U.S. Department
of Transportation

**Federal Aviation
Administration**

Small Airplane Directorate
901 Locust, Room 301
Kansas City, Missouri 64106

September 14, 2010

Soaring Society of America, Inc.
P.O. Box 2100
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Dear SSA:

Based on numerous concerns from Aircraft Industries/LET model L-13 owners, this document provides clarification in response to our issuance of FAA AD 2010-18-05, dated August 25, 2010. This AD addresses a fatal accident which occurred to an L-13 Blanik on June 12, 2010 and affects the L-13 and L-13A Blanik gliders, all serial numbers. This letter is meant to provide information only and does not authorize, promote, or require any alternative actions or procedures.

Background

On July 19, 2010, FAA AD 2010-14-15 became effective. This AD, based on European Aviation Safety Agency's (EASA) AD 2010-0119-E, prohibited further aerobatic flights and required an immediate visual inspection of identified critical areas of the wings and to report inspection results to Aircraft Industries for further assessment. Since this issuance, we received preliminary information from EASA, which is the Technical Agent for the Member States of the European Community that identified fatigue as the failure mode in the fatal accident. Preliminary details identified 8 areas of fatigue cracking that originated from the surfaces of the rivet hole bores that attach the aluminum flange straps to the lug steel hinge. The fracture occurred in the wing's main spar lower flange approximately 20 cm from the wing root through 3 rivet bores arranged as a triangle. None of these fatigue cracks had propagated to the surface of the flange straps and were not visible from the wing inner space through holes in the root rib. As a consequence, these kinds of cracks are likely to remain undetected by visual checks of the wing spar lower cap and cap splice critical areas from the wing inner space as required by Aircraft Industries/LET Mandatory Bulletin No. L13/109a. EASA has issued subsequent replacements to its originally published AD. As of September 3, 2010, EASA has superseded its latest AD 2010-0160-E with AD 2010-0185-E. Other preliminary findings from the fatal accident are as follows:

Date of Manufacture:	1972 (to be confirmed)
Serial Number:	175117
Time since new:	2318 hours (to be confirmed)
Cycles since new:	5151 (to be confirmed)
Time since last overhaul:	428 hours
Cycles since last overhaul:	853
Date of last overhaul:	February 15, 2000

Time since last repair/inspection:	7 hours
Cycles since last repair/inspection:	17
Date of last repair/inspection:	March 21, 2010

In an effort to determine the effectiveness of Aircraft Industries' Mandatory Bulletin L13/109a, the FAA has attempted to perform the requirements of this Bulletin on a locally based L-13 and made the following findings:

a) Figure 1 of the above stated mandatory bulletin shows 3 rows of rivets on the inboard side. When viewing the splice joint rivet pattern from the wing skin, only 2 rows of rivets are shown. This indicates hidden rivet heads lie between the lower aluminum flange strap and the wing skin. These hidden rivet heads will never be inspected using a simple visual method as required in the bulletin. See the attached Photos 1 and 2.

b) The design of the spar assembly utilizes a "double rivet" configuration such that a smaller diameter rivet is inserted within a larger rivet. This type of design makes it impossible to visually inspect the larger rivet head (see Paragraph "a" above) as well and introduces stress concentrations at the interface of the two rivet heads leading to reduced strength of the larger rivet. This type of design also increases difficulty during rework. In addition, on a few selected rivets, the height and position of the shop head side of the smaller rivet was not properly formed. See Drawing 1.

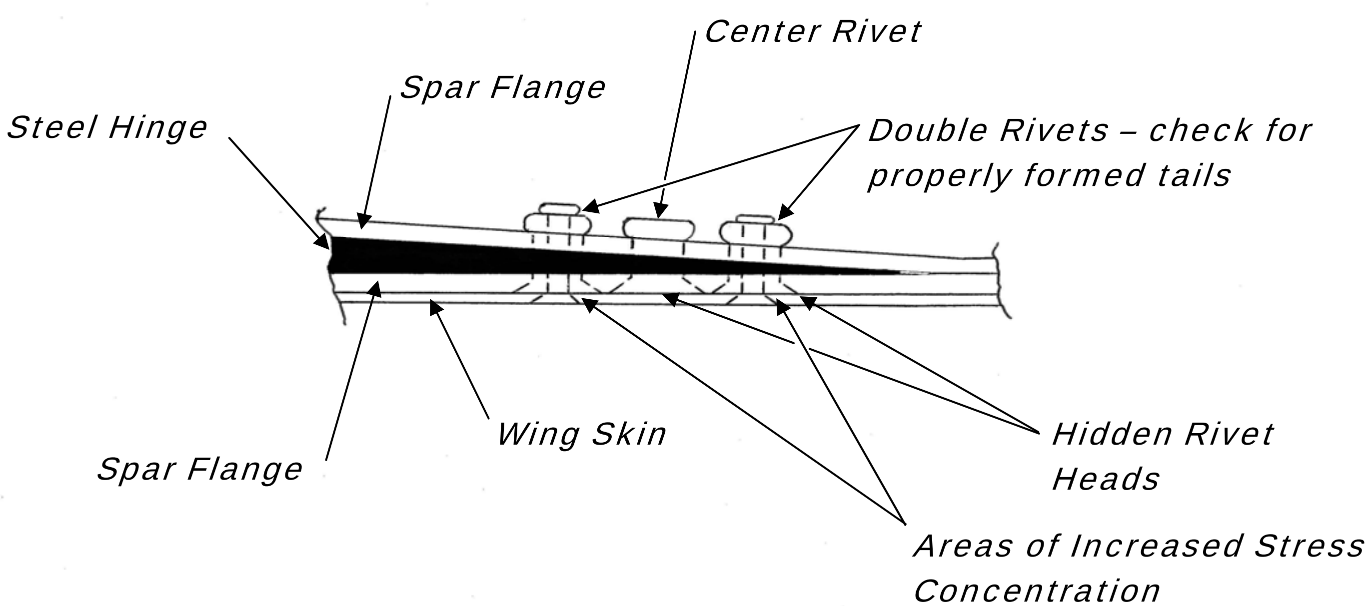
c) Figure 2 of the Mandatory Bulletin shows the inspection area of the fuselage lower spar. This spar is situated between 2 bulkheads and is not accessible when using a hand-held magnifier. The use of a boroscope with sufficient magnification would be more appropriate. See Photo 3.

d) There is a potential for galvanic corrosion in the spar assembly due to the use of dissimilar metals. Considering the age of these gliders, the protective finish between the aluminum flange straps, steel hinge, and the fasteners must be maintained, particularly in corrosive environments.

Photo 1: View of the spar cap splice joint from inside the wing

Photo 2: View of spar fastener pattern from the wing skin

Photo 3: View of forward and aft bulkheads;
Fuselage spars lay between these structures



Drawing 1

Since publication of our AD 2010-18-05, the FAA has received numerous requests from owner/operators/inspectors concerning what options are available to reinstate flight operations for the L-13. Based on the above findings, the FAA considers the visual inspection inadequate and believes the unsafe condition may remain even after the sailplane has passed the Bulletin's visual inspection requirement. Therefore, the FAA has superseded its AD 2010-14-15 and issued AD 2010-18-05, which effectively grounds the U.S. L-13 Blanik fleet until an approved inspection and/or modification program is developed by Aircraft Industries/LET and approved by EASA and implemented. As of September 13, 2010, Aircraft Industries/LET has not developed an approved alternate inspection procedure that is available for immediate use. Since issuance of our latest AD, EASA has superseded its AD 2010-0160-E with AD 2010-0185-E, which became effective September 3, 2010. This latest AD prohibits all flights of the L-13 and L-13A Blanik sailplanes.

One subject of the public's inquiries proposes various non-destructive test techniques to determine the condition of the gliders. Based on the mode of failure of the fractured wing and the complexity of the spar design, we have concerns that the use of any nondestructive test (NDT) method without the disassembly of the structure would provide adequate results. However, removal of all the spar fasteners at one time prior to inspection could lead to misalignment problems during reassembly. Because the cracks were found in the rivet bores, the preferred procedure would be the use of an eddy current bolt hole probe (automated rotary scanners are available), which requires fastener removal. These probes can detect a crack size of approximately 0.03 inch. To inspect with the fastener installed, the low frequency eddy current procedure could be used. However, this method requires the probe to be centered on the fastener head on the surface of the part and is limited to detection of relatively large cracks (approx. 0.5 inch) that originate in the fastener hole. Since the primary load bearing rivet heads are hidden, only the small rivet heads on the wing skin could be inspected (see Drawing 1.) This brings to question how this method will work with the double-rivet design. Also, the penetrating depth using the low frequency method coupled with a suitable probe on aluminum or similar structure is limited to approximately 0.4 inch. An alternate procedure, ultrasonic, would not be a viable method unless the spar is disassembled. Inspection with ultrasonic instruments is limited to the part in contact with the transducer because the ultrasonic beam will not cross an interface between two parts. A brief description of the most logical options, eddy current and X-ray are presented.

Description of Method: X-ray:
An X-ray inspection is performed by transmitting a beam of penetrating radiation through an object onto a photosensitive film. This beam is partially absorbed by the material through which it passes. Defects that cause a reduction in the total thickness of the material will result in less absorption of the X-ray. Any local change in the absorption of the X-ray will result in a change in the intensity of the X-ray striking the film. The film is processed to form a visible image, which is called a radiograph.

X-ray Use

	Applications	Advantages	Disadvantages
X-ray	Used for detection of discontinuities (cracks, voids, porosity, inclusions, etc.), examination of welds, inspection for foreign bodies or debris, diagnostic examination of components (e.g., switches, actuators, etc.) and detection of water in honeycomb structure. Useful when the geometry of the structure, material thickness, and location of the X-ray generator in relation to the crack are ideal	Inspect for both internal and surface defects Inspect covered or hidden parts or structure Permanent test record Minimum area preparation required	Expensive Area must be cleared of personnel to avoid radiation hazard Method is directional, depending on crack position and X-ray beam orientation. Cracks must be aligned with the path of the X-ray beam in order to appear as an image on the film Tight cracks that represent little change in material thickness are very difficult to detect Laminar cracks or tight cracks exceeding 5 degree orientation from the direction of the X-ray beam will not be detected Crack sensitivity decreases with the total thickness of the metal. Detectable crack depth is approx. 30% to 40% of the part thickness Probability of detection may not be sufficient when examining multiple material assemblies (aluminum and steel in this case) High degree of skill required for varied technique development and radiographic interpretation Access to both sides required

Description of Method: Eddy Current:
When an alternating current of selected frequency flows in a wire coil that is in close proximity to a conducting surface, the magnetic field of the coil induces circulating (eddy) currents to flow in the surface. This flow of eddy currents generates its own magnetic field, which affects the initial field from the coil. This effect of the resultant magnetic field becomes the source of information which is analyzed electronically to yield the required data. The condition of the part is determined from these data. Eddy currents are proportional to the permeability and electrical conductivity of the material. To detect a crack, the crack must interrupt the surface eddy current flow. For surface flaws, the frequency is usually set as high as possible for maximum resolution and high sensitivity. For subsurface flaws, lower frequencies are necessary to get the required depth of penetration and this results in less sensitivity.

Eddy Current Use

	Applications	Advantages	Disadvantages
Eddy current	Detect surface crack, pits, porosity, and corrosion using a high frequency (approx. 100 kHz to a few MHz and provides less part penetration) Detect sub-surface crack and corrosion on an inner surface using a low frequency (approx. 100 Hz to 100 kHz)	Moderate cost Portability Minimum part preparation required Provides immediate results Sensitive to small imperfections Able to detect cracks at an angle Various probes/coils are available. Bolt hole probes are available to fit all standard hole sizes.	Surface must be accessible to contact by the probe High degree of skill and familiarity required in using test equipment Crack sensitivity decreases rapidly with depth. Detectable crack size beneath a 0.25 inch part is approx. 0.5 inch long Cracks lying parallel to the current path will not cause any significant interruption (required for reading) and may not be detected. Electrical conductivity may be altered by changes in shape or dimensions, variations in chemistry or alloy content Not generally recommended for use on steel parts due to interference produced by local permeability (ease which material can be magnetized) variations.

Another subject of the owner/operators/inspectors requests concern the ability to utilize the work done by the Gliding Federation of Australia (GFA) per their Airworthiness Directive GFA AD 160 or GFA AD 369. GFA 160 authorizes the use of Supplemental Type Certificate no. 96-1, held by Riley Aeronautics Pty. Ltd in Australia, to extend the service life of the L-13 through a modification and inspection procedure. GFA AD 369 finalizes extensive work to resolve the L-13 glider fatigue life issue by establishing a definitive time in service after which each wing or fuselage must be removed from service and inspected/modified accordingly. Since these airworthiness directives have not been approved by Aircraft Industries/LET or the State of Design (EASA), these methods can not be considered as an alternate means of compliance. If approval of either of these procedures is granted by Aircraft Industries and EASA, the FAA, based on its findings, would *consider* approval of these processes. The FAA would need to further investigate the GFA's procedures for determination of the overall condition (i.e., inspection of all hidden surfaces and fasteners) of the spar assembly.

Another subject of request concerns the development and implementation of an inspection and maintenance program to reinstate flight operations. The FAA has previously addressed this concern on other aircraft and on April 29, 2008, published Advisory Circular (AC) No. 91-82 titled: "Fatigue Management Programs for Airplanes with Demonstrated Risk of Castastrophic Failure Due to Fatigue." This AC provides guidance on developing and implementing a Fatigue Management Program (FMP) as a method to address an unsafe condition that has shown demonstrated risk of catastrophic failure due to fatigue. An FMP incorporates damage-tolerance based inspections or a part replacement/modification program to mitigate the demonstrated risk. An FMP also incorporates inspections based on service history and engineering judgment to address the broader risk posed by potential cracking of other fatigue critical structure in the airplane. The FAA may mandate an FMP by Airworthiness Directive only in cases in which the FAA has determined that airworthiness action is necessary to address an unsafe condition. The FAA may also approve an FMP as an alternative method of compliance (AMOC) to an AD. This AC is not mandatory and does not constitute a regulation. It describes an acceptable means, but not the only means, for maintaining the continued operational safety for airplane type designs that have a demonstrated risk. However, due to the complex design of this spar assembly (inaccessible areas for inspection, double-rivet configuration, crack propagation and residual strength of fatigue-damaged structure, etc.,) we recommend that corrective action reside with the manufacturer and State of Design (EASA).

The design of the L-13 wing spar assembly has been the focus of much attention. Related service bulletins issued by LET are as follows.

In 1961, Information Bulletin No. L13/003 was issued to address modification of the main spar root during the general overhaul, and is applicable to production series 1 through 21. Operating Bulletin No. L13/023 was issued to provide follow-on instructions to Bulletin L13/003.

In 1976, LET issued Mandatory Bulletin No. L13/042. This bulletin requires defined inspections to determine the actual state of the gliders which were, at that time, nearing the established third overhaul time limit. It required a visual check on the main spar flange plates at a distance of approximately 200mm from the wing rib no. 1. If the number of rivets found to be loose exceeded 6 places on the top and bottom flange plates, the sailplane was required to be overhauled. (Note: this inspection location coincides with the fracture position identified in the preliminary findings of the accident report.) This bulletin also set the service life at 3000 flying hours, 15,000 take-offs, or 25 years, whichever occurs first. If the 25 year criterion is met first, this bulletin authorizes life limits up to 3000 flying hours or 15,000 take-offs if these limits have not been previous met and the aircraft is in a condition for safe operation. Acceptability is dependent upon the aviation authority.

In 1977, Mandatory Bulletin L13/045 was issued to supersede Bulletin L13/042 and revise the service life of the L13 and the conditions of its applicability. This bulletin set the service life to 3750 flying hours provided defined average operating conditions and defined loading spectra are met. It also states conditions for further increases in the service life if specific flight operating procedures are applied. However, these conditions and loading spectra are not required to be logged by U.S. operators, thereby rendering an extension of service life inappropriate under this Bulletin's defined requirements.

In 1978, Information Bulletin No. L13/050 was issued to potentially increase the L13 service life by 3750 hours for average operating conditions specified in Mandatory Bulletin No. L13/045 or by the value of the service life specified for the average operating conditions indicated by the operator to the manufacturer. This increase is hinged on replacement of the complete wing, the lower flange of the wing center section, and the wing-to fuselage connecting pins. Again, this potential increase in service life utilizes LET's average operation condition concept, which requires specific data tracking that is not required of U.S. operators.

In 1993, Mandatory Bulletin No. L13/062 was issued to inspect the wing spar lower flange strap for cracks and report the glider's operation history within the next 50-hour periodic inspection. This bulletin was issued based on a crack found on a glider and affected all L13 and L13A models after accumulating 2000 flight hours. Again, this bulletin only requires a visual inspection, which will not detect subsurface flaws.

In 1995, Information Bulletin No. L13/068 was issued to prescribe wing replacement on the L13 and L13A during the next overhaul. This replacement increased the total service life by 6000 hours.

Bulletin L13/070 was issued to describe conditions to extend the service life to 4500 hours. This bulletin was not valid outside of the Czech Republic and is currently cancelled.

A last issue of concern from Blanik owners concerns the similarity in design between the L-13 and the L-13 AC and if the L-13 AC is affected in any way. The L-13 AC's wing joint of the main spar lower flange is reinforced as follows:

- Longer and thicker steel wing hinge and increased dimension of the hinge eye
- Longer and thicker duraluminum splice
- Increased number of rivet rows at the joint
- Use of double rivets has been replaced with single piece fasteners
- Wing skin joint relocated to outside of the spar flange
- An external steel splice was added to this joint from serial number 018901 and subsequent

Therefore, based on these differences, the L-13 AC is not affected by FAA AD 2010-18-05.

The FAA has published guidance material in the form of Advisory Circulars to assist the public in obtaining an acceptable means (but not the only means) of compliance with federal aviation requirements. These documents may be found within the FAA's website: www.faa.gov and within its Regulation and Guidance Library: http://rgl.faa.gov/.

- AC 23-13A Fatigue and Fail-Safe, and Damage Tolerance Evaluation of Metallic Structure for Normal, Utility, Acrobatic, and Commuter Category Airplanes
- AC25.571-1C Damage Tolerance and Fatigue Evaluation of Structure
- AC 39-7C Airworthiness Directives
- AC 43.13-1B Acceptable Methods, Techniques, and Practices-Aircraft Inspection and Repair
- AC 91-56B Continuing Structural Integrity Program for Airplanes
- AC 91-82 Management Programs for Airplanes with Demonstrated Risk of Catastrophic Failure Due to Fatigue

In addition, the FAA has published Order 8110.103, Alternative Methods of Compliance (AMOC) This order explains how requests for alternative methods of compliance (AMOC) to airworthiness directives (AD) are managed. It is available on the above listed websites.

This document is meant to provide information only and does not authorize or promote any procedures. As information relating to the accident and airworthiness is received, we will provide updates as deemed appropriate. The FAA wishes to thank the SSA for its support in addressing this important safety concern. For further information about FAA AD 2010-18-05, contact Gregory Davison, Aerospace Engineer, FAA Small Airplane Directorate, 901 Locust, Room 301, Kansas City, Missouri 64106; telephone: (816) 329-4130; fax: (816) 329-4090.

Sincerely,

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