

EVOLUTION AIRCRAFT SYSTEMS



The Lancair EVOLUTION is a high performance, four-seat, amateur built aircraft capable of 300 KTAS at FL 180 and higher. It is normally powered by a 750 shp Pratt & Whitney Canada PT-6A-135A. The engine turns a four blade constant speed Hartzell HC-E4N-3N/D8292B fully feathering and reversing propeller. The aircraft features a composite airframe of predominately carbon fiber in an epoxy resin matrix. The wings have electro mechanically actuated full slotted fowler flaps and mechanically actuated high aspect ratio ailerons. The elevator and rudder have centerline bearings. The elevator is push rod actuated; a stainless steel cable actuates the rudder. The tricycle retractable landing gear is hydraulically actuated. The nose gear is a self centering free swiveling unit and has an oleo strut for dampening. The trailing link main gear struts are made of welded steel tubing. The main wheel brakes have their own independent system and are hydraulically actuated.



Cypilot Rudder Pedals

The secondary flight controls are the wing flaps.



The electrically driven fowler flaps extend from aileron to fuselage on each wing.

On earlier Evos the flaps are operated by an electric flap switch mounted above the power lever quadrant and are selectable to any setting between zero and forty six degrees. On newer Evos

the flaps switch is a three position switch Up, Approach and Down. The electric flap motor is located in the non pressurized bay under the passenger seats.



Flap Motor

The engine power controls are located on the instrument sub panel between the pilot stations and consist of the PCL or power control lever, propeller control and condition lever. There is also a standby power lever that directly meters fuel to the engine in the event of a fuel control failure or PCL disconnect.

Heading / Attitude System	CHECK
Pressurization	SET (FE +500')
Pitot Heat	AS REQUIRED
Propeller De-Ice	AS REQUIRED
Defog	AS REQUIRED
ATIS	Check
Approach	Brief

A timely descent, particularly from high, fast cruise in the Lancair EVOLUTION requires that you be well ahead of the aircraft. In smooth air conditions descent can be accomplished at the Vne of 256 KCAS until reaching 10,000 feet MSL, where it should be reduced to comply with FARs. In turbulent air the aircraft must be slowed to its Vno of 220 KCAS or below. Throughout the letdown, monitor your engine instruments. Allow 4 nm from destination from each 1,000 feet to descend to reach pattern or FAF altitude. Hold enough power to maintain cabin pressurization.

APPROACH & LANDING

BEFORE LANDING

Fuel Selector	FULLEST TANK
Flaps	<160 KCAS 10 DEG
Landing Gear	<150 KIAS 3 DOWN & LOCKED
Brakes	TEST
Landing Light	ON
Flaps	< 130 KIAS 40°,
NORMAL LANDING	
Propeller Control Lever	FORWARD
Deice door	OPEN

Approaching the terminal area, keep the airspeed less than 160 KIAS to allow for 10 degrees of flaps, if necessary. Enter the pattern as directed, or at a 45° degree angle to downwind, at pattern altitude as appropriate. On the downwind leg, a power setting of about 400 pounds of torque, 1900 rpm and configured with 10° of flaps will hold the aircraft at 120 KIAS. Lower the gear prior to the abeam position-- opposite the intended point of touchdown. Landing gear position will be confirmed out loud by the Lancair pilot in training. Lower flaps to full and the plane should slow to about 100 KIAS with a 500 foot per minute rate of descent. Reference your angle of attack indication (AOA) –it should be in the donut when you are onspeed. Halfway through the base leg turn your altitude should be approximately 500 feet AGL. Turn final with at least ¼ mile straight away and at approximately 300 feet AGL. Cross check airspeed and AOA. Cross the threshold at about 85 KCAS cross checking AOA. Allow airspeed to decay to arrive at the intended touchdown point at 75 KCAS. Reduce power to idle, maintain directional control with rudders, and slowly apply beta. Beta is destabilizing so be judicious in its use.

NO FLAP LANDING

Fly a normal pattern except plan for 100 kts on short final. On the roll out, lower the nose gear onto the runway and brake and beta as necessary.

CROSSWIND LANDINGS

Analyze the wind before pattern entry, or on downwind, to determine if it is an undershooting or overshooting crosswind. Adjust for drift during the turn to final so that you will not undershoot or overshoot the approach or final leg. The optimum technique is to fly a crabbed approach, taking out the crab with rudder to align the aircraft with the runway center line and direction of travel just before touchdown. After touchdown apply lateral stick into the wind to counter the upwind wing rising. Use judicious rudder to track down the runway center line and brake and beta (as necessary) to a stop.

GO AROUND

Smoothly Advance PCL	1200 Maximum Pounds of Tq if on the runway
Flaps	25 DEG
Gear	UP, POSITIVE ROC
Flaps	UP, BEFORE 120 KIAS
Propeller	1900 RPM /AS REQ'D

Do not delay the decision to go around to the point that control of the landing or rollout is in jeopardy. Smoothly advance the power lever using enough power for a positive rate of climb. Pitch the aircraft to a normal takeoff climb attitude. Check for a positive rate of climb and positive aircraft acceleration. Recheck trim. Anticipate the need for considerable right rudder input as power is applied. Raise the landing gear and flaps only after a safe climb has been established.

CLOSED TRAFFIC PATTERN (in training all landings are to a full stop)

For closed traffic, the takeoff technique and procedures and approximate power settings and airspeeds described earlier in this section still apply. However, the landing gear will be left down after takeoff and remain down throughout the pattern. This is to preclude excessive wear and tear on the landing gear mechanism and to minimize configuration changes so the pilot can more easily concentrate on flying a good pattern. Even though the gear remains down and locked throughout the pattern, a full before-landing-checklist will be conducted on each downwind leg. Landing gear position will be confirmed out loud by the Lancair pilot in training. Flaps will remain at the takeoff position until more flaps are needed to intercept and maintain the proper glide path. All landings will be to a full stop followed by a taxi back to the approach end of the runway for subsequent takeoff. This procedure will allow the pilot to enjoy the training

Lancair Evolution By The Numbers**

Conditions	Torque	RPM	Gear	Flaps	SB	Speed	Pitch	ROD/ ROC
Takeoff	1248	1900	Down	10	In	Vr 70		
Climb	2080	1900	Up	Up	in	Vy 140	7 ANU	
Climb	2080	1900	Up	Up	In	165	7 ANU	
Cruise	1940	1900	Up	Up	In			0
							2-3	
Descent		1900	Up	Up	In/ Out		AND	
Downwind	400	1900	Up	10	In	120		
Base	400	1900	Down	Full	In	110	5 AND	
Final	400	1900	Down	Full	In	100		
Go Around	Full	1900	Up	Up	In	Accel	7 ANU	
Precision								
Downwind /								
Vector		1900	Up	10	In	140	2 ANU	
Base	400	1900	Down	10	In	120	3 ANU	
Final	400	1900	Down	10*	In	120		
Non Precision								
Downwind /								
Vector	400	1900	Up	10	In	140	2 ANU	
Base	400	1900	Down	10	In	120	3 ANU	
							1-2	
Final	400	1900	Down	10*	In	120	AND	
Level off		1900	Down	10	IN	120	3 ANU	
				* until field in sight				

** Due to differences in aircraft the above numbers are not absolute but provide a frame of reference to start analyzing your aircraft's performance. You should complete a "By the Numbers" form for your aircraft.

INSTRUMENT FLIGHT

The Lancair EVOLUTION is generally equipped with all the necessary instruments and navigation aids for instrument flying. Flight into high-density traffic areas in IMC should only be undertaken after thorough planning preparation and with plenty of proficiency. Flight into icing conditions must be avoided for unprotected aircraft. Pilots flying aircraft equipped with deice systems should remember that those systems are not tested for flight into known ice conditions and should proceed with extreme caution.

Climb, cruise, and descent in instrument conditions will be the same as the VFR procedures described previously. Holding should be conducted at 140 -160 KIAS, 1900 rpm, power as required.

INSTRUMENT LANDING SYSTEM

The downwind or radar vectors to final should be flown at 140-160 KIAS. The power settings should be as required with 1900 rpm with 10° of flaps. A power setting of 400 pounds of Tq. at 1900 rpm on base leg should give you about 120 KIAS with 10° of flaps. When the glideslope is one dot high on the indicator check flaps 10°, and lower the landing gear. Perform a before landing checklist. A power setting of about 400 pounds of Tq (aircraft dependent). should result in a 500 fpm rate of descent at 120 KIAS. Adjust power and heading as necessary to maintain centered ILS needles and 120 KIAS. Lower full flaps after breaking out into visual conditions. Prior to landing ensure that the before landing checklist is complete.

NON-PRECISION APPROACH

The downwind and radar vectors to final and base leg should be flown as described above for the ILS. From final approach fix inbound, a power setting of about 400 pounds of Tq at 1900 rpm, with gear down and flaps 10°, you should see a 700-fpm rate of descent. Complete your before landing checklist at this point. Just prior to reaching the minimum descent altitude increase the power slightly to level off and maintain 120 KIAS. The aircraft will be nose up and, again, a significant amount of right rudder will be required to maintain balanced flight.

LANDING FROM AN INSTRUMENT APPROACH

If you break out prior to 400 feet AGL, plan on reconfiguring the aircraft to flaps 40° (full). Continue down, or intercept the proper glide path, and land the aircraft. If you break out below 400 feet AGL, consider leaving the flaps set at 10°. Even with the flaps at 10°, 95 kts on short

final provides for ample stall margin. Prior to landing ensure that the before landing checklist is complete.

MISSED APPROACH

Smoothly advance the PCL to full power and apply the flight controls as necessary to keep the aircraft in a trimmed condition. Once a climbing attitude is established, and a rate of climb is confirmed, raise the landing gear. Raise the flaps when the airspeed is 100 kts or greater and set cruise climb power when you are comfortable and above 400 feet AGL. Comply with air traffic control instructions.

EVOLUTION CONDITIONS OF FLIGHT INSTRUMENT PROCEDURES

NON-PRECISION APPROACH

CONDITION	SPEED	GEAR	FLAPS	TORQUE	PITCH
Arrival	160	UP	UP	~600	Level
Holding	140	UP	UP	~400	Level
Procedure Turn	140	UP	UP	~400	Level
Inbound FAF	slowing	UP	UP	~300	Level
2nm from FAF	110	UP	25	~300	Level
FAF	110	DOWN	25	~300	3 degrees
MDA	110	DOWN	25	~500	Level
RWY in sight	85	DOWN	50	~170	~3 degrees

If a descent is required between the IAF and FAF

Descent	110	UP	25	~150	~3 degrees
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PRECISION APPROACH

CONDITION	SPEED	GEAR	FLAPS	TORQUE	PITCH
Arrival	160	UP	UP	~600	Level
5nm from FAF	slowing	UP	UP	~300	Level
GS Active	110	UP	25	~300	Level
GS Intercept	110	DOWN	25	~300	3 degrees
RWY in sight	85	DOWN	50	~170	~3 degrees

MISSED APPROACH

CONDITION	SPEED	GEAR	FLAPS	TORQUE	PITCH
Missed App	110	UP	25	1500	7 UP
1000' AGL	145	UP	UP	1500	~7 degrees

EMERGENCY PROCEDURES

This section contains procedures to correct an abnormal or emergency condition. Not every emergency you encounter will be in “the book” or covered by the POH. You may have to improvise. Modify these procedures as required in case of multiple emergencies, adverse weather or peculiar factors. Use common sense and sound judgment to determine the correct course of action. Apply the following rules to all emergencies:

1. Maintain aircraft control.
2. Analyze the situation and take proper action.
3. Land as soon as practical.

Do only those steps required to manage the problem. As soon as possible notify air traffic control (ATC), tower, etc., as applicable, of your emergency, position, and intended action. Do not hesitate to “declare an emergency”. Tell ATC exactly what your problem is and how they can help you – climb, descent, radar vectors, airport information, etc. Do not assume ATC will do the right thing. Many times they will sit idly by and watch an airplane auger in. They will go home after it is all over. You may not.

EMERGENCY PROCEDURES

The following emergency procedures are copied from the Evolution POH.

The following checklists are presented in a compact format. Those procedures requiring immediate action should be committed to memory and reviewed periodically using the cockpit to become familiar with locations of all controls and switches as well as checklist flow patterns. This checklist should be readily accessible in flight for quick reference if needed. In any emergency, aircraft control should be your first priority. Be aware that each situation will have its unique aspects which should be approached using good judgment and common sense.

GROUND EMERGENCIES

FALSE START/ HUNG START

Power Control Lever.....IDLE
Fuel Condition LeverCUTOFF
Start SwitchOFF
Fuel PumpON THEN OFF AT 10% NG
Ignition SwitchOFF
Fuel Drain Period30 SECONDS

FLAP SYSTEM MALFUNCTION

Airspeed140 to 160 KIAS
Flap Circuit Breaker.....CHECK IN
Check that Flap Indicator and Flap Position Agree. If there is an
Asymmetry and/or
Rolling Moment.....RETRACT FLAPS

CAUTION

Higher than normal approach speeds will be required without flap extension. Add 10 KIAS to all pattern speeds and be aware that higher deck angles and longer landing distances will result.

EMERGENCY SPEED REDUCTION

NOTE

The nature of the emergency should be considered before taking this action.

Power Control Lever.....IDLE
Pitch Attitude INCREASE TO CLIMB, SITUATION PERMITTING
Landing GearEXTEND BELOW 150 KIAS
Flaps.....FULL EXTEND BELOW 140 KIAS
When Target Speed is Obtained: Gear.....UP
Flaps.....UP

SERVICE ADVISORY**SA016-0036**

Subject: Evolution Aircraft Attach Points

Date: October 4, 2021

Ref:

Pages:

Status: Inspection

Background:

It recently came to our attention that a Lancair Evolution was found to be missing a bolt at a flap rod to flap inboard bracket attach point. See Illustration on Page 2.

Action:

Evolution Aircraft Company is recommending that you inspect **all flying surfaces and their attach points** prior to any flight. The attach points requiring safety wire must be secured with safety wire or lock nuts as is recommended in your Evolution Build Manual.

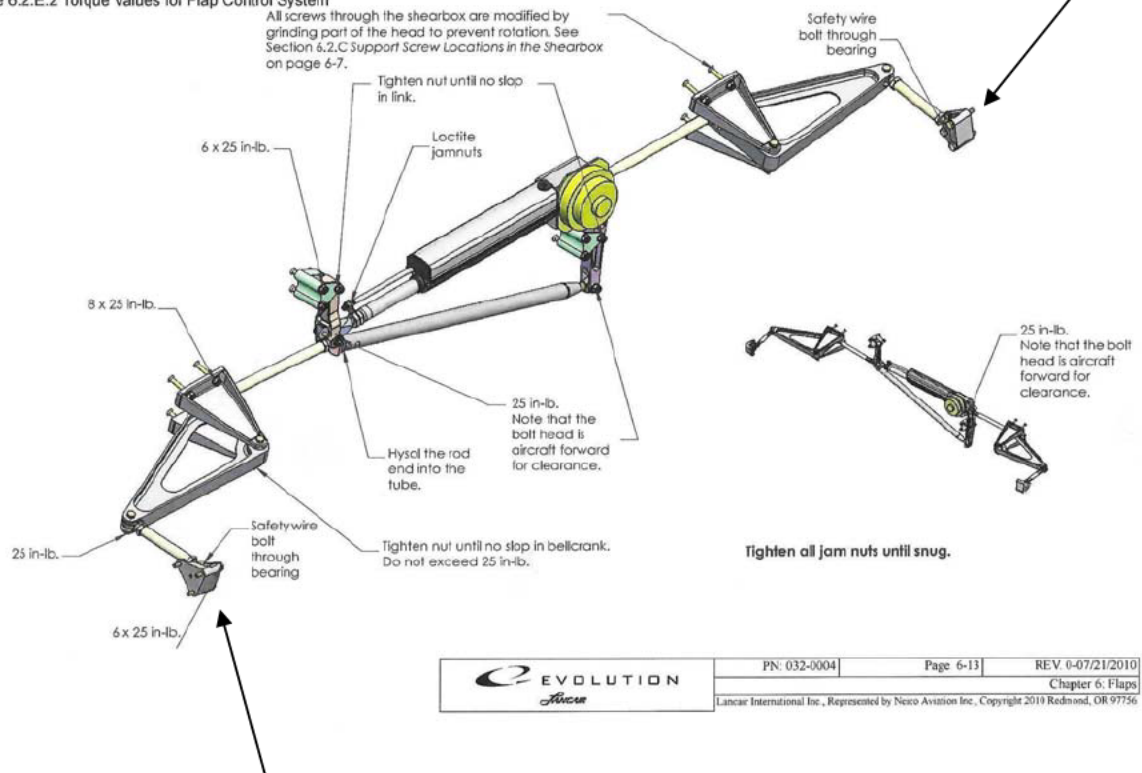
Inspections should be done prior to the next flight, any flight thereafter, and inspected at the next condition inspection.

Owners are additionally reminded to ensure critical safety of flight items are included in their preflight inspections.

Example of Proper Installation of Safety Wire on Rod End Bolt

Evolution Build Manual Illustration example of two attach points requiring safety wire.

Figure 6.2.E.2 Torque Values for Flap Control System





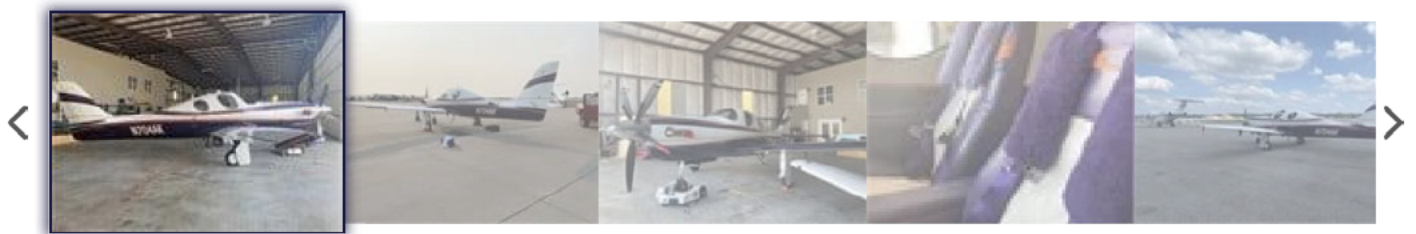
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» LANCAIR » EVOLUTION » N704AK



Photos (20)



N704AK - 2017 LANCAIR EVOLUTION

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AIRCRAFT SUMMARY

General

Year	2017
Manufacturer	LANCAIR
Model	EVOLUTION
Serial Number	EVO-070
Registration #	N704AK
Condition	Used
Description	FL 280 at 270 knots with four passengers, 100# baggage and full fuel Condition inspection done Oct 2020 Engine intake inlet upgraded to TBM shape Ice lights for wings Door to check fuel filter Steps on both sides of fuselage (in order to clean windscreen) Villanger anti-ice system installed on intake inlet, wings and horizontal stabilizers; ready for controller unit Improved windscreen defrost system LED landing lights on landing gear AOA indicator Cirrus aircraft front seats with 4 point

harnesses All seats
heated Unova
controller screen
(upgraded from
Moritz) Larger AC
fan & shroud
Upgraded main gear
shocks Hubcaps with
doors to check tire
pressure Fairings
over elevator and
stabilizer trim servo
linkages to keep
water out Flare
Assist landing
system King Air type
towing pins Mountain
High oxygen masks
– 3 New Odyssey
batteries New tires
Door pull handle
Travel and
Heavyweight storage
covers Cowling plug
with N-number TAS,
TAWS and Synthetic
Vision ADSB Out
Jeppesen charts 2
USB ports in center
console 3,000 ft per
minute climb and
4,000 ft per minute
descent Optical
prism test of
windscreen
completed with no
defects

Total Time340

Engine

Engine Notes

PT 6 135A 340 hrs
SMOH

Props

Prop Notes

5 blade MT propeller,
newly painted

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