

## **Carl Bahn Service Bulletin Number 1, Rev. 1, April 16, 2012**

**Title:** Spar Cap Borescope Inspection

**Subject:** Visual inspection of wing upper and lower spar caps for corrosion using a borescope

**Models Covered:** All Rogers (Aeronca) 15AC and S15AC series aircraft

### **Scope:**

This procedure is intended to be used as an alternate method of compliance to Airworthiness directive 2012-04-10. The borescope procedure contained in this service bulletin replaces the inspection procedure outlined in sections F (2) through F(7) of that AD. It provides an option to use a borescope instead of the installation of access covers that are required in the AD. Additionally, it provides for alternate access points for corrosion treatment application.

**Personnel: IMPORTANT:** All work and inspections required by this Service Bulletin are to be performed by a properly rated and equipped certified mechanic or repair station with appropriate authorization, experience in the work, use of equipment, inspections, and repairs listed.

**Statement of difficulty:** The Aeronca model 15AC/S15AC features a main spar composed of extruded aluminum spar caps riveted to an aluminum web. There have been instances where intergranular corrosion has been found in the spar cap extrusion. The exact number is not known. Intergranular corrosion is not uncommon in extruded aluminum pieces. It is a result of the grain of the metal and the boundary between the grains interacting with an electrolyte. A corrosive environment, i.e. a salt water/salt air environment, can contribute to the formation of intergranular corrosion.

Experience with the 15AC indicates that this corrosion can be detected by visual inspection, which is greatly aided by the use of a borescope. The difficulty lies in the fact that the 15AC has limited access to the wing for an inspection to be conducted. Current openings in the wing such as the inspection ports above and below the aileron bellcrank, the landing light port in the left wing, openings in front of the ailerons, and openings in the wing root allow for the majority of the spar in each wing to be inspected with a borescope with a length of 34" or more. This is somewhat variable depending on the equipment in use, technique, etc. Tests have shown that with a six-foot borescope the entire right wing would be able to be inspected with the addition of only one additional inspection hole. Borescope inspections are a normal practice in the industry and have become much more practical for the general aviation fleet as availability of the equipment has gone up and prices have come down.

The lack of access points have also made it difficult, if not impossible, to treat the wing with corrosion prevention chemicals. This service bulletin provides for careful inspection

of the wing spar caps for corrosion and for introducing access points that allow for the application of approved corrosion prevention treatments.

**Compliance, Part 2 (Perform Part 1 in accordance with AD 2012-04-10):**

Within the next 12 months, after the effective date of the AD, comply with Steps A and B instead of F(2) through F(7) of AD 2012-04-10.

Thereafter at each annual or 100 hour inspection, if required by operating rule, repeat Step A instead of F(2) through F(6) of AD 2012-04-10. Repeat Step B, instead of F(7) (applying corrosion prevention compound) of AD 2012-04-10, as determined necessary by the inspector conducting the inspection required in Step A. Step B, when required, must be completed within 10 flight hours or 30 days, whichever comes first, after the inspection required in Step A is completed.

**Step A:**

Inspect the leading and trailing edges of both the upper and lower main spar cap angles and web on both the left and right wing for signs of cracks, intergranular exfoliation, and corrosion with a borescope as described below in the borescope requirements section of this service bulletin. Except for the area covered by the fuel tanks, 100% of both the upper and lower spar caps and web must be inspected.

If only light corrosion is found, skip to stem B: If moderate or worse corrosion is discovered the wing must be removed from service or repaired in accordance with an Alternate Means of Compliance approved by the regulatory authority. Replacement of the spar cap per the service bulletin is acceptable. To facilitate this inspection, additional inspection locations may be installed per Burl's Aircraft, LLC Mandatory Service Bulletin No. 15AC06-08-10, Amendment B. Alternatively, additional inspection openings may be made in the underside of the wing 4 to 6 inches forward/aft of the main spar rivet line and centered between the ribs, plus or minus 1 inch. It is recommended that these holes be placed where they would be removed if the Burl's Aircraft, LLC Mandatory Service Bulletin, No. 15AC06-08-10, Amendment B, method were followed.

The diameter of the hole shall be 1/4, 3/8, 1/2, 3/4, or 1 inch, as required by the equipment being used. One hole per bay is allowed. No holes shall be made in the bays under the fuel tanks/bladders. All holes shall be properly deburred on both edges. A Unibit or similar tool is recommended. The diameter, number, and location of the holes shall be as required, subject to previous limitations in this paragraph, to inspect and the remainder of the spar. This will vary depending on the borescope/equipment used. The holes will be plugged with a nylon/plastic hole plug, or covered with aluminum tape, see materials list. Any combination of inspection holes from this or the Burl's Aircraft service bulletin are acceptable.

## **Step B:**

Corrosion prevention treatment must be applied to the spar caps after completing step A on the initial inspection. Refer to the schedule in "**Compliance, Part 2**" section for treatment requirements after subsequent inspections.

To facilitate this treatment, a hole of 1/4, 3/8, 1/2, or 3/4 inch diameter may be placed in the outboard end of each wing tip and in rib part numbers 5-469 R and 5-469 L, forward of the main spar, as required, for corrosion treatment of the spar and wing. These holes may be made 5 inches, +/- 1/2 inch, in front of the main spar cap strip vertical rivet line so that the holes will be in line with the nose rib lightning holes. The holes shall be plugged with a standard nylon/plastic hole plug, or covered with aluminum tape, see materials list. Holes in the rib do not need to be plugged. Treatment with an approved solution shall cover, at a minimum, the entire front and aft portion of the spar with the exception of the area covered by the fuel tanks on the front of the spar so that the material can "creep" between the skin of the aircraft, the spar web, and the spar caps. It is recommended to treat as much of the fuel tank area as practical. Follow the manufacturer's instructions for product application. It is recommended that any painting be completed before treatment with the corrosion inhibitor.

## **Repairs**

If repair of the spar cap is necessary it shall be done per Burl's Aircraft, LLC, Mandatory Service Bulletin No. 15AC06-08-10, Amendment B, along with any other requirements specified by the certificate holder. Alternately, repairs may be made following approved data from a DER if presented and approved as an alternate method of compliance to AD 2012-04-10 by the applicable regulatory authority.

## **Materials list**

Plastic hole plugs appropriate to the size hole drilled:

Crown bolt: 1/4" part number 14628, 3/8" part no 14728, 1/2" Part number 14748, 3/4" 14978, 1" part number 15188, or equivalent

Grainger: 1/4" P/N 1ELU2, 3/8" P/N 1ELU6, 1/2" P/N 1ELV2, 3/4" P/N 1ELV9, 1" P/N 1ELV7, or equivalent

Aluminum tape:

3M 051138-95166 425 Aluminum Foil Tape, or equivalent

Approved corrosion treatments:

ACF-50 brand corrosion inhibitor

CorrosionX Aviation corrosion inhibitor or equivalent products meeting, or exceeding, Mil-C-1309E type II, or Mil-C-81309E Amd 3, Type II and specified for aircraft use.

Any product that would obstruct the view for later inspections shall not be used. Products such as LPS 3 or Boeshield T-9 fall into this category. Besides not having the necessary properties to "wick" into the joints of the spar assembly, they can also hide corrosion from view and are thus unacceptable.

**Flashlights:** Maglight LWSA301, or equivalent

**Borescope minimum specifications:**

Given the literally dozens of video borescopes that are on the market today, along with the rapid advances and introduction of new models, it is impossible to list every model that is sufficient for the purposes of this inspection. However, at least two models have shown that they are sufficient for the task. These are the Milwaukee 2300-20 M-Spector Digital Inspection Camera with a 320x240 resolution color screen, and the AGPtek GB8803 camera with the 3.5" monitor 480x240 resolution color.

Other systems may be acceptable if they meet the following minimum specifications:

Minimum focal length of 1" or less to infinity

Minimum resolution 320x240 color

Magnification is not required; however, most video borescopes provide magnification, which may be helpful. The image viewed must be actual size, or larger when the camera or lens, is 4 inches from the area being inspected.

Must include a self-contained high intensity light source, which is adequate for illuminating the areas to be inspected.

The length of the scope probe must be at least 34 inches in length. Longer probes may require fewer access points.

The probe shall be of the "obedient" or controllable articulation type.

A simple test to help determine if a system is sufficient is to view a recent U.S. \$20 dollar bill. The small amber "20" symbols which are printed on the back of the bill should be readily visible and in focus when viewed from a maximum distance of one inch when viewed in a dark location. Additionally, the hash marks inside the letters of the word twenty, which is printed over the Department of the Treasury seal on the right side of the front of the bill should be visible when viewed in a dark area, using only the illumination provided by the borescopes light source. The final decision of suitability shall rest with the properly licensed inspector making the inspection consistent with the guidelines above.