

perator Survey: Challenger 601-3A

Canadair Challenger quality and support are improving after a rocky start, according to fleet operators.

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Gertrude Stein's much-quoted phrase, "A rose is a rose is a rose . . ." is regularly disproved in this age of accelerated technology. And corporate flight operations managers who continue to view the Canadair Challenger 601-3A as simply a matured counterpart of its CL-600 forerunner have a lot of learning to do, according to operators of the current wide-body, executive turboprop.

Despite the family resemblance in size and form, few similarities exist in sophistication, reliability and general operator satisfaction between the Challenger 600 and the Challenger 601-3A, contend those who have experienced both.

When its development was publicly disclosed in the late 1970s, Canadair's first venture into business jets was heralded as the ultimate in long-range corporate travel comfort and convenience—an aircraft designed, engineered and built to the most exacting air transport category standards, with ample room for up to 19 passengers. A healthy backlog of orders therefore existed when the CL-600, powered by two 7,500-pound-thrust Textron Lycoming ALF 502 engines, was certificated in late 1980. The winglet-equipped Challenger CL-601, with 8,650-pound-thrust General Electric

CF-34 turbofans, succeeded the Model 600 in late February 1983 and the Model 601-3A, the upgraded CF-34-3A engines of which each provide 9,140 pounds of thrust with automatic power reserve, was certificated in April 1987.

The most recent version incorporates a glass cockpit, fully integrated flight guidance and flight management systems, and engines flat rated to 21°C for improved climb and hot-day performance. Extended range, increased weight options and other customer-desired advancements round out the package. With an executive payload of more than 1,800 pounds, a 4,443-fpm rate of climb, 0.835 Mach redline and an advertised 3,430-nm range with five passengers and IFR reserves, the 601-3A is regarded by many as unsurpassed in its weight and price class.

QUIET COMFORT

B/CA surveyed nearly half the users of some 55 Challenger 601-3As now in civil operation in North America. Our inquiries revealed that the roominess, quiet and overall comfort of the passenger cabin and flight deck were perhaps the most telling initial points of attraction

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to the aircraft. Among the vast majority of those operators, though, the quality of product support provided by Canadair has contributed strongly to owner satisfaction. Virtually all survey respondents, in fact, cited support of the Challenger 601-3A as the best they have experienced from any manufacturer. And an unprecedented number of operators listed product support as the feature best-liked about the airplane.

Some respondents dated the beginning of that exemplary support to the acquisition of Canadair by Bombardier a few years ago. Most, however, felt that the subsidiary marketing element—Canadair Challenger, Incorporated, located in Windsor, Connecticut—has played a major role in establishing a network of exceptionally well regarded technical representatives over a longer period of time.

The age of the individual aircraft and length of time operated by the present user appeared to have little influence on the consensus toward product support. Experience with the 601-3A among those interviewed ranged from three months to nearly four years, with an average of just over two years. Annual utilization rates ran from a low of 250 hours to a high of more than 1,000. The majority clustered near the 509-hour-a-year average for the group as a whole.

Average trip stage lengths spanned distances from 350 to 1,500 nm, with a group average of 772 nm and average load factors of 4.17 in passenger compartments most commonly configured for nine, 10 or 12 seats. Nearly 75 percent of those contacted indicated that their Challengers are employed for international as well as domestic flights. Two operators reported that more than 25 percent of their activity is on overseas missions.

Conversely, few operators placed a practical minimum stage length on the airplane. Several, in fact, listed as one of the Model 3A's chief attributes its ability to perform trips of 100 nm or less from strips as short as 3,800 feet and from high/hot-field elevations with negligible penalty in fuel consumption or payload. Yet there was relative uniformity among survey respondents that they plan fuel burns on the order of 2,700 to 3,000 pounds for the first hour of flight, 2,000 to 2,200 pounds the second hour, and further reductions to as little as 1,600 pounds for the fifth and subsequent hours. Three operators who keep precise records of block fuel burn reported total usage over the past year of 2,317, 2,512 and 2,525 pounds per hour respectively.

Likewise, typical cruise speeds and altitudes reported were remarkably similar among members of our survey group. Most reported that the Challenger 601-3A will reach FL 370 to FL 390 at virtually any weight in 20 to 25 minutes without step climbing. And Mach 0.78 to 0.80 seemed to be the norm for most domestic opera-

tions. For transoceanic trips, 0.74 Mach to 0.77 Mach was preferred—at FL 410 when possible—to ensure coverage of the 2,600- to 3,200-nm, or 7.5- to 8.3-hour maximum range, which many operators have set as their "mental comfort" limit.

Concern over physical comfort in the 601-3A is hardly more limiting. Several pilots remarked that the spacious, quiet environment in the aircraft along with its smooth handling characteristics permit both passengers and crew to emerge from flights of six hours or more with little or no travel-induced fatigue.

Indeed, emphasis on comfort, good visibility and quietness as the most liked features of the Challenger 601-3A revealed a facet not usually brought out in B/CA aircraft-user surveys. Most frequently, comments offered by flightcrew and maintenance personnel are focused on operational aspects of most direct concern to those individuals in their workaday activities. In the case of the Challenger 601-3A, at least equal consideration was given to what flight department personnel knew or believed to be the opinions of their passengers. For that reason, the aircraft was depicted as the optimum executive passenger transport vehicle despite wide-ranging differences of opinion related to its handling characteristics and performance of maintenance functions.

The most negative comments made with respect to the 601-3A's passenger comfort and convenience features were that the large entry door is ill-equipped to protect passengers and entry-way carpeting when the aircraft is being boarded during rain and that the airstair may be too steeply inclined for children or for women wearing high heels.

"INCOMPARABLE" AIRCRAFT

Of the survey sample, a substantial number either had operated or continued to operate earlier Challenger models. Those individuals claim the 601-3A by comparison represents not just an improvement, but a markedly different product from its predecessors in terms of reliability and handling characteristics.

Diversity of opinion on handling qualities was wide and perhaps related to two factors: (1) the aircraft with which pilots had previous experience and (2) their ability and willingness to absorb and employ effectively the full capabilities of the Challenger 601-3A.

For example, a few pilots commented adversely on the aircraft's crosswind landing characteristics, but a greater number felt that the Challenger was more stable in crosswind conditions than most of its large empenage competitors. Generally, they attributed problems in that area to pilot technique. Several also noted that the airplane's comparative nosedown pitch attitude on landing approach can be disconcerting to the novice,

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but can quickly be adapted to as one of the distinct traits almost any airplane will display.

In fact, to compare the Challenger 601-3A handling "feel", which generally was rated from good to excellent by all those interviewed, to that of previously flown aircraft is difficult to do, it was agreed. At least three operators voiced the opinion that pilots transitioning from Learjets into the Model 3A perhaps encounter the fewest problems or surprises because, despite its comparatively great bulk, the Challenger is as responsive and maneuverable as its Bombardier-owned Learjet stablemates.

A former company pilot for a major airframe manufacturer disclosed that he is often asked how the Challenger 601-3A compares to the Lockheed Jet Star he captained for several years. "I have to tell those people that there is no way to compare the two," he said. "The only aircraft I have flown that the -3A can be compared to is the Lockheed C-5A because they both have large cockpits with good visibility, high-bypass fan engines, all AC electrical systems, full-power-controlled hydraulic system and other features that are more similar to those of a big airplane than to conventional business jets."

RIDING THE TECHNOLOGICAL WAVE

What he and several other pilots said they like least about the Model 3A is its technical complexity. "It's a state-of-the-art airplane," he said. "There are so many electronic control circuits in every system—the computers, the proximity switches and all—that are imposed between the pilot and the system itself. Those are the things that can cause one grief." Several other operators echoed the belief that the sophisticated automation of the Challenger 601-3A, with its multiple-redundancy features, is a mixed blessing. While it may enhance the performance, safety and reliability of the airplane, it underscores the need for new approaches to training and creation of confidence in automatic functions. For, as even the most critical of those interviewed agreed, the 601-3A's complexity is probably but a preview to a technological wave to which all who are interested in aviation careers must adapt. Perceptions of system complexities were suspected of being the cause behind the unprecedented number of "gremlin" reports—apparently self healing anomalies or malfunctions typically associated with avionics that did not repeat themselves during subsequent inspections, tests or operation—we encountered during our research.

Responding to this, Canadair officials acknowledged culpability of themselves and their contract training organization in failing to appreciate, from an operational viewpoint, the immensity and ramifications of advancements in this latest Canadair business aviation offering. Consequently, even though they are recog-

nized as catch-up steps, extensive training efforts reportedly have been launched by Canadair and some of its Challenger vendors to help operators more fully learn and enjoy the airplane's total capabilities.

This apparent malaise over the 601-3A's sophistication was not the leading criticism, however. A number of pilots deplored the airplane's 41,000-foot certificat-

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ed service ceiling, contending that the aircraft has sufficient power to operate more efficiently at FL 430 or 450. But most apparently recognize that the limit is dictated by pressurization requirements associated with engine rotorburst containment, and so few are optimistic that it will be altered for the 601-3A.

Less frequently mentioned concerns related to aircraft porpoising, engine vibration and turbine blade failure EFIS tube failure, lack of adequate support on air-driven generator problems and proximity of approved service centers

One operator in particular expressed concern that relocation of Canadair's Long Beach, California service facility to Bombardier's Tucson, Arizona complex might place Challenger operators on a lower priority for service than their more numerous Learjet operating counterparts. According to

Canadair officials, though, Challenger aircraft will be outfitted and serviced at Tucson by dedicated maintenance and repair crews in a facility completely separate from that of Learjet activity. Enhancement rather than diminution of support is thus projected by Canadair.

MAINTAINING THE MODEL 3A

Maintenance-wise, the majority of those interviewed reported that the Challenger 601-3A is a relatively easy airplane to work on, with ready access to systems and critical components. Some six maintenance chiefs and supervisors who took part in B/CA's survey pointed out, though, that the overall maintenance burden may be greater than many had anticipated. That is because it is simply a larger airplane than most corporate aircraft maintenance crews are accustomed to attending

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and because the volume of paperwork, along with prescribed inspections and repair procedures, amount to "overkill," in the opinions of a few.

Particular problems reported on the maintenance side included difficulties with the optional extended-range tail fuel tank; fuel system leaks and venting spillage; windshield deterioration and failure, as well as cockpit side-window cracking; misidentification of some parts received through Canadair's fixed-fee "Smart Parts" program; brake noise, overheating and valve failures; hydraulic pump and aileron control power unit leakage; air cycle machine failures; and replacement of air-driven generators.

The most commonly heard complaints from maintenance personnel, however were that service bulletins frequently are received before corrective kits are available, and that SBs too often are issued before a final fix is developed for a specific problem.

Canadair Challenger's product support division noted that because Canadair uses only alert wires and service bulletins to issue maintenance information, the paperwork may appear to be unusually great to those not familiar with that method of operation. Since its inception, there have been four ADs (three airframe, one engine) and 65 recommended SBs issued for the 601-3A, it was disclosed.

Only one of the 47 aircraft in which the optional tail tank has been installed has experienced what Canadair considers significant problems. Fuel seepage has occurred in others, but replacement of packing or faulty components has cured that, the company claimed. Two alert wires dealing with the potential for tail tank line damage were issued, one of which became an AD, but SBs are being issued to relocate and modify the lines.

Both windshields and air cycle machines in early Challenger 601-3As failed to achieve the lives expected, it was admitted. Time between removal of later windshields seems to be improved fleet-wide, however, and an SB is available that, if followed, allegedly will prevent icing on the air cycle machine turbine assembly, thereby increasing turbine life, Canadair said.

With regard to the fuel system- which at least two operators described as archaic, but which Canadair contends was designed to latest concepts to minimize

pilot workload-modifications reportedly have cured leakage problems. SBs dealing with venting or spillage also were said to be widely incorporated through the fleet and seem to have solved those difficulties, it was reported.

Brake complaints, which were among the more frequent voiced by flight and maintenance personnel alike during the survey, have been largely overcome by modifications and testing procedures that already are in the field, Canadair believes. As far as brake pedal stiffness, mentioned by a few operators, one individual disclosed that he had overcome the problem by the application of automotive motor oil to the push-rod ends at regular intervals. The same operator revealed that every pilot in his department who is assigned to -3A flightcrew duty receives special training in braking procedures.

Engine fan bushing migration was found to be the cause of abnormal vibration, but a GE service bulletin reportedly addresses and corrects that concern. To alleviate the potential for turbine blade failure (although Canadair claims there has never been an inflight shutdown as a result of blade failure), modified blades currently are being introduced to the fleet, the manufacturer disclosed.

Canadair also revealed that it is working with the vendor on improvements to overcome paint-marring hydraulic leaks. Also, to correct aileron power control leakage, a new seal is being tested. With regard to reports of the aircraft porpoising while on autopilot during certain flight conditions, an SB that directs linkage of the digital autopilot to both elevators rather than one appears to have silenced the complaint, Canadair said.

It must be remembered, several Challenger 601-3A operators pointed out, that the aircraft still is relatively young. Ongoing product improvements make it obvious to them the manufacturer is listening to what pilots and maintenance technicians have to say about the airplane and its limitations, they believe.

Most telling, though, was that when asked if they could select any available aircraft for their present mission requirements- regardless of price- the overwhelming response was the Challenger 601-3A. **B/CA**