Memorandum

U.S. Department
of Transportation

Federal Aviation Administration

Subject: **ACTION**: Extension of Equivalent Level Of Safety (ELOS) No. ACE-99-02 for the Lancair Model LC41-550FG airplane

Date: FEB 24 2004

From: Manager, Small Airplane Directorate, ACE-100

Reply to Attn. of: Doug Rudolph
816-329-4059

To: Lancair Project File and ELOS File

Lancair Models LC40-550FG and LC42-550FG were issued the following ELOS during their respective certifications:

> Emergency exit requirements of FAR 23.807 in accordance with ELOS No. ACE-99-02 as detailed in FAA memo dated February 2, 1999, (FAA memo reference no. 99-190S-64).

Per the G-1 Issue Paper, the Seattle ACO is requesting to extend this ELOS to the new Model LC41-550FG airplane.

There are no safety concerns with, or changes to the product, its technology, or the applicable regulations, that invalidate the previous ELOS determination finding. This ELOS is found suitable for the Lancair Model LC41-550FG airplane.

The Type Certificate Data Sheet (TCDS) will reflect the old ELOS number and will specify that the ELOS was extended to the Model LC41-550FG airplane by this memorandum.

If you have any questions, please contact Doug Rudolph at 816-329-4059.

James E. Jackson

for Dorenda D. Baker

Memorandum

U.S. Department
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Subject: ACTION: Project No. TC1616SE-A -- Pacific Aviation Composites (PACUSA) Lancair LC40-550FG -- Requesting Review of and Concurrence with Equivalent Level of Safety (ELOS), FAR 23.807, Emergency Exits. **ACE-99-** 02

Date: FEB 2 1999

From: Manager, Seattle Aircraft Certification Office, ANM-100S

Ref. No.: 99-190S-64

To: Manager, Small Airplane Directorate, ACE-100
ATTN.: S. M. Nagarajan

Reply to Attn. of: J. Morfitt
(425) 227-2595

Background:
The LC40-550FG was certified with a maximum of two occupants and no baggage using the baggage door as an emergency exit. This is not adequate for certification with four occupants and baggage. The airplane is equipped with two gull-wing doors, one on each side of the airplane. In order to meet the requirement of Federal Aviation Regulation (FAR) 23.807(a) to allow escape in any probable attitude (i.e. inverted) a hinge release mechanism was added to the door. This hinge release mechanism has been demonstrated to work well when operated from outside the inverted aircraft. Easy removal of the door using the hinge release mechanism requires a slight rocking of the aircraft. Clear instructions (both text and pictograms) are provided on the placard near the external control for the hinge release, and the procedure is easily accomplished from outside the aircraft as demonstrated by tests. However, the release mechanism was not practical for use from inside the inverted aircraft, since the rocking motion was difficult to achieve by a person inside the cabin. For this reason, a crash ax has been incorporated into the type design. Tests demonstrated that the ax was easily used to remove the entire window from the cabin door. However, the window opening is a parallelogram with approximately 21 inches vertically between top and bottom sills and 29 inches longitudinally between fore and aft sills. The inside angles of the parallelogram are approximately 67 and 113 degrees. The corners are rounded with radii of approximately 3.9 inches at the 113 degree corners and 2.7 inches at the 67 degree corners. The result is that the 19 by 26 inch ellipse required by FAR 23.807(b) overlaps the window opening by approximately 1/4 inch on the ends.

Applicable Regulations:
FAR 23.807, Emergency Exits.

Applicant Position:
PACUSA would like to submit the following Equivalent Level of Safety proposal.

The crash ax and cabin door window are used for emergency exit only when the airplane is inverted on the ground, and only if outside personnel are not available to use the external hinge release mechanism. The opening of the cabin door window, while not in strict compliance with the 19 by 26 inch ellipse, meets the intent of the rule. The corner spaces of the parallelogram provide additional maneuvering space for an occupant crawling through. During FAA emergency exit tests a large broad-shouldered male crawled in and out of the window with ease, after a small female had demonstrated the effectiveness of the crash ax in removing the window. The ax has the added benefit of allowing the removal of the slightly smaller rear windows, and even the windshield, if the aircraft rests inverted after a forced landing. The ax is located in a location accessible by all occupants and placards are provided which clearly describe its use. The two large cabin doors and the hinge release mechanism exceed all other requirements of FAR 23.807.

FAA Position:
The area of the cabin door window is approximately 590 square inches which is greater than the 388 square inches provided by a 19 by 26 inch ellipse. The FAA project manager witnessed a test of the emergency exit system including the crash ax. The test verified the effectiveness and ease of use of all aspects of the emergency exit provisions. The proposal detailed above in the applicant position section of this memo provides a level of safety that is equivalent to that provided by strict compliance with FAR 23.807(b). Therefore, the FAA agrees that this equivalent level of safety criteria may be used for showing compliance.

Compensating Features:
As described above, the emergency exit system has been shown to be effective in all probable attitudes, and clearly meets the intent of the regulations.

Recommendation:
We concur that the PACUSA proposal detailed above in the applicant position section of this memo provides an equivalent level of safety as envisioned by the regulations and thus meets the requirements of FAR 23.807.

Recommended by:

2/2/99

Manager, Seattle Aircraft Certification Office, ANM-100S — Date 2/2/99

Concurred by:

Manager, Standards Office, ACE-110 — Date 2/9/99

SM 2.4.99 2/4/99

Manager, Small Airplane Directorate,
Aircraft Certification Services, ACE-100 — Date 2/5/99