably, aircraft with the most elaborate avionics upgrades have the highest BOWs.

B/CA found a large variation in mission profiles, but most operators say their

bread-and-butter missions are 1.5 to 2.0 hours long. The average load factor is three to four passengers. Many operators say they fly 550 to 600 hours per year. This group of operators say their aircraft have high dispatch reliability.

Denver-based Qwest, for example, says it had operated each of its four 731 Falcon 20s as much as 800 hours per year. "We went 29 months without a dispatch delay or failure," flight department manager Steven Bloomed reports. Qwest has since pared down to one 731 Falcon 20 and added other aircraft to its fleet.

"We had only four or five departure cancellations in 11 years of service," says Smuckers' McGonigal.

A second group of operators fly their aircraft 250 to 300 hours per year. Their passenger load factors typically are lower. They report lower dispatch reliability and more maintenance problems, especially ones related to fluid leaks, such as hydraulic power control units.

Most operators say they're comfortable flying their aircraft 2,000 miles, or about five hours, 15 minutes. They also say that Honeywell's range, speed and fuel burn projections are highly accurate, if not conservative. Honeywell claims a 731 Falcon 20F, having a 9,170-pound fuel capacity, has a maximum range of 2,369 nm with NBAA IFR reserves at 0.72 to 0.74 Mach long-range cruise. Most operators, though, fly their aircraft at 0.78 to 0.80 Mach.

When departing at MTOW, the initial cruise altitude is FL 350 to FL 370, and perhaps as high as FL 390 on ISA days. FL 410 is usable when the aircraft weight is 25,000 pounds or less and outside air temperatures are near standard-day, operators say.

Cruising at 0.76 Mach, the first-hour fuel burn is 2,000 pounds, the second-hour burn is 1,500 to 1,650 pounds, and subsequent hourly fuel burns are about 1,450 to 1,550 pph. Fuel burn can be as little as 1,200 pph at 0.72 Mach at FL 410 near the end of the long-range mission.

Pushing up the aircraft to 0.78 to 0.80 Mach cruise, beyond the 0.76 Mach "sweet spot" in the drag curve, the first-hour fuel burn is closer to 2,200 pph, the second hour fuel burn is 1,800 pph, and subsequent hourly fuel burn is 1,500 to 1,600 pph.

Most operators told B/CA they budget \$1,250 to \$1,450 per hour for direct operating costs, but that doesn't include amortization of any annual fixed or long-term capital costs.

When asked to name their five favorite features about the 731 Falcon 20, operators lauded the aircraft's handling characteristics, stable ride — especially through turbulence — dispatch reliability, cabin comfort and low noise levels, cruise speed,





Some operators have chosen Rockwell Collins Pro Line IV avionics, giving their aircraft the appearance and functionality of a new Falcon 50EX.

range and runway performance. Several operators also praised the performance of the optional Honeywell GTC36-150 APU.

Many operators complimentarily described the 731 Falcon 20 as being an "old man's airplane." Dassault's design/build quality also ranked high with operators. "It's a real joy to fly because of the control harmony," Candace Covington, VC Jets LLC's flight department manager, told B/CA

However, topping the list of operators' least-liked features are spare parts availability and cost. Rotable component spares, especially from French manufacturers, are increasingly hard to find. Dassault's stocks of overhauled and exchange parts are drying up, operators say.

Chronic spares shortages have spawned an alternate parts supply market from outside vendors such as Global Trade Group ([www.global-trade.net](http://www.global-trade.net)). The firm, with offices in Portsmouth, N.H., and Coral Springs, Fla., has a \$14-million spares inventory and its own metal fabrication facility, according to Pat Cuiffo, a senior partner at Global.

Smuckers' maintenance chief Mark Kershey also recommends Cosgrove, Corporate Rotable and Supply, and Aviation Materials Management for parts supplies. Kershey claims that most 731 Falcon 20 parts aren't any harder to obtain than those for a Raytheon Hawker 800 or Citation III.

Sparse external baggage room was frequently mentioned as a shortcoming. Add-on aft baggage compartment modifications are available, but they restrict access to maintenance components in the aft equipment bay, operators say.

Aging aircraft issues are another big concern for operators. They're worried that non-rotable parts, such as airframe skins, fluid tubes and structural frames,

may not be available in the future. Many of these components have been out of regular production since the late 1980s. Some replacement parts must be made to order, if they're available at all.

Many operators say Dassault doesn't support the Falcon 20/200 fleet as well as models still in production, even though these aircraft represent one-third of all Falcons built to date.

"Dassault Falcon Jet parts support leaves something to be desired. Sometimes I feel treated like a redheaded stepchild," remarks David Logan, who flies Serial Number 0048, a 1966 Standard model, for Noble Drilling in Houston. "And their parts prices are too damned high," Logan adds, echoing the comments heard from many operators.

To help remedy the chronic Falcon 20/200 airframe parts shortages, in late 2001 Dassault Bordeaux and Dassault Falcon Jet at Little Rock, Ark., moved most tooling for both models to an upgraded DFJ maintenance and overhaul facility at Wilmington, Del. The tools now

have been installed and calibrated. Translation and digital scanning of blueprints is currently in progress. DFJ estimates that its Wilmington facility will start to produce and deliver Falcon 20/200 airframe parts, along with control surfaces, for Falcon 50/2000/900s in the second quarter of this year, thereby increasing inventories.

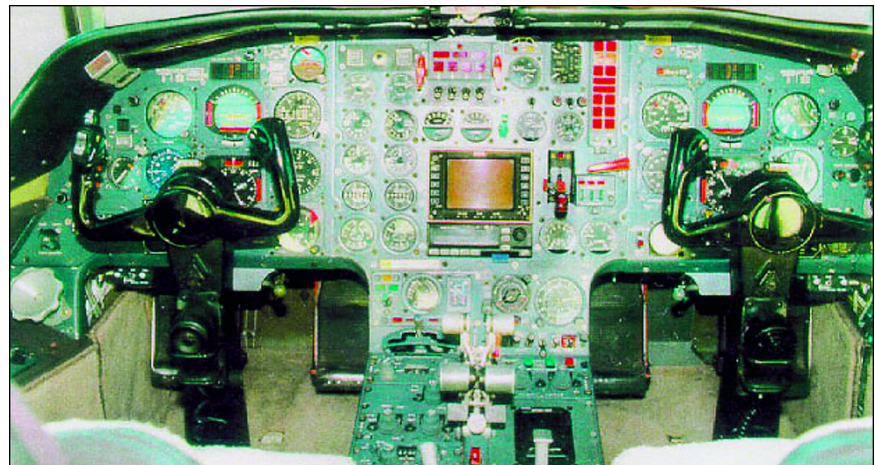
Parts availability and pricing issues, combined with highly sophisticated systems, make the 731 Falcon 20 more expensive to operate than other midsize aircraft, according to operators. But the aircraft's heavy-iron airframe systems, Falcon Jet handling qualities and cabin size also put it into a class by itself, they add.

### Report Card

Operators who fly the aircraft 550 hours per year or more generally give it higher marks than low-utilization operators. "This aircraft loves to be flown and it doesn't like to sit on the ground," comments one. "It has to be exercised regularly," Smuckers' McGonigal advises. "The worst thing you can do to a Falcon is not fly it," observes Honeywell's Sterling.

High-utilization operators generally rate the basic Dassault Falcon 20 airframe as "excellent," with a few "good" ratings. The Honeywell TFE731-5BR turbofan engines received mostly "excellent" ratings, particularly because of their reliability. The -5AR engines also are very reliable, but operators said the -5BR provides much improved runway and high-altitude climb performance. Currently, the base price for the -5BR engine upgrade is \$4.2 million, according to Sam Haycraft, formerly a senior manager with Garrett Aviation's Springfield, Ill., facility.

The optional Honeywell GTCP 36-150 upgrade received high marks, especially when compared to the aircraft's original, optional Microturbo Sapphire or



The original factory "steam gauge" panel offers limited 21st-century airspace capabilities.

Garrett Aviation





The trailing-link main landing gear makes for passenger-pleasing smooth touchdowns. Large rolling stock and wheel brakes provide excellent stopping power.

Sundstrand (nee Solar) T-39 APUs. The GTCP 36-150 installation is approved for inflight operation, thereby enabling operators to boost bleed air availability for heating and cooling. The installation costs \$330,000, Haycraft says. The Microturbo and Solar APUs are not approved for inflight operation, and they produce considerably less bleed air, operators say.

Most airframe systems received at least “good” grades, with some operators awarding “excellent” marks. About one-fourth of the operators surveyed report pressurization bumps on takeoff. Many also complain that the aircraft’s ABG-SEMCA turbo-compressor air cycle machine has mediocre refrigeration performance and costs as much as \$30,000 to repair if it breaks.

Fuel quantity indication problems afflict some aircraft. A handful of operators report fuel, hydraulic and oxygen leaks, particularly if the aircraft sits on the ground for long periods of time. A few operators also complain the aircraft doesn’t have enough oxygen capacity for extended, overwater missions.

Most aircraft had avionics upgrades to complement the engine retrofit. A few aircraft had been fitted with Honeywell (aka AlliedSignal) Bendix EFS10. Operators say these systems are heavy, not particularly reliable and difficult to support. Many aircraft also have been fitted with Honeywell GNS-Xls FMS boxes. Early -Xls production units were plagued with poor reliability. Late model units are much improved, but not flawless, operators tell B/CA.

Later avionics upgrades include Universal Avionics Systems’ UNS-1 series FMS boxes. Most operators give the UNS-1 FMS “excellent,” with a few “good,” ratings.

Rockwell Collins Pro Line I and II radio

packages, with EFS85 or EFS86 and APS85 autopilots, were fitted to many newer 731 Falcon 20s. UNS-1 or GNS-Xls FMS boxes usually were included in the upgrade. The total package costs about \$1.375 million. Operators report “good” or “excellent” performance for these packages, including both FMS options.

Newer upgrade packages include dual digital air data computers, making appropriately equipped aircraft eligible for RVSM certification in accordance with a Dassault Falcon Jet service bulletin.

A few of the latest 731 Falcon 20 aircraft have been fitted with Pro Line IV integrated avionics packages, which can cost as much as \$1.8 million installed. This upgrade gives the aircraft the same appearance and functionality as a Falcon 50EX, including easy RVSM certification.

Overall, operators say the aircraft, engines and avionics are highly reliable, but airframe systems are dated compared to newer Falcon models. Some operators wish Falcon 50/200 systems upgrades were available for their 731 Falcon 20s.

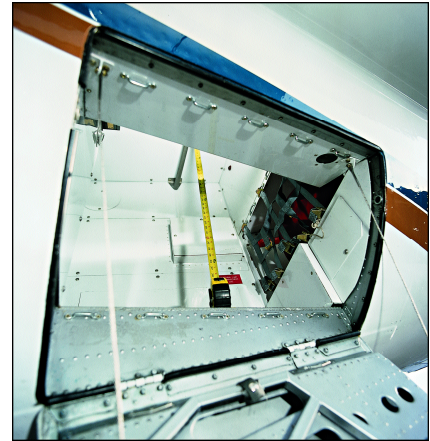
#### Potentially Major Maintenance Expenses, Plus Aging Aircraft Issues

Asked about the top five maintenance issues, operators frequently mentioned corrosion damage as the first concern. This is most commonly detected during certain scheduled maintenance inspections.

Scheduled maintenance for the 731 Falcon 20 is divided into 300-flight-hour/six-month A basic visual inspection, servicing and lubrication checks; 1,200-hour B checks during which operational and functional checks are conducted; 2,400-hour/two-year Z airframe integrity, component attachment and corrosion



Honeywell TFE731-5BR engines are highly reliable, operators reported. Avoid the earlier -5AR engines. They don’t have enough takeoff or high-altitude thrust.



Many 731 Falcon 20 aircraft have been fitted with an STCed aft baggage compartment that shares space with the aft equipment bay.

checks; six-year C checks during which detailed airframe and system inspections are performed; and a 24-year Major Corrosion Inspection (MCI), repeated at subsequent 12-year intervals in accordance with a DGAC airworthiness directive. Dassault also requires a thorough 20,000-cycle/30,000-flight-hour service life extension inspection.

Corrosion damage will be detected most likely during the second C inspection, conducted at 12-year intervals. The 2C check requires removal of bottom wing panels and internal inspection of wing fuel tanks. The 2C “tank and plank” inspection also includes complete disassembly of the cabin interior to check for fuselage corrosion and lubricate control rod linkages.

The flat-rate charge for a basic A check is \$5,000 to \$6,000, and \$6,000 to \$7,000 for the second A check, Haycraft estimates. Every 1,200 flight hours, or two years, Dassault requires an extended A check, known as a 2A+ inspection, typically priced at \$12,000 to \$14,000 at Garrett Aviation and most maintenance facilities. Many operators elect to perform A checks in-house with their own mechanics.

B check flat rates range from \$9,000 to \$13,000, regardless of interval multiple. Similarly, the flat rate for a 24-month Z check is \$19,000 to \$21,000, regardless of multiple. A few operators perform both B and Z checks in-house.

Things start to get expensive with the C checks. The flat rate for the first C check typically is \$45,000. The estimated cost of a 2C “tank and plank” inspection is \$80,000 to \$90,000. Virtually all of these inspections are done by authorized service centers, such as the Garrett-Springfield facility; Garrett’s completed the vast majority of the TFE731 engine conversions.

The MCI, while not as extensive an inspection as the 2C, nonetheless runs





Highly effective thrust reversers decrease landing roll on contaminated runways and save on wheel brake wear.

\$65,000 to \$70,000, according to the flat-rate estimator used by most authorized service centers. Aircraft built before Serial Number 385 were originally constructed with fuselage skins spot-welded to airframe ribs and stringers to save weight, making them especially prone to corrosion. Later model aircraft have chemically milled skins riveted to the airframe substructure, similar to the Falcon 50 and 200, and are much less prone to corrosion.

Operators tell B/CA that the Service Bulletin 701 windshield frame upgrade, known as the Embellisher Modification, is highly desirable. The SB improves access to the individual windshield panels and gets rid of old-style insulation that traps moisture.

Now the kicker. Dassault Falcon Jet insiders tell B/CA to double the flat-rate

cost to account for unscheduled repairs and squawk remedies. Operators tell B/CA they frequently multiply the scheduled maintenance flat rate by 2.5 for budgeting purposes. As a result, a 2C check and an MCI can run \$250,000 to \$350,000 or more.

The landing gear of Falcon 20 aircraft must be overhauled at 12- to 15-year intervals, depending upon part numbers. The procedure is flat rated at \$35,000 to \$50,000 for each main landing gear strut and \$42,000 to \$45,000 for the nose strut. Unscheduled replacement of internal landing gear parts can increase the total cost to \$160,000 to \$180,000.

Other on-condition components also must be periodically replaced. The windshield panels, for example, must be replaced if they become delaminated or if one of the center three electrically heated panels fails a conductivity check. Parts cost alone runs \$7,000 to \$21,000.

Operators advise potential buyers of 731 Falcon 20 aircraft to look closely at scheduled maintenance inspection status and to have a Falcon 20 specialist conduct a comprehensive pre-purchase inspection to avoid running into big bills. One operator, for example, says his company spent \$600,000 on an inspection that had been flat rated at \$100,000.

#### Worth the Investment?

Operators gave the 731 Falcon 20 a conditional thumbs up. "We've just not been able to find a better tradeoff of performance versus capital investment and daily operating costs," Jim Lara, Sea Ray's chief pilot, tells B/CA

"Our experience has been very good and our people, our customers, like the aircraft," says one Midwest operator. Those comments were similar to ones heard from many other operators.

Long-term, though, operators also



The 731 Falcon 20F, having full-span leading-edge slats, offers impressive runway performance, operators said.

## Falcon 20 Standard/D/E/F Model Differences

### 1965 Through 196

#### Falcon 20 Standard:

Asking price.....	\$4.4 million to \$6.7 million
Fuel capacity.....	8,442 lb
MTOW.....	26,450 lb
Partial-span slats	
Over-the-wing refueling	

### 1969 Through 1970 Falcon 20D:

Asking price.....	\$5.7 million
Fuel capacity.....	8,978 lb
MTOW.....	27,337 lb
Partial-span slats	
Over-the-wing refueling	

### 1971 Through 1975 Falcon 20E:

Asking price.....	N/A (No aircraft currently offered for resale)
Fuel capacity.....	8,978 lb
MTOW.....	28,660 lb
Partial-span slats	
Over-the-wing refueling	

### 1971 Through 1984 Falcon 20F:

Asking price.....	\$5.9 million to \$7.0 million
Fuel capacity.....	9,246 lb
MTOW.....	29,100 lb
Full-span slats	
Single-point pressure refueling	

express concern about support, parts availability and parts pricing. Dassault's product support received mixed reviews from operators, but DFJ is taking positive steps toward improving parts supplies. Honeywell received high marks for supporting the engine and APU, but operators says the high reliability of the TFE731 engines makes Honeywell's support job easy.

Global Trade Group and other second-tier suppliers help supplement parts supply from DFJ and airframe system component manufacturers.

Some operators also point out that the 731 Falcon 20's hot-and-high takeoff and second-segment climb performance is more restrictive than that of newer midsize aircraft. And the aircraft definitely needs more external baggage volume, according to a half-dozen operators.

All in all, though, operators believe their aircraft offer the largest and quietest cabin, the best performance, the nicest handling and the highest quality of any midsize aircraft priced under \$8 million.

They also concede the 731 Falcon 20 has a considerable intangible advantage. "It just looks great on the ramp," several operators say. With resale prices currently depressed to the lowest levels in a decade, buying and operating 731 Falcon 20 aircraft could prove to be quite a bargain — if prospective operators conduct rigorous pre-purchase inspections. B/CA