Lancair Legacy

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It's almost impossible to describe a Lancair without mentioning speed in the same sentence. The two are bound together in permanent matrimony and those pilots amongst us for whom knots is the holy grail, a growing number have found a rite of passage when deciding to build a Lancair. The company, founded in 1981 by Lance Neibauer, has flourished, though not always prospered on two basic designs; the 200/300-series two-place rockets and the more substantial IV, which is perhaps famous for being ultimately acquired by Cessna, who call it the Corvalis.

Four inches of additional width has been built into the Legacy. However, the cabin is not a place for big pilots and passengers.

Neibauer, like most of his contemporaries, started out with modest goals, his first aircraft, the Lancair 200, was built to carry an ancient O-200 Continental engine, familiar to Cessna 150 owners. The Lancair 200 nevertheless proved the designer's mettle by propelling his early aeroplane to an astonishing 200mph. It helped that Neibauer had adopted both lighter pre-pregnated fibreglass and graphite rather than the typical and heavier, wet-laid epoxy fibreglass used by most kit builders of the era.

Such was the success of the Lancair 200, it wasn't long before builders cried out for more speed. Neibauer happily responded by offering a slightly more powerful O-235 Lycoming engine in 1986 and then two years later, a Lycoming O-320. Many believed the same year's final power increase to 180hp, using Lycoming's O-360 engine to be the most the airframe could take. Far from it.

By 1990, with 600 kits sold, Niebauer was claiming to hold 30-per cent of the homebuilt kit market. Whilst this may have been somewhat hopeful, his aeroplanes were continuing to make a name for themselves. Temporarily distracted by Lancair IV development and subsequent financial disaster, the final two-place 'Legacy' version was launched in 2001. From 180hp, the new aircraft not only benefited from its previous model's finer points (hence the name Legacy), it was powered by a monstrous 310hp, Continental IO-550 powerplant, normally installed in late model Beech Baron and Bonanzas as well as Cirrus SR22s and Cessna's own Corvalis.

Whilst the 180hp Lancair 320 could cruise at 180 knots, the extra 130hp added another 50-knots to the Legacy. With well over 300 kits sold, the 'big-six' IO-550 installation appears to have been a success even though some pilots, like Dieter Bock, owner of our test example, opted to go further with horsepower by ordering a Performance Engines, 370hp 'EXP' version of the standard 310hp IO-550. However, as we shall see, the blueprinted EXP choice is not simply about knots.

For a design with such an uncompromising approach to speed, it's hardly surprising the Legacy is shaped like a toothpaste tube with wings. To accommodate the larger powerplant, the aircraft has been widened by four inches. This extra girth stretches to the cabin before being pinched in typical Lancair fashion to minimise wetted area and provide structure for the tail feathers. The laminar flow wings appear as minimalistic as the rear fuselage sections and it's obvious the Dan Somers aerfoil has been carefully chosen to allow room for fuel as well as space to fold the main undercarriage. A thin gap between the outer wings and centre section shows where the wings can be removed to allow for trailering.

The Legacy's high stance on the ground makes the aircraft appear larger than it is. The bulky but smoothly cowled nose area supports this initial sense of size, which diminishes as you walk towards the rear of the aeroplane. A matter of pride and even one-upmanship amongst builders are the control surface and canopy gaps. I was told that the ones in front of me were sized to slide a credit card only between the outer skins and control surfaces - the late Stelio Frati would have approved, despite it being a composite build.

Like many Lancair builders, Dieter took a trip to the factory to take part in their two-week-long builder's workshop. It was an invaluable experience and not only took care of a few major assemblies but prepared him for a smooth five-year ride to completion. Most builders will agree the more difficult tasks are joining the fuselage halves and then fitting the canopy. There are others, like bonding wing skins, aligning the centre section and trimming the control surface gaps. However, casting my eyes over the shapely Legacy reveals little of Dieter's intimate knowledge of his aeroplane. For most flying enthusiasts, a Lancair will remain simply a symbol of speed rather than a joyful but at times frustrating journey of discovery within a small community of like-minded builders who have spent years exploring plans and constructing detailed and precision components to form a finished flying machine.

Mindful of this, I'm gently instructed on the whereabouts of the fuselage/wing strongpoints that will withstand the awkward acrobatics needed to get into the machine. It doesn't take long but is not for the sedentary, making sure feet are kept well away from the flaps and that only a certain portion of the cockpit edge can be used to pull on when swinging your body weight onto the wing and into the cockpit. There's no abrasive wing-walk or convenient handholds to use whilst getting in and the process means stepping onto the seat and sliding your feet under the panel and astride the short control stick. It's not unlike getting into a single seat race car and then strapping in.

Flying the Legacy

Even with an additional four-inches of cabin width, the Legacy is not made for heavies. Whilst the seats are wide enough, full travel of the short control stick has it buried in your crotch at full aft pitch and hard against each inner thigh at full aileron deflection. The lithe aeroplane is really made for similarly built occupants although head and elbow room are both more than adequate. Lancair describe the seating position as straight-backed, which in a sense it is, although the rear seat rests are raked somewhat resulting in a reclined but comfortable position. The seat padding is an important aspect as there's no room to stretch and shift weight and remaining in one position for much over two hours could be uncomfortable. However, in two hours the Legacy goes a long way at 240 knots-plus and Dieter has made the right hand control stick removable and left out the right hand rudder pedals to give his passenger as best a measure of comfort as possible.

The canopy is hinged at the forward edge and latched at the rear using a lever high up between the seats. The canopy has been the source of much debate amongst owners, especially following some loss of control accidents and incidents. Fastening the large area of canopy is vital as is positioning it carefully during the construction process. Most Legacy owners install an inflatable seal as even with the tiniest of canopy gaps, at Lancair speeds, wind-noise is considerable. This was demonstrated later during our flight when Dieter deflated the seal to show how much noisier the cockpit can get.

Homebuilders celebrate the customization of their aircraft and Dieter is no exception. The most obvious personal choices are always in panel design and the first thing I noticed was a firm vote in favour of round, 'steam-gauges' for primaries. Dieter is not a total Luddite however, and on the right hand side is an expansive MGL Voyager flat screen multi-function display. This not only provides a back-up primary flight display with ribbon speed and altitude displays as well as an artificial horizon, it also shows engine parameter detail amongst its many functions. The Legacy's panel is not exactly generous in terms of space but Dieter has done a fine job of providing the highest level of equipment that would please even the most ardent IFR pilot.

With the primary flight instruments filling most of the space on the pilot's side, there's room for a digital chronometer at the top left and a Trio Avionics Pro Pilot, integrated autopilot immediately below. Along the lower left hand panel are the electrical switches including avionics master and a analog suction gauge. A simple gear switch, which activates an electrically driven hydraulic pump and its attendant position light is located at the top right section of the pilot's panel. The centre avionics stack includes mostly Garmin units with the primary VHF being a combined GNC 300XL GPS sitting at the top. Beneath it is a GMA 347 audio panel, GTX 327 transponder, King KN64 number two VHF and a third VHF in the shape of a Garmin SL 30. At the bottom is a Strikefinder stormscope and flap switch, below which is the throttle quadrant.

Aerospace Logic digital oil and volt-gauges occupy the upper right hand panel and alongside these is an analog tachometer with system circuit breakers mounted to the right of the MGL, keeping company with an ELT control unit and Datcon hobbs meter. Fresh air is provided via three eyeball vents although these would struggle to cool the cockpit whilst taxying on a hot day. The engine can be started with the canopy open however. The flaps don't have their own indicator so need to be eyeballed into position - anything between 10-degrees required for takeoff to 30 on landing. Aileron and rudder trim is activated with toggle switches on the pedestal between the occupants.

Gear components are beautifully made and even provide a softish ride over uneven surfaces.

Such a sizeable engine in such a small airframe seems incongruous and the sensation is not eased whatsover when it's time to bring the IO-550 to life. It's not unlike poking a Rottweiler awake with a long stick and with a sharp bark, the high compression Continental roars into instant life effortlessly from cold. Whatever sense of aggression an observing pilot might have from simply gazing at a parked Legacy, it's magnified a hundredfold with the three-blade composite MT propeller spinning away just in front of the canopy. There's little vibration, which is not untypical of these big bore Contis, just a lot of noise and wind until the canopy is eased down, latched shut and the inflatable seal activated.

There's little doubt the Legacy is an adrenaline rush, even on the ground. Dieter being a long time Lancair 320 owner, is entirely familiar with all the commotion however and patiently runs me through the after-start checks. With no rudder pedals on the right hand side, I'm unable to judge steering effectiveness through the tall nosewheel. The ride seems compliant and comfortable however as we head towards the run-up point, park and go through the necessary checks before lining up.

Mindful there's no fuel quantity indicators but knowing we are carrying half of the total 250 litres capacity, the pedestal-mounted selector is swung to the fullest tank. The MGL does have a flow system and quantity indicator but this requires a manual input to establish an accurate quantity. With a double check of the canopy lock and 10-degrees of flap, we're ready to blast off.

Above: Mathew Human, Dave Human the guy who has helped me through all my follies really switched on (AME), Dieter Böck and Hannes ?????

Top: Hannes ??? who helped me once to calibrate my avionics and Mischel his wife.

Pushing the throttle home and releasing the brakes invites an immediate acceleration, which after some 16-seconds is enough to ease the stick rearwards at some 60 knots. The nose comes up smoothly with no tendency to over-pitch from a too-light elevator. The mainwheels unstick and the Legacy is soon climbing at over 2000 feet per minute with little effort. Raising the flaps pitches the nose down slightly as we target 135 knots giving us a satisfyingly steep trajectory towards the lower airspace boundary above Krugersdorp Airfield's circuit. The gear switch is snapped up before 140 knots and the wheels stow within six seconds as we curve northwards to find some airspace to play with. Dieter is quick to bring the wheels in, preferring to do it as the Legacy accelerates through 120 knots rather than the 140 knot limiting speed. I am guessing that he grasps the potential delicacy of the outboard motor derived hydraulic pump but it's probably a craftsman's respect for well-engineered machinery and protecting his systems from unnecessary work.

The Lancair's intake air nostrils are small and the engine baffles are an important precision build item. Consequently, temperatures, especially during a homebuilt's early flying, need to be carefully monitored. The initial climb too and the relatively high power settings and slower speed encourage Legacy owners to get to their cruise height without delay. This is thus an aeroplane most comfortable at high speeds and not for weekend flipping around the neighborhood. Setting the engine at 24-squared, ie 2400 rpm and 24 inches of manifold pressure gives a modest 190 knots and at this speed, the diminutive aeroplane handles beautifully. The ailerons and elevator are well harmonised and light and at these speeds only small movements of the stick are enough to make big changes in direction and attitude. If this were a fighter aircraft, the controls would be ideal and this concept is not far removed following the Columbian air force's acquisition of 25 fixed-gear kits for use as primary trainers.

Changes of power setting have predictably little effect on trim and the aircraft is neutrally stable in all axis. Dieter says that an aileron displacement left or right will eventually return the aircraft to straight and level flight indicating it is positively stable in roll. The Legacy would perhaps be hard work when hand-flown in IMC. Lancair claim the Legacy will go to over 240 knots with standard IO-550 powerplant. Dieter says this number goes

up by around ten knots with his EXP engine, which is not a big increase considering the jump in horsepower. However, he says the EXP engine with its balanced conrods, flow-matched heads, balanced crank and ported and polished cylinders works less hard than a factory unit and this translates to ease of mind and engine longevity.

The view out of the expansive canopy is panoramic and the higher the aircraft gets, the sensation of speed naturally falls away but is easy to watch, in awe, on the MGL or Garmin GNC 300. The wing seems unnaturally small - and even more so when appreciating the highly satisfying handling. Perhaps it's slow speed qualities are the Legacy's weak point. We stalled the aeroplane, leaving some power on but leaving the flaps up. With no warning, the laminar flow wing gave up its tenuous hold of the airflow and expecting to be on our backs in an instant, the nose nodded down firmly and the aircraft rolled off to the left in a cleanly defined break at exactly 72 knots. It was an undramatic departure for such a finely tuned aeroplane and recovery couldn't have been easier. It was time to return to the airfield.

Those used to high performance aeroplanes won't have a problem bleeding speed off. Lancair provide an optional scissor, wing-mounted air brake they say will bring the Legacy down at 4000ft per minute with no heat distress. Without this tidy installation, management becomes a little more important but it's really just a matter of throttling down in good time to establish a downwind speed of around 120 knots, when the gear can be selected down and first stage flap deployed.

Target final approach speed is 100 knots from a fairly steep approach. I'm told that Lancair owners aren't comfortable with a shallow final and prefer to have some height in hand, at the correct airspeed, in the event of an engine stoppage. I was mindful of the small wing on approach and the effect it has on sink rate when dramatically changing attitude at the flare. It turned out to be a non-event and the aircraft with its speed bleeding down to 90 over the threshold, easily transitioned from sink to nicely mannered float to land gently on the mainwheels in a Cessna'esq nose-high attitude. I would imagine the small wing, even with 30-degrees landing flap, would be difficult to displace in a crosswind or under gusty conditions, taming the Legacy's landing behavior and erasing any worries that this sleek machine might be fearsome to return to earth. Moreover, the efficient brakes quickly clawed the roll-out down and we were at a comfortable taxying speed with at least a third of the 800 metre runway remaining - pure joy.

There's little doubt that flying a Legacy is an exciting experience and with an endurance of four hours or so, the aircraft is ideal for 500-nautical mile trips. I would imagine the ownership experience is not for those with a laissez faire approach to their flying however. These homebuilts are precision items and mostly constructed by enthusiastic perfectionists who dote over almost every engineering facet of their aeroplane, from the engine to its compact systems. The type does not have a glowing safety record, but when flown diligently and with deserved respect for the engine's operating needs - in particular temperature limits, a Lancair can be one of the most rewarding aircraft to fly and own.