THE D-JET FLYER
ISSUE 2, SEPTEMBER 2007

D-JET S/N 002 First Flight!

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Following its roll out on July 20th, 2007, D-JET S/N002 made its first flight on September 14th. D-JET S/N002 represents a very significant milestone for the program. It is the first D-JET conforming in aerodynamic and structural design. After a short development flight test program, we will use it to start the systematic completion of the series of certification flight tests. This test program will demonstrate that the type design complies with the applicable airworthiness requirements and is eligible for issue of a Type Certificate – and ultimately delivery to you, our valued customers.

D-JET S/N002 first flight

It is often said that the last 10% of the job takes 90% of the time, and while an obvious exaggeration, it sometimes actually seemed like this as we prepared S/N002 for first flight. There were the completion of open work, the repeated inspections, structural tests, control system function and loading tests, ground vibration testing, electric system power-on, avionics checkout, getting all the computers to talk to each other – and in the same language, countless system function tests, gear swings, hydraulic system tests, emergency egress function tests, fuel system calibration, weight and balance, ground runs, general debugging and installation of flight test equipment. This is where the skill, dedication and experience of the Diamond group and our partners shone. Many late nights, some missed anniversaries and birthdays, but in the end, it's all worth it. Thank You and Congratulations to everyone involved.

In this issue of the D-JET Flyer, you will find impressions of my first D-JET flight, Daniel Ribeiro's report on first flight of D-JET S/N002, technical discussions including our choice of engine location and how V-Strakes work, general D-JET Program updates and lots of great new photos.

We trust you will enjoy this issue of the D-JET Flyer – If you haven't yet registered for periodic e-mail or hardcopy updates, please do so at www.diamondair.com/djetflyer. We look forward to telling you more about the very exciting D-JET and keeping you updated on the program as we progress toward customer deliveries.
As always, we appreciate your feedback and FAQ's, so please contact us at D-JETsales@diamondair.com

Peter Maurer
President

THE D-JET FLYER
ISSUE 2, SEPTEMBER 2007

D-JET Pireps

002 First Flight

On September 14, D-JET S/N002 made its first flight, following a comprehensive ground test program and high speed taxi tests the previous day. The flight was conducted by Daniel Ribeiro, Diamond's Chief Test Pilot. Upon returning from the 43 minute flight to 11,0000 ft, and including gear retraction, Daniel reported:

"During 43 minutes of flight, we checked systems and handling. Airplane handling was as anticipated, with the expected improvements based on the experience with S/N001 being evident. Flight controls were smooth, with good harmony and light forces. Engine behavior was as expected, with stable performance during accelerations and decelerations. All installed systems worked as planned, and landing gear was retracted during climb out to the test area. Maximum altitude achieved during the flight was 11,000 ft."

"Congratulations to the Diamond D-JET team for the hard and good work making this airplane safe and pleasant to fly," he added. "We will now continue the flight test program with progressive expansion of the envelope".

D-JET S/N002 taxis out for first flight

D-JET S/N001 flying chase for S/N002

S/N002 first flight September 14, 2007

Daniel Ribeiro debriefing after S/N002 first flight

THE D-JET FLYER
ISSUE 2, SEPTEMBER 2007

D-JET Pireps (continued)

First impressions – Peter Maurer reports on flying S/N001

This job comes with its share of headaches, but it does have some perks! One of these is that I finally had an opportunity to get a taste of what D-JET flying is all about. I thoroughly enjoyed the flight with our chief test pilot Daniel Ribeiro, in S/N001, not just because of the actual flight, but because I got to see our Flight Test Group in action, which was a great confidence builder for me, considering the many certification flight test hours yet ahead of us.

Peter Maurer and Daniel Ribero with D-JET S/N001

Our planned flight to FL250 was capped at 10,000' due to a lingering ear infection, which I was advised would be most unpleasant in case a rapid descent was required. I deferred to better judgment, somewhat disappointed, but better a low flight than no flight. S/N001 is operated without pressurization and with emergency egress provisions that, when activated, quickly pull the pilot and copilot seats aft into position for exit through the jettisonable main door. Contemplating the need to explain any such action to Christian Dries quickly banished any such thoughts from my mind. All current flights are conducted with Flightsuit, Helmet, Oxygenmask, Parachute and MaeWest. The Weight and Balance very kindly had me at 255 lbs suited up – these guys are not just professionals, they are diplomats as well!

After the obligatory egress practice, that initially didn't go quite as smoothly for me as I would have expected and thereby highlighting the value of training, we were ready for the preflight brief and flight.

In the cockpit, I felt somewhat insulated in all the flight gear, however quickly forgot about it as Daniel put me to work, acting as his automated checklist. Engine start was dead simple. The whine of the starter-generator, the ticking of the igniters, followed by the whoosh of combustion as the FADEC commanded fuel injection and the rapid engine spool up reminded me of my days at Eurocopter. As nice as the propeller planes are, there is no comparison to the ritual and sensation of starting a turbine. Compared to the mechanical fuel-control units that require close attention, quick thinking and decisive action to avoid overtemping, the FJ33's FADEC made engine start not much more complicated than starting your car.

The relatively high seating position and visibility from the cockpit made for easy taxiing. Although we were near gross weight with high OAT's, the acceleration to Vr + 10 kts (85 kts) was smooth and brisk with initial climb rate over 2000 fpm. The immediate and overwhelming sensation was the complete absence of vibration and utter smoothness as we continued the climb and we were quickly at much higher altitude over Fanshawe Lake to the north of London's Runway 33, than I'm normally used to. After climbing to 10,000' and entering Diamond's usual flight test area to the northwest, Daniel let me try the controls at low and high speeds with gear and flaps extended and retracted to get a feel for the basic handling of the aircraft, which was best described as uneventful – the way it should be.

D-JET Pireps (continued)

Two items that I noted specifically were a lack of sensation of change of speed due to the smoothness of the turbine, and much more noticeable acceleration upon pushing the throttles forward from low airspeed. We flew some simulated approaches and then, demonstrating climb performance in relation to glide performance, Daniel demonstrated a turn back maneuver after simulated engine failure on take-off. Climbing at T/O thrust and configured for climb with the gear retracted, the engine is idled and a teardrop maneuver is initiated. Without exceeding 45 degree bank angle, first to the right and then to the left, Daniel brought the aircraft around to reciprocal heading and configured for landing with a loss of only 700 feet altitude.

D-JET S/N001 in flight

While the conventional wisdom in case of power loss after take-off in a single engine propeller airplane is to land straight ahead, this does not consider the high climb performance, low speed maneuverability and high glide ratio of the D-JET. This procedure will be something that we will be discussing extensively with Transport Canada and the FAA. We believe it is a good safety exercise and would like to see it included as part of the Type Rating training. In practical terms, this means that the high risk exposure window associated with engine failure at take-off is extremely low, even compared to conventional twins, with the added advantage of no adverse asymmetric thrust in case of engine failure. Coupled with the high reliability of a turbofan and the FADEC engine controller that can annunciate many abnormalities prior to them leading to powerloss, this will result in a very high overall level of safety for D-JET owners.

All too quickly the flight was over and it was time to return to YXU. Daniel demonstrated a full ILS approach and unfortunately due to traffic in the pattern we were not cleared to do the actual turn back maneuver that we had planned. The visibility on approach was superb, the attitude of the airplane on approach made for good visual references and the slow approach speed made the entire approach and landing very manageable with low workload. We taxied back to our flight test hangar and after photos and debrief, it was back to the "real world" for me.

Thinking back to the flight, the main impressions were the generous cabin space, even with my helmeted 6'3" frame and "255 lbs" suited up weight, the system simplicity, the low rotation and approach speeds, the performance, the smoothness and lack of vibration, the unobstructed visibility forward – and that great jet sound! I can't wait to fly in the final configuration airplane with pressurization and full interior – more than ever I am convinced that the D-JET is the best personal jet concept on the market and we look forward to delivering yours.

THE D-JET FLYER
ISSUE 2, SEPTEMBER 2007

Program Update

S/N003 Build Status

We are progressing well on the assembly of S/N003. All major structural components for both the fuselage and wing components have been laid up. The fuselage is ready to be closed and our team is beginning to assemble the wing.

In addition to composite parts, our suppliers have been working hard to deliver components for S/N003 and other certification aircraft. Major suppliers include not only Williams International and Garmin, but many others with whom we have been working closely throughout the development phase. Over the next few issues of the D-JET Flyer, we will profile some of our vendors so you can see what an outstanding group of partners we are working with.

S/N003 fuselage shells being bonded in the mold

Almost all of the materials and equipment for S/N003 is in house or due in the next few weeks in support of our assembly sequence. Long lead items for the follow on aircraft are on order with many parts already delivered.

Certification Aircraft

Each of the aircraft planned for use in our Flight Test and Certification program have specific goals in support of the overall D-JET program. Each test aircraft will build on the previous one with progressively more equipment and systems installed.

- S/N002 will be used primarily for aerodynamics and performance testing. Our flight test team will use S/N002 to fully explore the flight envelope and validate our performance goals. Their feedback will also be used to make any minor adjustments to ensure that we achieve our goal of an easy to fly aircraft.
- S/N003 is designated as our Powerplant and Systems aircraft. We will use this aircraft to finalize development and certify our powerplant and fuel system installations as well as other aircraft systems such cabin pressurization, de-icing, air conditioning and landing gear.
- S/N004 will be used for avionics/electrical system and autopilot development and certification.
- S/N005 will have a full production quality interior and be used for ergonomics, ice shapes testing, as well as function and reliability testing.

In addition to our flying test aircraft we will be assembling test articles for load and fatigue testing.

Program Update (continued)

Production Quality Tooling

A key feature of the D-JET Program is our early decision to invest in production quality tooling during the development and certification phase. Our confidence in the design work done early in the program, including our intensive analytical and testing program, lead us to view this as a low risk approach. Diamond elected to do this for several reasons including:

- **Development time** – our investment in this quality of tooling shortens the cycle between design, tool design and part assembly. We are avoiding repeating the cycle when acquiring production quality tools and fixtures.
- **Production ramp up** – the lessons learned during R&D and prototype manufacture will facilitate a more effective transition to production.
- **Conformity** – as part of certification testing, it is critical that the test articles conform to the later production aircraft. High quality prototype manufacture and assembly tooling ensure this.

Wing assembly fixture with S/N003 wing spar

THE D-JET FLYER
ISSUE 2, SEPTEMBER 2007

F.A.Q.'s

With the ever increasing popularity of the D-JET, we get more and more frequently asked questions that we think are of interest to a wide group of readers. With each issue of the D-JET Flyer we will select some questions and get our experts to answer them. Submit your questions to D-JETfaqs@diamondair.com and win a D-JET baseball cap if we use your question. We'll also compile the questions on the D-JET website.

FAQ 001

I noticed that the D-JET has grown downward slanted fins on the rear fuselage, as seen on many Learjets. What exactly are they for and how do they work? *Dave Forwell, Ontario*

The fixed ventral fins on the lower rear fuselage of the D-JET are commonly referred to as 'V-Strakes' or 'Ventral Fins'. They are designed to prevent the aircraft from entering a deep-stall at certain flap and center of gravity combinations.

D-JET S/N001 taxiing out to flight test Ventral Strakes

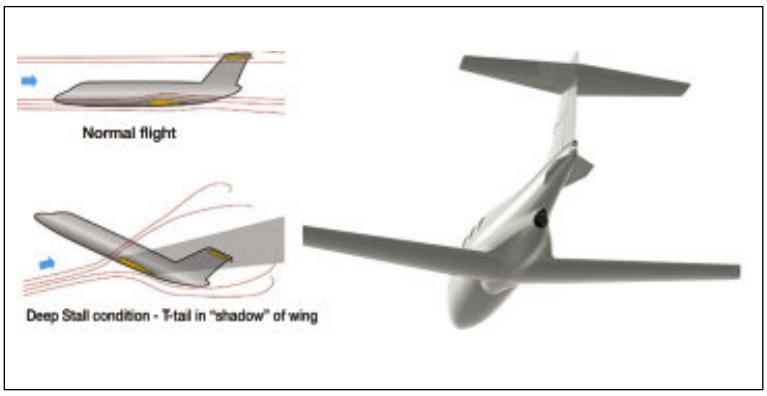
A deep-stall is a post stall phenomenon that occurs when the low energy wake of the stalled main wing blankets the horizontal stabilizer, reducing the elevator effectiveness and preventing a recovery from the stall. A deep-stall is a stable, wings level flight condition, characterized by a very high angle of attack and a high rate of descent. Although predominantly an effect seen with T-Tail configurations, experience has shown that deep stall can also be found for some Mid-tail and V-tail configurations.

The ventral fins are placed low and aft on the fuselage, such that in normal flight they are aligned with the airflow, but at high angles of attack, these fins are now below the wake of the stalled wing and in clean air. The lift that these triangular fins generate at high angles of attack raises the tail – thereby lowering the nose of the aircraft and preventing deep stall.

Ventral fins also increase directional stability. The optimum size, position and orientation for the ventral fins are found from a combination of Computational Fluid Dynamics (see D-JET Flyer Issue 1) and Wind Tunnel testing, with final finetuning done by actual flight test.

THE D-JET FLYER
ISSUE 2, SEPTEMBER 2007

F.A.Q.'s (continued)



How they work. In a "Deep Stall" pitch control can be lost because the wash from the wing can blank the horizontal stabilizer and elevator. V-strakes are in clean air and will force the nose down until pitch authority is regained or prevent the high angle of attack to begin with.

Optimizing planform and orientation angle in the windtunnel.

High Angle of Attack testing in Vertical Windtunnel. In this tunnel, the air flows from the bottom to the top.

F.A.Q.'s (continued)

FAQ 002

There are so many different engine configurations when it comes to the new single engine jets. What are the differences and why is the D-JET engine located where it is? *Graham Gurney, New York*

A conventional twin turbofan with nacelle mounted engines makes life easy for the engine installation engineers. By contrast, a single engine jet represents some unique challenges, regardless of configuration. The upside of course is simpler operation, lower acquisition cost and lower operating cost. The main requirements that the engineers are trying to balance are the engine thrustline, engine intake and exhaust ducting requirements, induction ice protection, rotorburst protection, and accessibility.

Thrustline – ideally, the thrustline should be roughly in line with the airplane cg and slightly downward tilted. Mounting the engine above the fuselage like the PiperJet or Eclipse ECJ results in a nose down pitching moment which may require a compensating system such as Piper's automatic stabilizer that pitches the nose up with increasing thrust. One of the design targets for the D-JET was system simplicity and this effectively ruled out coupling pitch control to varying thrust levels.

Engine Intake and Exhaust Ducting Requirements – The easiest solution is a pod mounted engine, like on a conventional twin jet. However with a single engine mounted on aircraft centerline, the intake air has to somehow get around the people and the exhaust out the tailpipe. With limited ground clearance and a large cabin preventing an F16 like belly intake, the choices quickly reduce to side mounted inlets or a single top mounted inlet. At high angles of attack, the fuselage has the potential to distort induction airflow into a top mounted engine inlet. This is less of an issue with a rear mounted engine and a very narrow fuselage, however especially with a wide fuselage, supplemental systems (e.g. stick pusher) may be required to limit the angle of attack to ensure undistorted airflow into the engine. With the D-JET, we opted for conventional, military aircraft style symmetrical dual inlets that feed induction air to the turbine through dual S – shaped ducts. This is referred to as a "bifurcated inlet". Our ground and flight tests have already shown this to function perfectly with stable engine acceleration and deceleration and no indication of compressor stalls.

With top mounted engines, the Cirrus and Eclipse ECJ have resorted to V-tails to clear the engine exhaust, while Piper has integrated their engine in the vertical stabilizer structure. V-tails present some unique challenges and special certification requirements, and as such Diamond chose the low risk approach. Both the Eclipse ECJ and Piper will need to compensate for their high trustlines, while Cirrus has elected to lower their thrustline by inclining the engine and redirecting the exhaust thrust. Consistent with our requirement for system simplicity and low technical risk, the D-JET's exhaust nozzle is a simple affair, similar to those of pod mounted engines, that exits below the tail structure.

F.A.Q.'s (continued)

Induction Ice protection – Again, this is where the simplicity of a pod mounted engine of a twin has an advantage with less inlet lip and ducting needing to be deiced. However in a single engine installation, the induction air ducting needs protection where ice is expected to collect. Cirrus, Diamond and Epic all face similar challenges, while Piper and Eclipse have simplified their inlets, but need to deal with high thrustlines. In the D-JET, bleedair is used to heat the inlets and ducts which also serve as the heat exchangers to cool the bleed air used to pressurize the cabin. Oh, if you should buy an airplane with top mounted inlet, please be extra careful to scrape the ice and snow off the fuselage before take-off!

Rotorburst Protection – The airplane designer must design the airplane such that in the very unlikely case of an uncontained turbine failure, the airplane can still land safely. This requires that any structure or system in the potential path of rotor fragments (as big as 1/3 of the entire rotor hub, per certification requirements) must survive with sufficient strength and functionality to get home safely. Diamond chose an engine location that has no possible effect on flying surfaces or critical systems and where the width and height of the fuselage offer maximum geometric system separation (e.g. control runs) and maximum structural cross section.

Accessibility – Good accessibility is a real driver when it comes to reducing operating costs. Because most small turbines are designed for conventional twins, their accessories (starter generator, oil sumps, alternator, etc.) are typically located at the bottom of the engine. A top mounted engine results in limited accessibility due to the fuselage structure underneath. A completely or partially fuselage integrated engine is even worse. The D-JET has one of the most accessible installations of any aircraft, due to its underslung design. Although it may look like the engine is buried inside the fuselage, this isn't the case at all. The fuselage of the D-JET is constructed such that aft of the pressure vessel the aft fuselage or "tailboom" sweeps up and over the engine. The firewall is actually a flat horizontal surface with the engine suspended below. With easily removable cowlings the entire engine can be exposed for easiest possible service – and without a ladder.

As with everything in airplane design, engine location is a trade-off. Diamond has selected its location with a focus on safety, ease of maintenance, system simplicity and low program risk.

A picture is worth a thousand words: D-JET engine uncowled shows excellent accessibility of engine for maintenance

THE D-JET FLYER
ISSUE 2, SEPTEMBER 2007

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Diamond Aircraft is an international company with over 900,000 square feet of production facilities worldwide. Our people are passionate about what they do and it shows in every aircraft we build. Our quality comes from our integrity.

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