

# TWINS TAMED

If you thought twins were intimidating, think again. We sample the first production DA42NG with the new Austro engine

Words Nick Bloom Photographs Keith Wilson

A traditional multi-engine trainer has ten levers to control its two engines: throttle, pitch, mixture, cowl flap and carb heat. The DA42 has just two power levers.

The problem with engine failure in a twin at takeoff is the yawing effect of a free-wheeling propeller on one wing. If the distracted pilot allows the airspeed to fall, there won't be enough airflow for rudder to counteract the yaw and the aircraft spirals into the ground.

To avoid disaster, while pushing with one quivering leg trying to keep the slip ball centred, the pilot has to shut down the dead engine in the correct sequence and feather the prop. In the DA42NG all the pilot has to do is flick a single switch (one for each engine) from 'on' to 'off'. A computer does the rest.

To sample this and other improvements on the twin formula encapsulated in the DA42NG, I'm at Conington with Henrik Burkal. He's the Managing Director of Diamond Aircraft UK Ltd and will take the right hand seat for the flight.

The DA42 has striking looks with long, tapering and graceful wings ending in upswept winglets, an obviously well-



streamlined fuselage and an outsize fin and rudder. The fin and rudder extend below the fuselage to a marked degree, slightly spoiling the look of the aircraft... although giving it the instantly recognisable shape beloved by 'spotters'. See a DA42 flying overhead and you'll identify it at the first glance. Something else that slightly spoils its good looks is a rather bulging cabin.

However, the cabin is undoubtedly one of the DA42NG's best features.

Front seat occupants board up either side of the wing via a step attached to the fuselage. Rear passengers have their own door on the left which swings up and to the right. I try the rear seats and not only do rear passengers have a lot of leg, head and shoulder room, but they also have a very good view forwards and downwards.

The front canopy hinges forwards, so a DA42NG with both doors open does look rather ungainly. However, the forward hinging canopy makes this one of the easiest aeroplanes I've met for getting into, because you can stand fully upright inside it (your feet on the floor in front of the seats) without having to bend. There are two substantial handholds set into the glare shield to help you

raise yourself from seated to standing and to help lower you into your seat. All four seats are slightly bucket shaped.

The cabin is more than generous and the view from the front is excellent. The front seats are fixed, but a rocker switch moves the brake-and-rudder pedals backwards or forwards. I feel rather low in my seat and wonder about being able to see over the nose for landing, but Henrik assures me that with flap at the landing setting the pitch angle is such that I won't have a problem.

The instrument panel is dominated by two G1000 screens – the DA42NG has a fully integrated autopilot. It also has full de-icing. The backup dial instruments are set under the glare shield at the top of the panel – "Where you'd need them to be if you had to use them," says Henrik.

Primary control is via joysticks. The other controls are simple and there aren't that many of them, so that a quick glance around the cockpit tells you all you need to know.

Starting the engines is nice and simple. Since they are diesels, there's one small additional complication – when they're cold you might have to wait until the glow plug light goes out, just as you would in a car

diesel engine. Otherwise, you just flick the start switch to 'start' and the on-board computer does the rest.

The diesels are a lot quieter and lower in tone than spark ignition petrol engines and they rumble gently in the background while the screens light up and come to life. With very little left to do, Henrik tells me to release the parking brake and taxi to the hold. Taxiing is pleasant, the ride firm, the view excellent, the toe brakes and nosewheel steering efficient. The response to the power levers appears to be instant, just like a Lycoming's.

We make the usual pre-takeoff checks, with one significant improvement over the Duchess and all other aircraft. On the panel there are two powerful buttons. Press and hold them and the computer makes all the pre-take off checks necessary for the engines and propellers for you. You hold the buttons and watch the checklist come up on the screen then delete itself line by line until all the lines are gone. Meanwhile you can hear the props cycling, the engine throttling back for slow running and so on, all done for you.

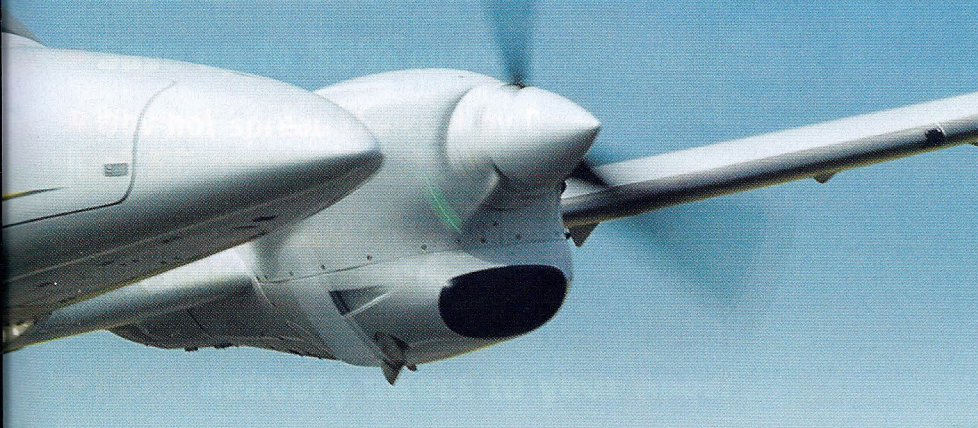
For takeoff we leave the flaps up.

After lining up we're ready to takeoff. Henrik covers my throttle hand just in case and I smoothly advance the levers to the forward stops. I'm for unloading the nosewheel, but he's nervous about premature lift-off (which the DA42 will do – I manage one later) and overrides me on the right stick. He evidently wants the nosewheel to stay down until the rotate speed at 60kt. I'm expecting the nosewheel to come up a few seconds before we lift off, but there's not much of a pause between the two. The DA42NG seems eager to fly.

The takeoff run is around 500 metres.

We climb at 90kt at a brisk 700fpm, which rises to 1,000fpm once I raise the undercarriage. (Flaps and undercarriage are controlled by switches on the panel).

I don't have to worry about altering pitch, manifold setting and mixture as we climb – the computer looks after all that. Although Henrik does remind me to throttle back to max continuous power after takeoff. Full power is limited to five minutes. Power is indicated on the right hand screen in as a



From this angle, and in a fast fly-by, the DA42 is a beautiful machine

## DIAMOND AIRCRAFT

Diamond is an Austrian company that began by making gliders and motor gliders before it became Diamond Aircraft – it still makes motorgliders. It was an early entrant into composite technology and the high

performance DA40 rapidly became a market leader in four-seat tourers, especially since it was fitted with a diesel engine. The gliding background is also apparent in the long, tapered wings and close attention to

streamlining in the company's aircraft.

In 2008 Thielert went into receivership, but under German rules, this is usually seen as a temporary measure to stave off bankruptcy rather an actual failure of the

company. The cause is generally attributed to difficulty with the Thielert engines then fitted to the DA40 and DA42NG and that company's financial problems. Thielert has been trading again for quite a while.

## Flight test Austro Diamond Twin

Somewhat weird looks do at least make the DA42 one of the most instantly-recognisable aircraft in the sky



percentage of maximum.

At climb speed the controls are crisp, powerful, well harmonised and fairly light. Though they do stiffen up a little once we level off and accelerate to cruise settings, at no time do they become heavy and the aircraft feels lighter and less ponderous than traditional twins. Having a control stick helps in this regard – sticks give greater leverage.

The view out and down is fabulous although the glareshield does slightly interfere with the view over the nose for someone my height. If you leave the aircraft to fly itself it's so stable, you'd swear it was on autopilot.

As you would expect, the Austro DA42NG is fast. We're getting something like 150kt indicated at 2,000ft (max cruise is 184kt at 14,000ft) at around 75% power.

After climbing to height I sample the stall behaviour, which is pretty docile for such a large aircraft. In the crucial turning stall at low speed and power, the DA42NG rolls the right way – level, away from the turn.

The aircraft stalls at about 60kt with full flap and gear down, so final approach for a novice-to-type like me shouldn't be allowed to fall below around 85kt.

To simulate engine failure after take off, I lower the undercarriage and slow the DA42NG to 85kt, its climb speed. Then Henrik fully retards the power lever on one engine. As expected I have to push hard with one leg to keep the slip ball centred. It's also necessary to adjust elevator to get the airspeed to the blue line. I raise the undercarriage, but don't have to bother raising flap, because in the DA42 you take off without it. Having identified the dead engine all I have to do is switch it off. It takes about a second for the blades to feather and the engine to stop, ker-chunk, instantly relieving half the pressure on the rudder pedal and increasing our climb rate, which is now about 500fpm. Twirling the rudder trim knob prominently displayed at the front end of the centre column takes out the rest of the pressure.



Hinged doors a-plenty makes for great access to the cabin and luggage locker - one advantage of composites

All I would have to do now is remember to throttle the good engine back to 92 per cent power, make a circuit and remember to wind off the rudder trim each time I reduce power during the approach.

Clearly the nastiest aspects of the twin rating have been tamed in the DA42NG. However, a pilot who learns on one of these ought to undergo some differences training before flying a conventional twin with its ten engine control levers and its heavier rudder and takeoff flap; the DA42NG makes things a little too easy.

### SPECIFICATION

#### AUSTRO DA42NG

##### DIMENSIONS

Wingspan	44ft
Length	28ft 1in
Height	8ft 2in

##### WEIGHTS

Empty	3,119 lb
Mtow	4,189 lb
Payload	987lb
Seats	4

##### PERFORMANCE

Maximum cruise	184kt at 14,000ft
Cruise	174kt
Range	710nm
Stall speed	61kt
Initial climb rate	1,150fpm

##### POWER

Two Austro Engine AE 300 turbocharged, common-rail injected 2.0 liter 168hp diesel engines with EECU single lever control. Driving two MT MTV-6-R-C-F / CF187-129 3-blade constant speed propellers
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##### MANUFACTURER

Diamond Aircraft Industries GmbH <a href="http://www.diamondaircraft.at">www.diamondaircraft.at</a>
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We return to the circuit for my first landing. Several things make life easier for the pilot in the circuit in this aircraft. Firstly, you don't have to worry about the mixture control. Secondly instead of adjusting pitch and manifold pressure each time you want to change power, you only need to set one lever. Under Henrik's directions I fly at 40 per cent power during most of the circuit and 20 per cent on final approach. The circuit speed is 120kt, reducing to 100kt on final, 90kt on short final and 85kt over the numbers. There are only two flap settings to worry about: ➔

## Flight test



Joysticks in this twin trainer set the tone and if they suggest to you lighter handling, you won't be disappointed



Engine controls are simpler than in heritage twins

approach, which you set at the same time as you lower the undercarriage; and final, which you set after turning base to final.

Finally, there is no speed limit for lowering undercarriage, because the carbon fibre gear doors are so strong, which takes away yet another complication for the pilot.

Henrik was right: the view over the nose with final flap set is excellent. The aircraft's angle is now such that I am looking over the glare shield and the nose.

The only time I become aware that the DA42NG is actually quite a heavy aircraft is when I round out and fly over the runway shortly about to fully close the throttle. I find I'm undulating slightly in roll because of the momentum of the wing-mounted engines. All I have to do is relax and this settles. I don't have the same problem in pitch, perhaps because the elevator is geared precisely to be neither too heavy nor too light. With the throttles closed the DA42NG manages to stay flying for around four seconds, then the aircraft settles lightly on its mainwheels.

After rounding out I fully closed the throttles and you can feel the braking effect of the CS props. With its long wings, the DA42NG could be expected to float a long way, but the flaps are very powerful in creating drag as well as lift at their full extension and this, plus the propellers keeps the float to PA-28 proportions. The aircraft has large split flaps under the fuselage and wing

centre section.

The main wheels have trailing link suspension, which is normally rather soft, but, possibly because this is a brand new aircraft, the feel is firm. I noticed that, while taxiing, every bump on the runway made itself felt. However, our arrival is gentle and when the nosewheel comes down a couple of seconds later that settles gently too. The landing run with medium braking was around 500m.

Henrik is amused by my landing technique, which he says is typical of aerobatic and tailwheel pilots, but isn't really suitable for the DA42NG and certainly not the way landings in the aircraft are taught. I am gathering from his 'patter' in the right seat that the DA42NG is mostly used to train airline pilots and its ability to simulate passenger jet behaviour is a considerable part of its appeal... and here I am trying to fly it like just another light aircraft!

So, while we make some circuits for the camera, I try to land the way Henrik wants, which is to fly the aircraft on without a pronounced round-out and flare. I'm not good at it, and the DA42NG's undercarriage makes it clear that I'm not by emphasising a slight tendency on my part to bounce.

I know this is an aeroplane for training airline pilots, but were Henrik not there I'd be tempted to throw it about a bit. Its controls and handling certainly suggest that it would respond joyfully. However, there are the Austro engines to consider – this is the first

time they've been installed in a DA42NG, so I fly sedately (by my standards) not banking more than 45 degrees and being gentle and smooth on all the controls. A couple of times Henrik says "this is a big twin and you're not supposed to bank more than 30 degrees".

After three or four circuits I feel completely at home in the DA42NG. Henrik told me that in 2008 the biggest selling light aircraft were helicopters and the biggest sellers after them were DA42NGs, mostly to schools teaching airline pilots, but also to a lot of private customers. Many of the latter fly across the Channel on a regular basis and want the margin of safety only a twin can provide. Should one engine fail in cruise, the DA42NG can continue at 130kt, and climb at 500fpm at low altitudes. That is quite a safety margin.

Of course the DA42NG's other virtues are its integrated autopilot and G1000 flatscreens, ability to fly in known icing conditions and its superb levels of comfort. Unlike other twins, which by their very nature tend to have high fuel costs, the lower price of diesel means that cost per mile is better than many complex single engine aircraft.

One criticism previously levelled at the DA42NG – its limited load capacity – has been addressed in this latest version of the aircraft, which has a 115kg higher maximum takeoff weight. However, the Austro engines add 70kg to the aircraft's empty weight, so useful load is only 45kg higher.

## AUSTRO ENGINES

Diamond actually began developing its own diesel engine well before Thielert went into receivership. The two-litre Austro is 35kg heavier than the two-litre Thielert, having

a cast steel crankcase rather than the Thielert's cast aluminium.

The Austro engine was developed by Bosch, Diamond and MB-tech, the company which

designs Mercedes automotive diesel engines.

The Austro engine develops 168hp as against the 135hp developed by the Thielert, but has fifteen

per cent less fuel consumption per horsepower. The injection system is more sophisticated, giving several squirts per combustion cycle instead of just one.

