Safety Information

Section X

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INTRODUCTION

Your Lancair 235-320/360 is an extremely high quality aircraft and one which will give years of service given the care a fine machine deserves. It, like most other pieces of equipment, will operate best under certain conditions, and can be dangerous in others. We have attempted to identify the latter in this manual, and now will offer some suggestions for the safe operation of this very high speed aircraft.

First, it will be to your benefit to become thoroughly familiar with this Handbook, and the Warnings and Cautions noted herein. These have been selected to highlight those areas of special concern to you as a Lancair 235, 320, or 360 pilot.

If you built the aircraft you are undoubtedly familiar with the aircraft and its systems and much of this Handbook's information will already be familiar to you. On the other hand, if you have purchased the machine from someone else, that same information can prove invaluable. This particular section however can be of benefit to all of us. As the old adage goes, we're never too old to learn. Much of this will undoubtedly be a refresher, and some suggestions may not be exactly to your preference. That does not mean either is wrong, as for example, cross-wind landings can be made from either a crab or slip approach.

Many FAA and other such documents cover the material covered herein. You are probably familiar with many of these. Where Lancair and its dealers have learned by experience, trial and error, or the "hard way", we will try to provide you with our "lessons learned". As we obtain feedback from this original issue from you, we will include that feedback, providing you with the benefit of what others have learned.

WARNING

The Lancair 235/320/360 aircraft are very high performance vehicles. All safety precautions must be observed to reduce to the maximum extent possible injury to the pilot(s) or passengers. Improper operation or maintenance compromises the safety of all involved.

GENERAL

Knowledge, skill, judgment and experience go together to make up the truly good pilot.

Know your airplane and its systems. Not just how it works, or is supposed to work, but how healthy its systems are. To do that you need to watch it in action, which means track its performance from day to day, flight to flight. This will allow you to correct minor problems so they don't become major ones.

Skill results when you continuously set tougher and tougher standards for yourself as you operate the aircraft. Fly smoother today than you did yesterday. Be more precise on lift-off speed today and hold climb speed closer.

Predict your and your aircraft's performance and understand why you were not quite on the mark. Total fuel used on this trip, why were you two gallons off... How was your prediction of the enroute and destination weather as compared to the briefers? Why was it different?

Experience comes from a combination of all of the above when we are honest with ourselves and objective about the facts. Experience need not be expensive, but it does cost time. Time not measured in hours of time logged, but how well those hours are flown, how aware we are during those hours, how we understand the differences of this flight from the last one. Making each flight a learning experience will gather that precious experience much quicker.

First Flight

Prior to your first flight in your Lancair, it is only prudent that you obtain some training "in type". You are encouraged to take advantage of this type of training which can be with another Lancair owner in his aircraft, or thru a program offered by Lancair or its dealer. For information on training/flight familiarization, call Lancair or its dealer. Your first flight should be safe, enjoyable and rewarding. Training is very good insurance.

Every time you fly, take advantage of the FAA services which are provided for your safety - weather briefings and flight plans. Plan your flight with these data and plan out alternatives if weather is any factor what-so-ever.

Preflight your aircraft as if it is a game. Someone has deliberately introduced a fault into the aircraft - try to find it. If you make your preflight without a checklist in hand, go over the checklist in the cockpit to see if you checked each item. Once in the cockpit use your checklist religiously. Was the fuel level correct for both wing tanks? Is it adequate for the trip intended. Always keep the header tank at 1/2 or more. Baggage (secured of course) is not excessive such that gross weight or CG is out of limits? Mentally review the flight from takeoff thru landing for speeds and altitudes. Rotate at ___ kts, climb at ___ kts, level off at xxx feet, etc. First fuel transfer at _____, then ____, and so forth. With transfer pump failure at 3rd transfer what is course of action? Etc.

Is all equipment operative for the flight? Lights, x-ponder, flashlight batteries plus spares, life vests for that cut across the lake, first aid kit just in case, sickness bags for that novice passenger, maps, approach plates for destination and alternates enroute, etc.

At big airports be wary of jet blasts, you can be hidden from the tower by bushes where a DC-10 would be quite visible, following that "10 Heavy" for takeoff, lift off well before he rotates and slide to the up-wind direction to avoid the wing tip vortices which are dangerous horizontal tornado like winds shed from each wing tip. These vortices move down and out from each tip gradually dissipating but remaining dangerous for up to two minutes or more. AVOID THEM.

SOURCES OF INFORMATION

There are numerous sources of information available to make your flying not only safer, but more enjoyable as well. Of course, the number one source is our FAA (or your country's regulating authority). F.A.R. Part 91 covers the "General Operating and Flight Rules" for the U.S. This document covers subjects such as the responsibilities of the pilot, use of flight plans, fuel requirements, right-of-way rules, etc. Not particularly enjoyable reading, but essential and educational.

Much current information is carried in the Airman's Information Manual, Advisories and Notices, and other publications of U.S. origin.

Airman's Information Manual

The AIM provides pilots with basic flight information, Air Traffic Control (ATC) procedures for use in the U.S., a glossary of terms used by the pilot/controller during radio contact, pilot's medical information, accident and hazard reporting information, etc. It is revised at six month intervals and can be purchased locally or from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

Organizations such as the Aircraft Owners and Pilots Association (AOPA) and Jeppesen also publish their version of the AIM essentially in another format, but containing the same information.

Become familiar with the AIM and use the information in it to become and remain a more "professional" pilot.

Advisory Information

Notices to Airmen (NOTAMs) provide information of a time-critical nature which can affect the decision to go or not go... for example a closed airport, navaids out of service, runway closures, etc.

FAA Advisory Circulars

These circulars are the FAA's means of informing the flying public of non-regulatory items of interest. They cover a myriad of subjects and can be obtained at FAA offices, bookstores specializing in flying or government publications, some FBOs, etc. Some are free, and others have a nominal charge - all are worthwhile reading and of general interest to airmen. A complete listing of current advisory circulars is published as AC00-2, which lists those that are for sale, as well as those distributed free of charge by the FAA as well as ordering information.

Some of the free circulars are:

00-24	Thunderstorms
00-50	Low Level Wind Shear
20-5D	Plane Sense
20-93	Flutter Due to Ice or Foreign Substance on or in Aircraft Control Surfaces
20-105	Engine Power-Loss Accident Prevention
43-12	Preventative Maintenance
60-4	Pilot's Spacial Disorientation
60-9	Induction Icing- Pilot's Precautions and Procedures
61-67	Hazards Associated with Spins in Airplanes Prohibited from Intentional Spinning
61-84	Role of Preflight Preparation
90-23D	Wake Turbulence
91-6A	Water, Slush and Snow on Runway
91-43	Unreliable Airspeed Indications

A similar listing of publications could be prepared for Advisory Circulars which are not free however the cost is nominal.

Other publications include "General Aviation News" by the FAA, The Experimental Aircraft Association (EAA) magazine "Sport Aviation" is a very valuable source of special interest topics for your aircraft both during its construction and after. The Lancair newsletter titled, "Lancair Mail" which is obviously oriented specifically to our Lancairs, and of course this Handbook.

GENERAL FLIGHT TOPICS

Flight Plans

Plan your flight and fly your plan. Words worth remembering and following. Planning means checking the weather, NOTAMs, aircraft, and planning "what if's" so that you are never backed into a corner. Someone on the ground should always know where and when you are going and by what route. Enroute an occasional weather check for the destination is prudent if there is anything but severe clear in the area. Since your Lancair has "long legs", you can well expect significant weather changes between takeoff and landing both in terms of temperatures and types of weather. Over deserts in the summer calls for carrying some drinking water, perhaps a sleeping bag, and some plastic sheet for sun protection - just in case. Winters calls for warm clothing, matches for a fire, etc. Like the Boy Scouts, "Be Prepared".

Mountain Flying

Flight of small aircraft over mountains and in mountainous areas is different from "flat lander" flying. It is extremely quick transportation compared to ground means and can be done safely, but is not without its special concerns. Operation of the aircraft is generally at much higher altitudes where engine performance is poorer, and stall speeds are higher due to the less dense air. Care must be taken to allow for these effects by reducing the gross weight if necessary. More room must be allowed for takeoff and landings and slower climb rates expected. In addition, the weather is significantly different. Winds can be extremely strong and turbulent especially between the passes where we tend to go to improve terrain clearance. The weather can change in very short periods of time, both to the good and to the bad. In the winter weather fronts can make crossing a range of mountains next to impossible at times with short periods of acceptable time in between the fronts. Even then however the winds and turbulence can be extreme. Obtain the advise of "locals" before venturing into this unknown. They can provide you with required/desired equipment, best routes, service possibilities and such to make your crossing more comfortable. Nights and mountains almost always calls for IFR operations. The MEAs, ATC following, someone to talk to and listen to are most comforting. Always follow airways as "the rocks" are not visible at night. NEVER ATTEMPT TO SCUD RUN.

Severe Weather

Your Lancair is stressed for all but the most severe maneuvers but anything man can build he can break. Severe weather means dangerous wind shears and vertical air movements. These can often be seen as evidenced by cumulus or lenticular clouds, but not always. Winters can lower the jet stream into our flight altitudes where wind shears can result in clear air turbulence. Should surprise add some adrenaline into the picture over stressing could be a problem. The same could be true busting thru a front with thunderstorms. The answer - DON'T.

Icing

Your Lancair performance is the result of both a clean design aerodynamically and a laminar airfoil which provides lift with less drag penalty than conventional airfoils. While bugs on the leading edge will reduce your performance a small amount, ice has the potential to not only reduce its lifting capability, but also will significantly increase drag and stall speeds and, more importantly change your stall characteristics.

Should you begin to accumulate ice in flight, as soon as you notice it attempt to avoid by changing altitude or reversing course. (Remember that preflight briefing where you noted the potential for icing and determined what your "out" would be?) If that ice does not sublimate (evaporate as ice) or melt prior to your landing, increase your approach speed and land "hot". If circumstances permit, make an opportunity to feel out the approach to stall characteristics before attempting the landing.

WARNING

Do not take the aircraft into a "full" stall. While decelerating slowly feel out the controllability of the aircraft. As soon as an acceptably low speed is reached to allow landing at the intended airport accept that, add about 5 kts and land. Stall/spin characteristics of the Lancair with ice have not been evaluated. AVOID !

Flight into known icing is prohibited. Flight into inadvertent icing is not to be treated lightly. Remember that other systems may be affected such as the pitot system. If flying in IMC conditions have the pitot heat ON. If no heater is installed be extremely aware of the potential for blockage at air temperatures approaching and below 32° F (0° C), and exit those conditions as soon as possible.

Marginal VFR Flight

Flight in VFR conditions is what we normally think of, but... Statistics suggest that marginal VFR is where problems often occur. Again the preflight weather briefing should include the weather man's (and your own) assessment of the potential for less than VFR conditions. Do not attempt to mix VFR and IFR conditions. If the weather is "marginal", and if you're not IFR **equipped, rated** and **current**, wait it out.

Night Flying

Night flight should be considered as marginal VFR. In many countries IFR flight plans are required for night flights - and for good reason. Forced landings off-airports are problematical at best. Clouds are hard to see ahead, and in some locations there are as many stars in the sky as lights on the ground and "which way is up" becomes a problem without reference to the instruments. Use the MEAs for altitudes flying enroute, and approach plates for terminal area altitudes and flight paths and be on the alert for "spacial disorientation" or vertigo as it is commonly called.

On the positive side, night flights are quite rewarding in many ways. The air is smoother, traffic is lighter later in the evening, and on clear nights dead reckoning navigation from lights to lights is easier due to generally clearer air. With a well equipped and operating aircraft, acceptable terrain enroute, and predictable surface winds (just in the case of engine failure) night flights have their own special reward.

Vertigo & Hypoxia

Vertigo is the condition where your inner ear, based on gravity, gives you that sense of "which way is up". Small prolonged accelerations in any direction, a low rate uncoordinated turn will affect the inner ear fluid such that down is no longer down, but off to one side and you will sense that you're in a turn. When there are few or no visual clues (nights or IMC conditions without a good horizon) to correct this sense the result can be vertigo. BELIEVE YOUR INSTRUMENTS - PERIOD. The message is be alert for vertigo.

Vertigo is as insidious as hypoxia, that high altitude phenomena resulting from lack of oxygen. The regulations limit flight altitudes to 12,500 feet when operating without pressurization or oxygen. Hypoxia is the result of an insufficient supply of oxygen to the blood the result of which is insufficient oxygen to the brain cells. The manifestations of hypoxia vary from individual to individual and day to day however in general the following are symptoms in the order in which they occur;

1. Loss of peripheral (side) vision

2. Bluish fingernails vs reddish color

3. Sense of euphoria or well being

4. Seemingly darker than normal lighting conditions

5. Grey-out

6. Black-out

Somewhere in this sequence an in-flight decision can be made which is wrong or improperly reacted to, or just ignored. Loss of control or over-control of the aircraft is a typical result and an accident occurs. This type of loss of control is serious - an accident is almost inevitable. Hypoxia is a dangerous condition. It is not limited to VFR pilots. IFR rated pilots who are not up to par because of medicines, mental stress, turbulence, or other condition are also subject to the condition. All pilots should be particularly wary of and on the lookout for these symptoms - their lives and the lives of their passengers depend on it!

Hyperventilation, a kissing cousin of hypoxia, is another breathing anomaly. However rather than lack of oxygen, it is the result of over breathing which upsets the balance of oxygen and carbon dioxide in the blood. The resulting symptoms are similar. The correction is rather the opposite however, i.e. hold your breath and then breathe slowly and deliberately. The general cause of hyperventilation is stress, nervousness, anxiety, fright, etc. Upon the realization of the symptoms, evaluate the potential cause and take the appropriate action. Recovery from hypoxia is dependent upon obtaining oxygen (lower altitude). Hyperventilation requires a few seconds for the blood balance to be restored.

Both of these problems are aggravated by smoking and alcohol which also upset the bloods ability to carry oxygen to the brain. Avoid them for your safety and that of your passenger. The presence of carbon monoxide in the cockpit can result in similar symptoms also. An open vent to increase cabin ventilation should be used even to the extent of colder than desirable temperatures. This latter should be anticipated if an exhaust heater is being used. A carbon monoxide detector in the cockpit is good insurance for winter operations.

Engine failures

An all too sad fact is that engines can fail at any time. One of the most likely and worst times is on takeoff as this is when the most is being asked of the engine and there is the least amount of time to react.

On takeoff, if runway exists, attempt to stop, and even accept an overrun "into the weeds". After lift off the number one rule is to maintain flying speed. Climbing at V_x (greatest altitude for the distance traveled) after rotation provides the most altitude in the least amount of time and reduces your exposure to that low altitude glide to a landing. Do not attempt to turn around unless you have 800 feet AGL, just land on the remaining runway or within ±30° of the takeoff heading, maintaining control thru initial impact and until the aircraft comes to rest. Should you ever have this unfortunate occurrence you'll be happy you used all the runway available rather than made the takeoff from the intersection to avoid the long taxi to the "far end" of the field.

Again on the positive side, engine failures without warning are extremely rare. Being mechanical devices there is almost always some warning of a failure. Oil consumption increases, vibration increases due to the stuck valve, reduced power shows itself by an increased takeoff time and distance, metal chips are caught in the oil filter, etc. Paying attention to your "one and only" is most important. As suggested earlier, engine instruments are now available which can provide the information which, when faithfully tracked, will warn of failure of this mechanical marvel.

If you have a carbureted engine, one almost mandatory piece of data you can install is a carburetor temperature gauge to warn of ICE. This is, like hypoxia, an insidious "disease" of your engine. It can strike almost without warning and at any time from takeoff on. It is generally evidenced by roughness, and or loss of power. An accurate diagnosis, timely acted upon will cure the engine as evidenced by the great number of aircraft equipped with carburetors as opposed to a fuel injection system. Moist air at temperatures of 40 to 70° F are ideal conditions for carburetor icing. Be aware and you and your carburetor can live happily ever after.

Water in the fuel system is another cause of engine failure. In cold weather it can freeze in the filter, tank or lines and limit or totally restrict fuel flow to the engine. Preflight checks can completely control this potential engine problem.

One problem which causes more engine failures than all others is simply lack of fuel. Either the tanks are dry or the fuel valve is not on the proper tank. The "original" system requires that you transfer fuel from the wings to the header tank. Failure of a transfer pump or failure to transfer will allow the header tank to run dry resulting in engine failure. Quick action can transfer fuel if its there and altitude exists such that the header tank can be supplied with fuel and the engine re-started. Letting the engine run dry from an empty header tank is simply irresponsible and of course very dangerous. You should develop the habit of always refilling the header tank when it is no more than half empty.

Oil is your engine's life blood. Making sure it is always adequately supplied with clean oil is some of the cheapest insurance you can buy. In winter a lighter (thinner) grade is called for than in summer, and preheating may be not only desirable, but necessary. Such heating will also limit the wear which occurs during start-up when engine temperatures have not stabilized the internal clearances and the oil's viscosity is not yet normal. High power settings before the engine has reached minimum temperature also thermally stresses the engine.

All of the above simply says it is prudent to treat your engine with all the care it deserves and it will in turn take care of you.

Aerobatics

Your Lancair is capable of many aerobatics when properly flown. Aerobatics are controlled maneuvers which incorporate "unusual attitudes" during their accomplishment. A barrel roll for example is a 1 "g" maneuver when properly executed. A loop is basically a 3.5 "g" maneuver. Properly flown they do not load the airframe such that either load factor ("g's") or speed (Vne) are exceeded. "Properly flown" is the key phrase. It is not wise to learn to do by doing such maneuvers. Some aerobatic instruction is mandatory.

The use of a parachute is required by regulation, and a weight restriction is in effect during aerobatic maneuvers. Aerobatics are essentially single seat, with no other weight in the fuselage other than header tank fuel.

Improperly flown maneuvers can result in reaching a stalled condition and a yaw at the same time, the recipe for a spin. The Lancair has demonstrated its ability to recover from spins at both forward and aft CGs with the standard recovery technique, i.e. opposite rudder, stick forward to unstall the wings and fly out of it. Positive load factor smoothly applied is required to prevent excessive speed buildup. The sooner the spin is recognized and recovery initiated the less altitude will be lost and the lower the speed buildup will be. Power changes during aerobatics (from full throttle to idle) occur rapidly and thermal shock can be a factor in your engines life.

Always remember, your Lancair is a very "slick" aircraft thus speeds increase very rapidly during descents, stalls or incipient spins and you will consume great amounts of altitude during recovery. The best aerobatic aircraft is always a "draggy" aircraft and your Lancair is at the opposite end of that spectrum.

HAPPY FLYING
&
KEEP IT SAFE