
Stall warner - new build

Classification	Optional
Applicability	XS Europa in current build
Compliance	N/A

Introduction

The stall warner consists of a light alloy tube probe which provides a small opening in the starboard wing leading edge, with a pneumatic line and quick release connectors between the wing and the fuselage. Inside the fuselage an adjustable vacuum switch, triggered by reduced pressure in the line causes an electric horn to sound.

Installation

The alloy tube probe will be fitted through the centre of the starboard wing spar, just outboard of the BL102 leading edge rib.

Mark a vertical line on the rear face of the spar 45mm (1 3/4") outboard of the outboard edge of the W11 and W12 aileron bellcrank brackets. Mark a horizontal line at the centre of the depth of the spar - see figure 1.



Fig 1. Marking hole position on spar.

Drill a pilot hole about 6mm (1/4") through at this point, keeping the drill square to the spar in both axes. Carefully enlarge this hole to 10mm (3/8"), ensuring that the drill bit does not grab on entry or exit.



Take the piece of welding rod, and bend the last 15mm (5/8") at 45° on one end, so that the tip of the wire is 10mm (3/8") from the axis of the wire - see figure 2.



Fig 2. Bending of welding wire.

Insert the bent end of the wire through the hole in the spar, with the bend facing **inboard**, so that the tip of the wire will find the outboard face of the BL102 rib. Push the wire further in until it makes contact with the leading edge. Support the wire at its rearmost end to keep it straight - see figure 3.



Fig 3. Welding wire inserted through spar.

Using a flexible straight edge aligned with the wire, mark a line on the wing skin, extending to the leading edge. - see figures 4 and 5.



Fig 4 Marking line on wing skin.



Fig 5. Marking line to leading edge.

This will give you a position just outboard of the rib at the leading edge (the 10mm displacement of the wire at its bent end will put the mark into the centre of the rib flange). You may now remove the wire from the wing

Stick the leading edge template supplied (see page 7) onto a firm piece of card - see figure 6.

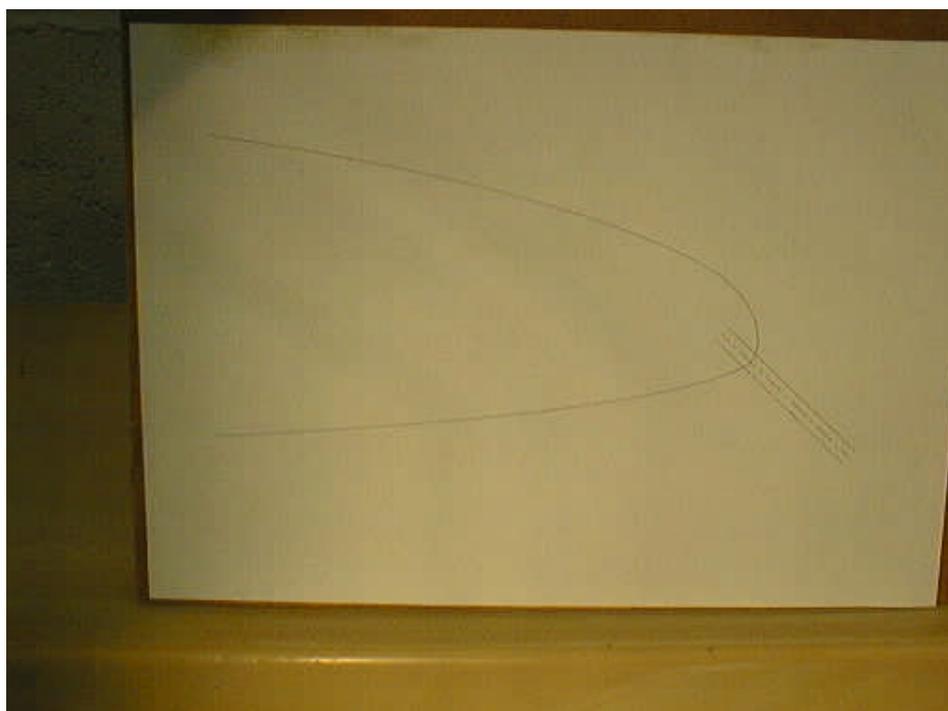


Fig 6. Template stuck onto card.

Cut out the profile from the card with a sharp craft knife, and push the template firmly into place on the leading edge, up against the line you marked on the upper skin.



Transfer the centre of the probe opening alignment marks onto the wing, intersecting the marked line.

Move the card template inboard by about 50mm (2”), keeping it firmly against the leading edge, and parallel to the marked line. Drill a 3mm (1/8”) pilot hole through at the marked position, checking alignment with the template - see figure 7.



Fig 7. Drilling pilot hole in leading edge.

Enlarge this hole to 10mm (3/8”) again referring to the template for the correct angle.

The probe can now be positioned in a ‘dry run’. Insert the probe from the rear through the spar, with the bent end forward. Feel your way along the rib, until contact is made with the leading edge. Rotate the tube until the forward end engages in the leading edge hole. Check for alignment with the template.

Repeat the dry run several times to get familiar with getting the tube through the hole, so that when it is done for real, with adhesive, the adhesive will not be disturbed too much. In practice the ease of locating the hole is inversely proportional to the amount of adhesive present!

Protect the card template with clear cellophane tape. Degrease and scuff sand the areas of the probe tube where it exits the leading edge and passes through the spar with 80 grit abrasive paper.

Mix up some Araldite 420, adding a little flox to achieve a non-drip consistency, and apply a generous coat to the bent end of the probe just back from the open end. Insert the probe through the spar, smearing additional adhesive to the rear of the probe where it will be within the spar, and push it through the leading edge hole.



With the card template beside the leading edge hole position the exposed end of the probe in line with the alignment marks.

Force additional adhesive into the holes around the probe both front and back and secure the tube to the template card. Allow to cure fully.

When cured, cut off the exposed tube and file it back to be flush with the wing leading edge. Bend the exposed end of the tube as it exits the rear face of the spar gently down and inboard - towards the aileron bellcrank access hole.

The 3mm bore tubing which connects to the W38 probe, runs inboard through the ribs and the root rib. Rubber grommets protect the tubing in the ribs, although the root rib being thicker will not need a grommet. Run the tubing just behind the access hole, then approximately 10cm (4") aft of the spar. Drill 10mm (3/8") holes through the internal ribs, near to the bottom skin, and insert a grommet in each rib.

Drill through the root rib, angled forwards and upwards so that the tubing can be passed over the top of the spar, and will eventually finish under the wing root fairing.

Feed a 2.5m (100") length of the 3mm bore tubing through the root rib and all the grommets and connect it to the probe, ensuring that there is no conflict with the aileron bellcrank assembly.

Run the tubing forward as it exits the root rib, over the top of the spar, and insert the female half of the quick connector assembly. Pot the tubing where it passes through the root rib with an epoxy/flox fillet.

Fuselage installation

Drill a 6mm (1/4") hole through the starboard fuselage side in line with the lower edge of the spar slot, and 13mm (1/2") forward of the front face of the cut out.

Feed a 75cm (30") length of the 3mm bore tubing out from inside the fuselage for about 15cm (6") and terminate with the male half of the quick connector.

Run the tubing down into the outboard seat pan. This is where the vacuum switch will be positioned. There is no need for it to be secured; in fact it is required to be loose for access during calibration.

The horn needs to be mounted in a place that will be audible to both crew members. The roof panel just aft of the screen is the recommended position, but make sure that its position doesn't interfere with the compass. Run the wires from the horn down to the vacuum switch, down either the screen pillar and under the door sill, or follow the rear edge of the door surround.

Connect the wires and tubing according to the diagram, figure 8, leaving the wires and tubing loose at this time, so that adjustment to the vacuum switch can be made with the switch on the co-pilot's lap, during flight testing.



The tubing must be connected to the vacuum switch on the same side as the wiring, otherwise it will not work. An optional red warning lamp (not part of the kit) can be fitted to the instrument panel if desired.

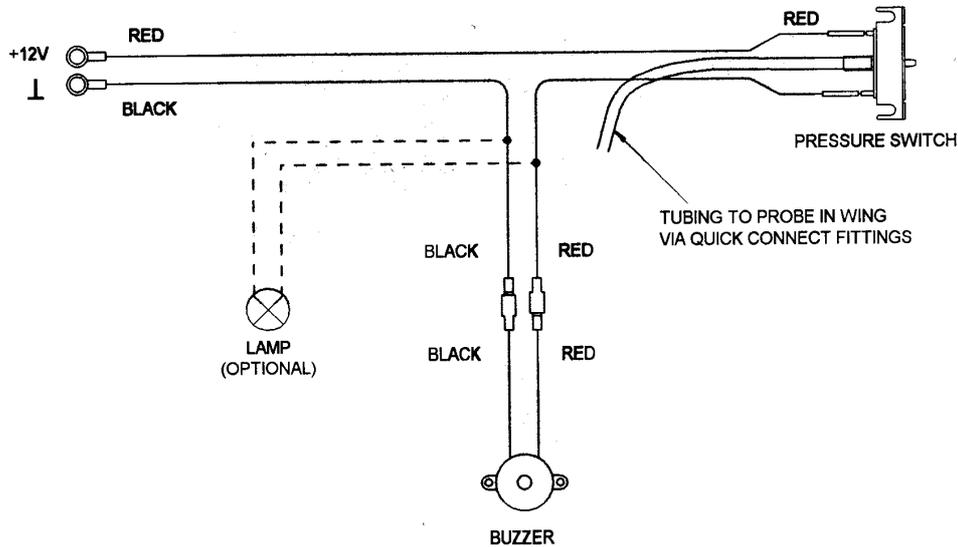


Fig 8. Wiring diagram.

Electrical connection

Depending on where you wish to connect the power and earth connections will determine the routing of the loom, and perhaps the exact position of the horn on the ceiling panel. It is recommended that the +12V supply is permanently live, as a landing without the master switch on (after an electrical fire for example) would otherwise isolate the stall warner too. Direct connection to the battery under the baggage bay, or to the battery solenoid connections would be suitable. Alternatively run the wires forward to the back of the instrument panel. You could connect the +12V terminal to the same fuse / circuit breaker as the trim system, as this should also be wired directly to the battery.

Inspection

Arrange for the installation to be inspected by the appropriate authority before flight.

Calibration

It is recommended that the stall warner is made to sound at least 5 Kts prior to the stall break, and at no more than 10 Kts before.

Prepare for calibrating the stall warner, which is done by adjusting the pressure switch with a small crosshead screwdriver.



Load the aircraft to gross weight and arrange for a fairly central C.of G; between 60” and 61” aft of datum would be ideal. Carry an observer who can make the adjustments while you concentrate on flying the aircraft.

Climb to a safe height to conduct the stalls (not below 3000ft. a.g.l.)

Firstly, by reducing airspeed at approximately 1 Kt / second, verify and note the stall speed of the aircraft with flaps up. Fly the aircraft at no less than 5 Kts above this speed and adjust the pressure switch so that the horn just starts to sound. Adjust the speed above and below the speed at which the horn sounds, and make fine adjustments as necessary.

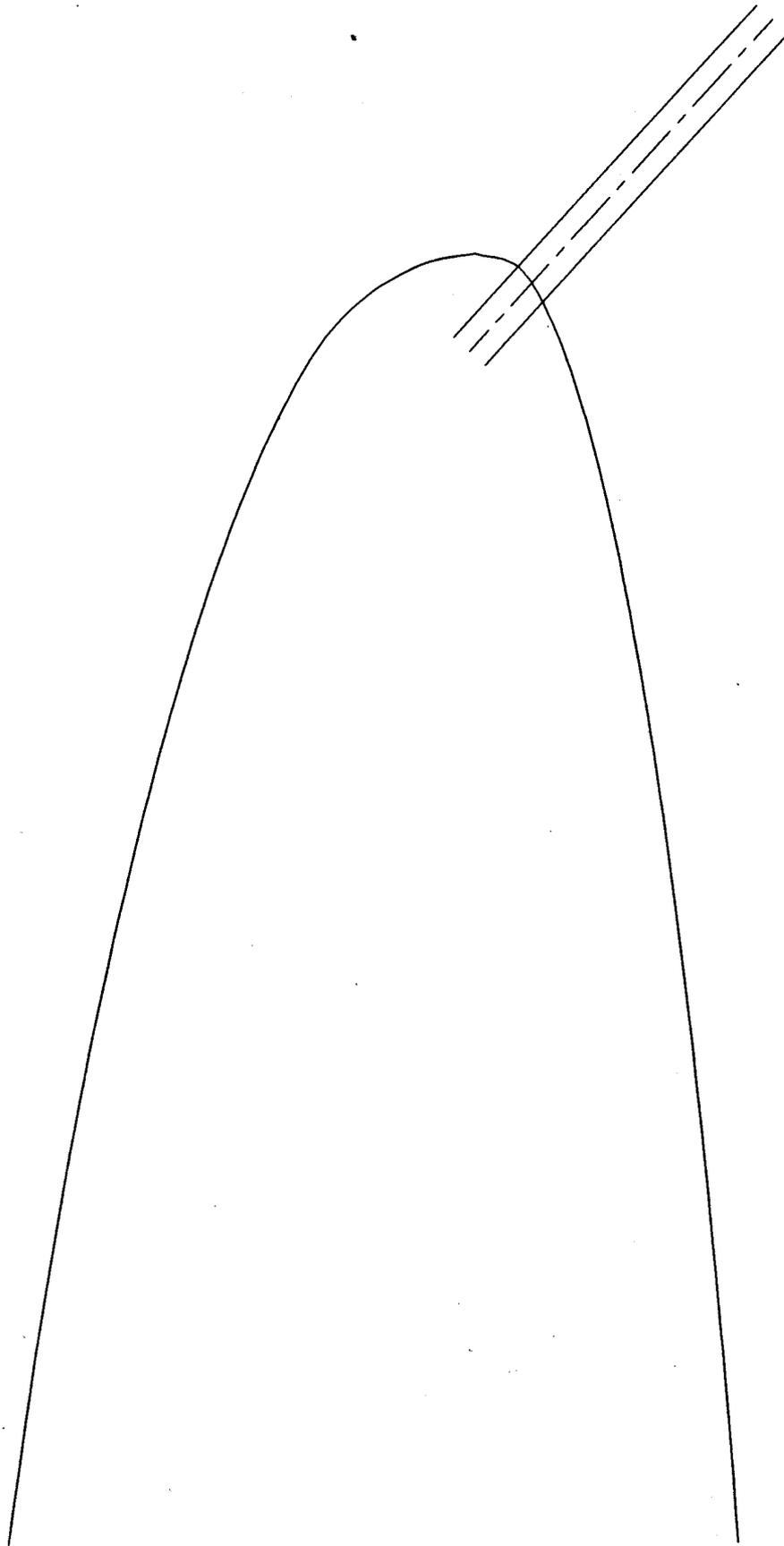
Conduct stalls at full flap and confirm that you get adequate stall warning, adjusting the switch as necessary. Check also that the stall warner provides adequate warning at full power, flaps down and up and also during accelerated stalls (at more than 60° of bank).

Documentation

Enter the incorporation of Mod 61A into the aircraft log book



INTENTIONALLY BLANK



Stall warning hole template



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