Blackburn Skua (MkII) and Roc

A guide for panel lines, access panels and errors in published plans.



Issue 2F, Revised after inspection of FAA Museum Skua L2940. This revision Dec 2023

John "Dinger" Dell

www.dingeraviation.net

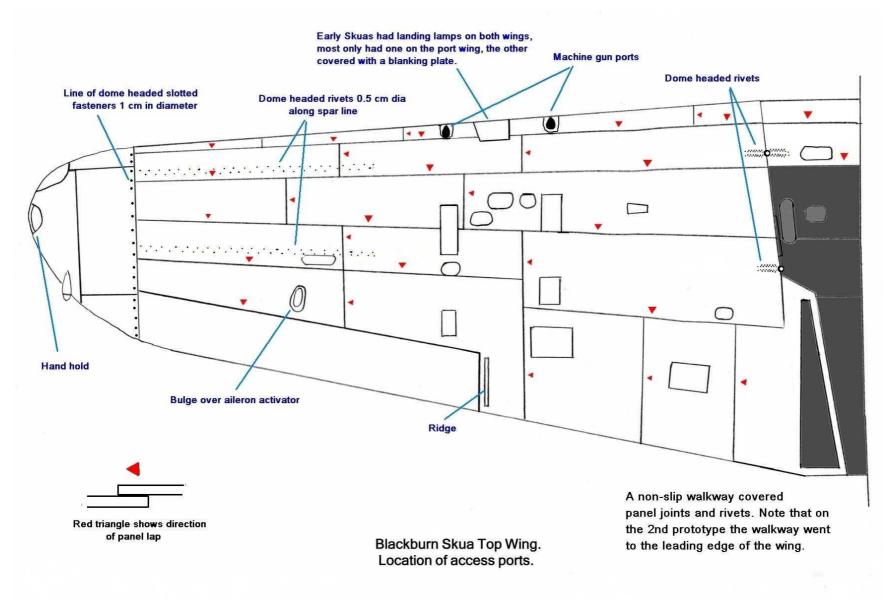
Massive thanks to Matthew Willis for help on sifting through photos. His book "Blackburn Skua & Roc" (published by mmpbooks) is by far the best reference on the subject although the 3-view drawings in it were done without the advantage of seeing AP1570A. Where photos in the book illustrate points in this document I refer to them as "see Willis...".

Contemplating building one of my "stash" of Blackburn Skua model kits, I wondered how the machine guns were fitted into the wings. On the latest Special Hobby kits the access panels marked on the wings were simply not big enough. The earlier Pavla model had much bigger access panels which seemed to be based on a plan published in "Scale Aircraft Modeller" back in the 1980's, but that did not match up with any other plans available on the internet or in books. Looking at photographs did not help much at first, access panels and panel-lines (other than those on the removable panels on the front fuselage) just did not show up well.

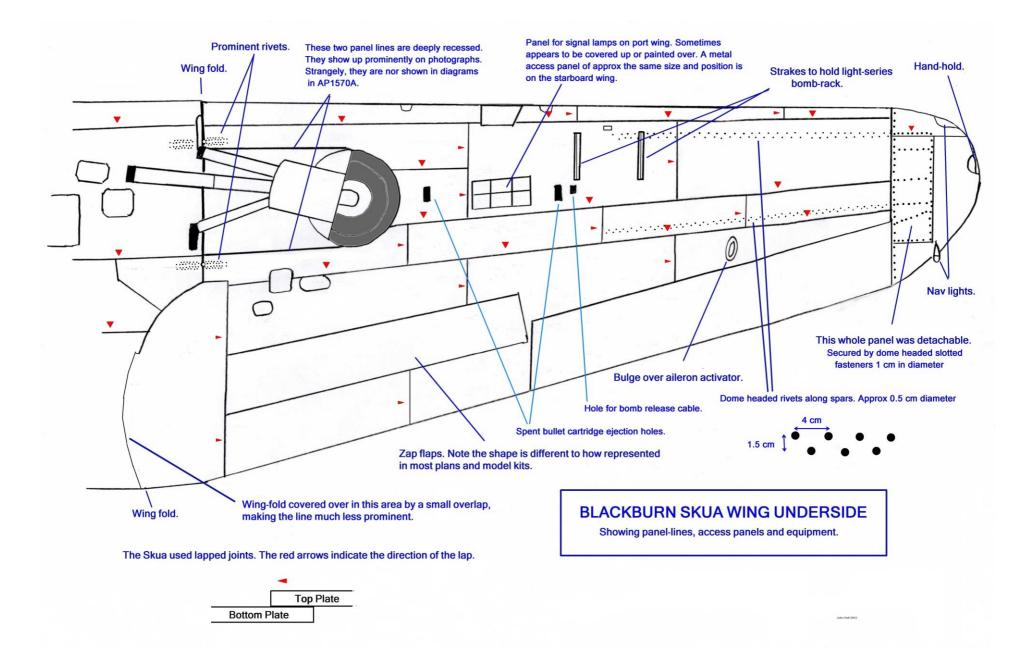
Then I remembered that I had a PDF copy of the "Air Publication" for maintenance and repair of the Skua (AP1570A Volume 2). I found that it answered all my questions and what is more, showed that all the published plans out there for the Skua are wrong! The manual has diagrams showing the outline of panelling on the fuselage, wings and tailplane, and also the location of access panels. It should be stressed that the diagrams are not "scale" drawings, and the only dimensions listed are of the size of alclad sheets to draw from stores to effect replacement of the various panels. But it did show the rough position of the panels and with this information I was able to go back and look at photographs to pick them out. Reading the manual also explained why it is hard to see any panel-lines on the Skua; its wings and fuselage were covered by panelling that overlapped. These "lap-joints" are very hard to see. The Alclad skinning of the Skua was only 0.7 mm thin and their edge would have been further softened by the jointing compound used. The laps were arranged to point away from the airflow and so are invisible when viewing the aircraft from the front. Some photographs taken from the rear of the Skua do show up the panels as they catch the light. Once I knew what I was looking for it was easy to confirm the panel outlines as shown in the manual (See photos on pages 17 and 132 of Matt Willis' book).

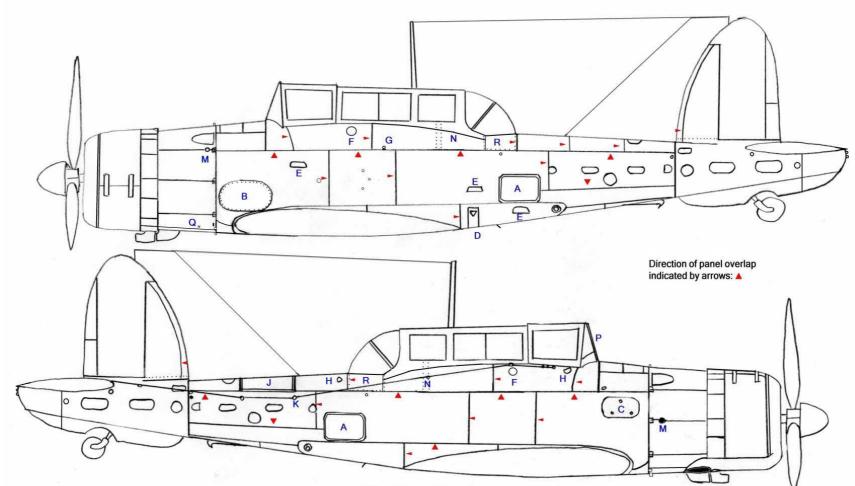
In the course of the investigation I discovered some quite startling errors in the available plans of the Skua and Roc, and these errors follow on to the Pavla, Warrior and Special Hobby models of the Skua and Roc (the old Frog/ Novo model of the Skua is so inaccurate as to be unworthy of consideration). In particular the shape of the flaps is wrong and the tailplane does not have the correct shape. All of this was confirmed by a visit to view the Skua remains at the Fleet Air Arm Museum.

By the way, there is nothing archaic about the use of lap-joints on the Skua; they are still widely used on aircraft today, even on the fuselage of jet transport aircraft. Obviously they fell out of fashion for wing surfaces because of their effect on laminar flow.



John Dell 2022





Blackburn Skua fuselage panels

A- Radio and first-aid access panels, both sides, raised rim around edge (see Willis Page 134)

B- Oval panel for front fuel tank, port side only. Approx 34 rivets around rim (see Willis page 45).

C- Oval inspection panel, starboard side only, with three prominent dome-headed fasteners.

D- Fold-down footstep.

- E- Sprung foot/hand-rests, port side only.
- F- Fuel cap covers for fuselage tanks, both sides.
- G-Rod, approx. 10cm long, possibly retracts. Port side only.
- H- Dinghy release handles (two), starboard side only.
- J- Dinghy compartment.

K- Anti-stall parachute release & cut-free cables, starboard side.

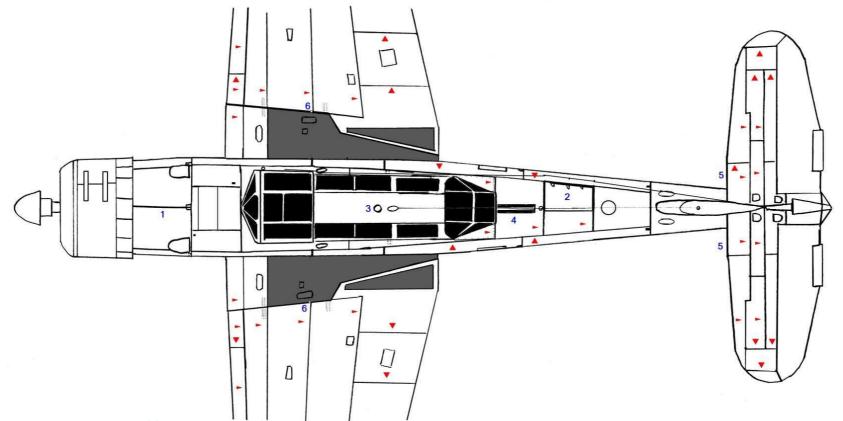
M- Holes in front panels, not shown on most plans.

N- Rows of larger dome-headed rivets or bolts, both sides.

P- Armoured windscreen on some Skuas from Sept 1940.

Q- Small hose protrudes through hole in panel, port side only. See Willis page 115.

R- Removable sides of gunner's compartment, held in place by dome-headed fasteners.

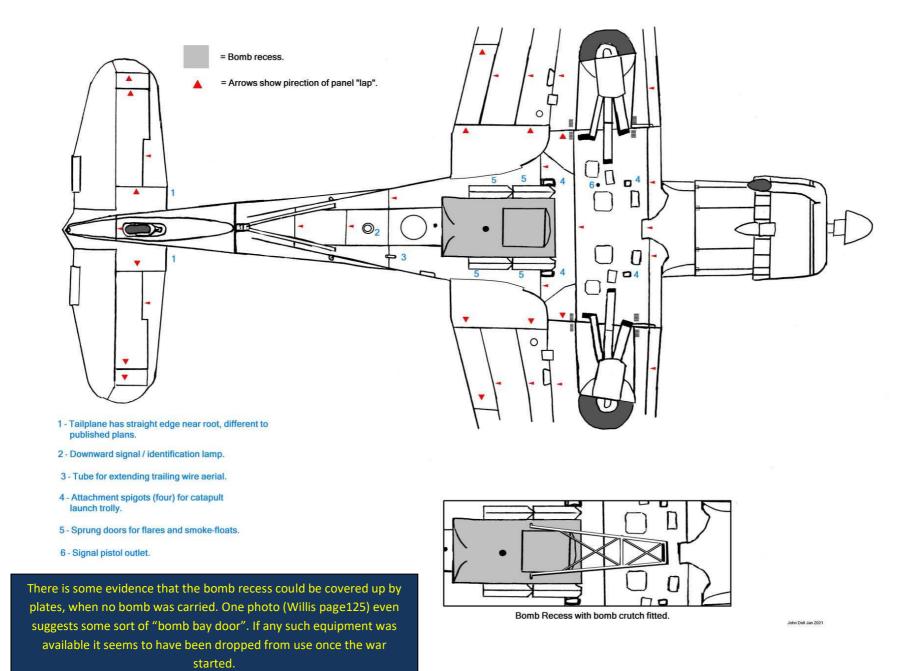


- 1. Panel-line along top of fuselage, missing from most plans.
- 2. Dinghy compartment, starboard side, extends very slightly to port side.
- 3. Top identification and signal lamp.
- 4. Gun recess trough, with wire aerial attachment insulator directly behind.
- 5. Straight edge to tailplane next to fuselage, shown wrong on most plans.
- 6. Undercarriage indicator rods, stick up 20-25 cm when undercarriage is up, bright-red in colour.

Red arrows show direction of panel "lap".

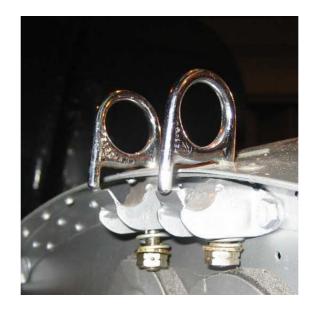
Blackburn Skua MkII fuselage top view

John Dell Jan 2021



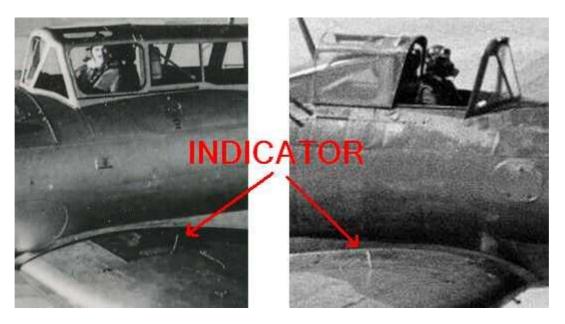
Points of note for modellers.

- 1. The two panels on either side of the fuselage to access the radio equipment had raised lips around their edge (Willis pg 134). A first-aid kit was also behind the panel on the starboard side, and stencilling often indicated that fact.
- 2. The oval front fuel tank panel cover on the port side of the fuselage had approx. 34 rivets/fasteners around its periphery.
- 3. The oval inspection panel on the starboard side of the nose had three prominent dome-headed fasteners.
- 4. The removable panels around the nose of the Skua were held in place by quick-release fasteners. These consisted of pairs of rings that stood out from the fuselage. You put your finger through the ring and pulled to release the panel (see photo below of the fasteners on the Bodo cockpit reconstruction).



- 5. The panels in front of the pilot's windscreen could be opened to give access to the filler points for the front fuel and oil tanks, and therefore any paint on them became quickly worn and chipped. Likewise the two fuel caps for the centre fuel tanks (one on each side of the canopy) were also an area that quickly became distressed.
- 6. The circular and oval access panels along the side of the fuselage were each held in place by only two dome-headed fasteners (see Willis Page 137). Note that the oval panels on the tailplane section were considerably larger than those on the fuselage (Willis page125).

- 7. There was an area of prominent rivets or fasteners (2 vertical rows with about 7 rivets in each row) on each side of the fuselage near the gunner's position. They are particularly noticeable on "silver", unpainted Skuas. They are probably associated with the internal bomb-hoist.
- 8. The panels on each side of the gunners position were removable and held in place by dome-headed bolts (see Willis pages 20, 118).
- 9. The tailplane section was built as a separate unit (its construction was sub-contracted out to the General Aircraft Company). It could be removed as a whole unit and therefore had a pronounced "panel-line" around the join. This was further accentuated by a black line indicating the trestle position under the fuselage which was just in front of the join.
- 10. A rod, about 10 cm long, is seen protruding from the port side of the fuselage of both Skuas and Rocs in many, but not all, photographs. In one film it can be seen being used as a hand-hold It may be that it somehow retracts back into the fuselage. It is seen on photos of aircraft both on the ground and in flight. I thought it might be mechanically linked to the retracting footrest on the port wing-root, but I have since found photos of it extended when the foot-rest is retracted.
- 11. On the outside of the fuselage, on the starboard side, next to the pilot and rear gunner's positions are handles, looking like a "ring-pull". These are activation handles for the inflatable dinghy. On the Roc there is a third one, located next to the tailplane, again on the starboard side. On the Skua the cable they operate runs inside the fuselage; on the Roc it is external.
- 12. The upturned wingtips had a row of prominent dome-headed slotted fasteners along one side of the top surface while the underside was covered with dome-headed slotted fasteners.
- 13. The Skua (and Roc) had white signal/identification lamps on the bottom of the fuselage and on top of the cockpit. These could be operated by the Morse-key of both the pilot and gunner to function like an Aldis signalling lamp. The Skua also had a "block" of lamps built into the underside of the port wing to show pre-arranged colours for identification.
- 14. There is some photographic evidence that, for a few months after the Skuas were first introduced into service, their bomb-recess would be covered up by a blanking panel (or panels) when no bomb was being carried (see Willis, Pages 14 and 125). This practice seems to have been dropped.before the start of the war.
- 15. The machine-guns of production Skuas did not protrude from the wings. It was only on the widely-photographed prototypes that the barrels of the guns poked through front of the wing, due to them still having flash eliminators fitted.
- 16. If you build a Skua or Roc with the elevators "drooped", note that small holes become visible in the tail (see photo on Willis page 114).
- 17. On both the fuselage sides were a number of small holes covered by "keyhole covers", fixed by a single bolt (see middle picture on Willis page 134 to see one). They look only large enough to get a finger through. They might have been peep-holes to check the correct operation of control-cables, or other equipment, inside the fuselage.
- 18. If you are building a Skua or Roc in flight, be aware that a 20-25 cm bright-red painted flat-sided rod stuck up from both wings, on the line of the wing-fold. These indicated when the undercarriage wheels were retracted. This is the reverse of most other aircraft manufacturers, who made their mechanical indicators stick out when the undercarriage was extended. This did have the advantage that the rods would not be damaged by groundcrew bumping into them, but it must have added a bit to the drag of the Skua in flight. From examination of the wreck in the FAA museum it looks like the "rod" rotated back to lie flush with the top of the wing.



Location of the mechanical undercarriage indicator, left on Skua, right on a Roc.

Representing the lapped joints on models.

In 1/72 scale it is perhaps best to ignore the lapped-joint panel-lines. At only 0.7 mm high on the real aircraft, barely thicker than a sheet of writing paper, they would be undetectable. Because the lap pointed away from the airflow they would not usually collect dirt and oil and so it's pointless to pick them out with washes. If you really wanted to, you might try to subtly suggest them with layers of paint, masking out the different panels and building up the layers from the wingtip and trailing edge of the wings to the leading edge and wing-root, and on the fuselage from the rear to the front.

In 1/48th scale the lap-joints might just be visible in certain lights. Particularly on silver Skuas, if the light comes from behind (for example, see photo on page 114 of Matthew Willis' "Blackburn Skua & Roc" which also shows open access panels).You could try the same method of building up paint layers, or you could run strips of Dymo tape and use it as a guide to try to very gently rub lines (or a gentle scrape with a wide blade). You would need to plan the order in which you did the lines on the wings, building up from the wing-tips and trailing edge.

Access panels were of the same thickness of Alclad, and were recessed flush with the surface. Again they would be barely noticeable in 1/72 scale, except were the paint around them was chipped. On silver Skuas a slightly different shade of silver might make them stand out. The photo below shows one of the silver prototypes with the access panels standing out. However, production "silver" Skuas seem to have been sprayed in a protective coat of "Cellon" that followed by silver painy which gave a more uniform finish. In 1/48th scale, very fine inscribed lines might be used to define the access panels.



Where you can use your washes to pick out lines – (1) Wing fold line (but notice the "lip" that makes part of the line on the bottom of the wing less prominent). (2) The joint line between the tail unit and fuselage. (3) The removable covers around the nose. (4) The oval oil and fuel-tank cover. (5) The two lines next to the wheel-wells. These were exceptionally deep and wide(on the FAA museum example you can get your fingers well into them). (6) The flaps. (7) The rear fuselage hatches for access to the radio equipment. On a couple of photos of well-worn Skuas the panel line that curls up from the leading-edge wing-root to the removable nose panels stands out , presumably with oil and dirt blown back from the engine. On photos of cleaner Skuas it is not noticeable at all.

Blackburn Roc

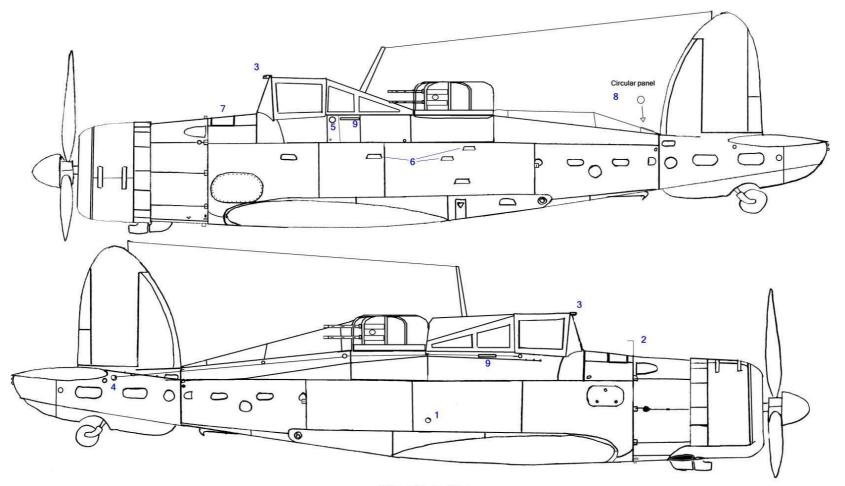
Without the benefit of the Roc equivalent of AP1570A, I can only speculate on the location of panel-lines and access panels on the Blackburn Roc, the Skua's turretequipped derivative. The principal differences between the two are:

- 1. The Boulton-Paul, four-gun, type A turret installed on the back of the fuselage. Fairings in front and behind retracted as the turret smoothed the airflow over it, but retracted when the turret rotated to give clear fields of fire. The radio aerial on top of the front fairing moved with it, the aerial being held taut by tensioners.
- 2. To reach the turret the gunner was provided with an extra three sprung handhold/footrests on the side of the fuselage on the port side.
- 3. The Roc did not have the radio access hatches on the fuselage sides (inaccurately shown on some plans). This was because the radio equipment on the Roc was repositioned in front of the turret. No such hatch is visible on any photographs of the Roc, but one seems to be indicated by a broken line on an official diagram of the Roc interior. It may be that this is just an area of fuselage that the gunner could break through, with the fireman's axe provided, in the event of being trapped in the fuselage after a crash.
- 4. Instead, there was a trap-door style hatch (doors opening inward) in the bottom of the Roc to give maintenance access to the radio and also provide the gunner with an alternative way to exit. There was enough room inside for the gunner to drop down and manipulate the radio if required.
- 5. The trap door on the Roc was accommodated in a "flat bottom", the area between the wing fillets being flat, unlike the complex curves of the Skua.
- 6. There was only one fuel tank behind the pilot (unlike the two in the Skua). So only one filler point was required and that was on the port side behind a door (unlike the circular filler covers on the Skuas). Confusingly there was a circular panel in this door which on some Rocs was left off to give quicker access. An extra ridge on both sides of the fuselage may indicate further access panels.
- 7. To improve stability, the Rocs wings had dihedral and did not have the upward-turned wingtips of the Skua.
- 8. The Roc did not have the very small, backward pointing, navigation lights that the Skua had, on the wing-tips.
- 9. There was a subtle difference in the cover-plates on the main undercarriage legs (first pointed out to me by Brian Derbyshire).

- 10. The top signal/identification lamp was moved to a protrusion on the top of the pilot's windscreen. There was still a small glass bubble, presumably with some sort of lamp in it, on top of the fairing between the turret and pilot (barely visible in the photo on page 30 of Willis, but clearly seen on the BAE originals).
- 11. The dinghy release cable was moved outside the fuselage (starboard side) and extended so that there was a third handle near the tailplane. This meant the Roc had three cables running down the starboard side: the dinghy release cable and the anti-stall parachute release and cut-free cables (these last two ran close together and look like one cable on most photos). From photographs it is clear that Rocs often flew with these cables removed. The dinghy was housed in the fairing on top of the fuselage.
- 12. The Roc did not have machine-guns in the wing and therefore would not have had the access panels required by the Skua. We can speculate that, other than that, the access panels and panel-layout on the wings of the Roc would have been much the same as the Skua.
- 13. For some reason, the panels in front of the pilot's windscreen on the Roc seem to be more prominent than on the Skua. It is hard to see why. On some photos it is almost as if someone had deliberately outlined them with black paint! Or maybe they were just a poorer fit.



Starboard side of the Roc, notice the cable for the dingy release and one of its "ring-pull" handles, and below it the double cable-run for the anti-spin parachute in the tail.



Blackburn Roc

1- Recessed circular socket, starboard side only, for connecting a "trolley acc" to power the turret on the ground for test or practice purposes.

2- Pipe, (de-icing spray?) seen in some Roc photos (see Willis, Page 37, 45 and 128).

3- Lamp in protrusion on top of windscreen. There was also a tiny "bubble" lamp on the fairing just in front of the turret, slightly offset to starboard (just visible in Willis page 30).

4- Extra handle for dinghy release on cable running external to fuselage, starboard side only. Dinghy was housed in the fairing on top of the fuselage.

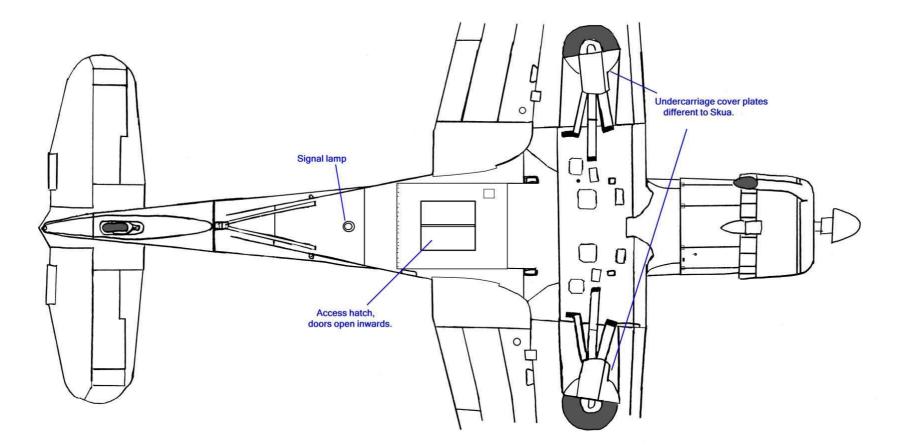
5-Fuel filler cap, behind door, port side only. Circular panel on door could be left off to give quicker access..

6-Extra hand/foot rests for access to turret, port side only.

7-More pronounced panel lines (or outline marking?) than on Skua.

8- Circular panel on top of fairing to give access to CO2 cylinder for inflating the dinghy.

9- Ridge on both sides of fuselage, may indicate extra access doors to get at internal equipment.



Blackburn Roc

The Roc had a flat area between the fuselage and the wing fillets (unlike the Skua which had a curved underside to the fuselage which mated with the fillets in a complex shape). There was door in the bottom of the fuselage for access to the inside for maintenance. This door was also available to the gunner as an escape route, but he usually got into the turret via the sliding doors at the rear of the turret. The Royal Navy did not issue Roc gunners with the all-in-one slimline "Rhino" parasuit used by RAF Defiant gunners. Instead, the parachute was stowed in either a receptacle built into the turret itself (near the gunners knees) or on the inside of the fuselage. The parachute would be clipped onto the front of the gunner's harness before jumping .

John Dell 2021

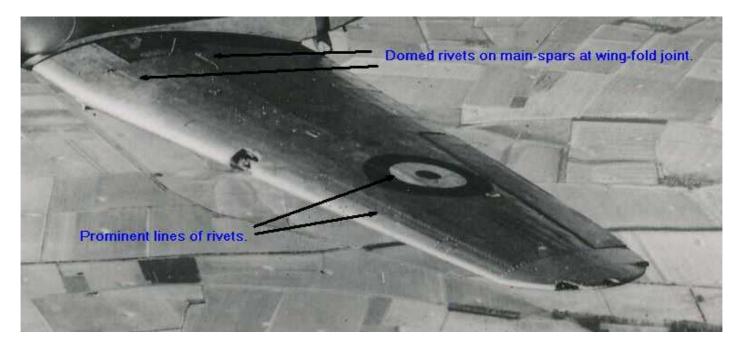
Rivets and fasteners

With the modern craze among model-makers for using rivet-wheels to add detail to models, it would be nice to produce a plan of where all the rivet-lines ran on the Skua and Roc. Sadly I've not been able to find enough photo-evidence to cover the whole surface of either aircraft. We will probably not get a full answer for the Skua until the Bodo restoration is complete, and probably never for the Roc. If you want to have a go, here are some things to consider.

1- Obviously each skin-panel was riveted around its edge. Make sure you examine the lap-diagrams and put the rivets on the lapped side!

2- Some skin panels were riveted by a single line of rivets, but others had a double line with the rivets on each line staggered.

3- The line of the two main wing spars were heavily riveted, both on top and underneath the wing, starting off with four lines of rivets at the wing roots, dropping down to two lines of rivets from a point midway between the "strakes" for attaching the light-series bomb-racks. From here the rivets are dome-headed and show up prominently. Each domed rivet is about 0.5 cm in diameter and they are arranged in two staggered rows.



4- As shown in my diagrams, where the spars crossed the wing-fold joint they had four staggered rows of dome-headed rivets.

5- In addition there were rivets along lines to tie the skinning to the underlying aircraft structure. These were mostly single lines, but could be twin or even triple. The outer wing of the Skua and Roc were built as watertight units to keep the aircraft afloat after ditching and AP1570A stressed the need to double-rivet any repairs in this area.

6- It is noticeable that the skin on the rear fuselage of the Roc sometimes had the stressed-skin "dimpled" effect common on larger, flat-sided airframes like the Lancaster and B24 Liberator. Probably because the Alclad sheets used on the rear of the Roc were larger than on the Skua and the fuselage of the Roc was slightly flatter (see Willis pages 71 and 117).

Pitot tube – The pitot tube was mounted on the starboard wing. It was on the wing-tip section, approx 8 cm outboard of where the tips bent up on the Skua and in the same position on the Roc (although the Roc did not have upturned wing tips). In early pre-war photos of Skuas and Rocs the pitot tube has two distinct tubes, one above the other and the tubes bend up to mate with a thicker section. On later photos of both Skuas and Rocs there is just a single tube that is in line with the thicker section.



The two styles of pitot tube seen on both Skuas and Rocs, in this case on Rocs. To the left is the early two-pronged type, generally seen on pre-war photos of "silver" Skuas and Rocs. On the right is the later simpler type seen on most wartime photos. The earliest serial number Skua I can find with the later type is L2923, a late aircraft of the first batch of Skuas ordered. The last Roc serial number I can find with the earlier pitot type is L3090, about one third of the way through the Roc production run.

Appendix 1 – Photos of wreck of Skua L2940 in FAA Museum

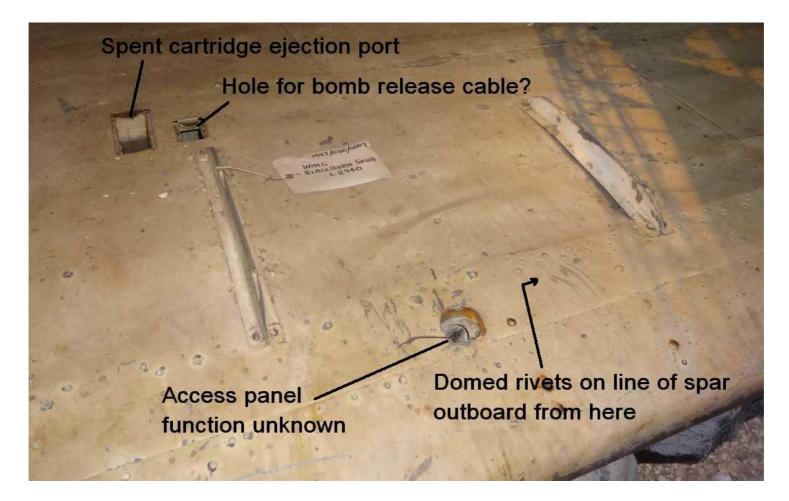


Photo1: The strakes on the underside of the starboard wing for attachment of a light series bomb rack.



Photo 2: Open panels on top of port wing.

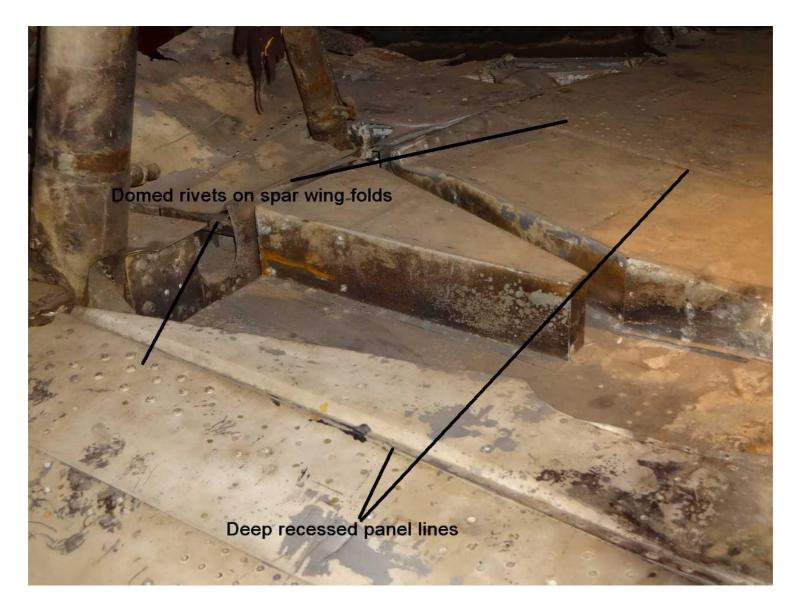


Photo 3: Undercarriage leg recess, starboard wing.

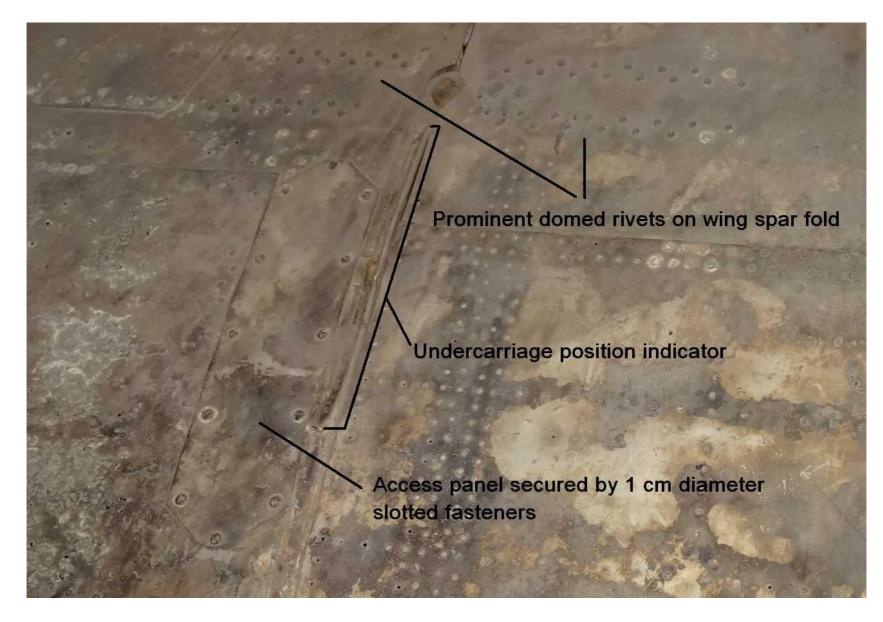


Photo 4: Top of port wing, showing area around the wing-fold. Outboard is to right of picture. Area to right would have been covered by rubber walkway.



Photo 5: Machine gun opening in wing leading edge, looking from bottom of wing. This area was covered by a plate with only a small hole on the top of the leading edge for the gun to fire through. Presumably this larger opening was required when fitting or removing the gun so it could be angled up through the relatively small access port on top of the wing.

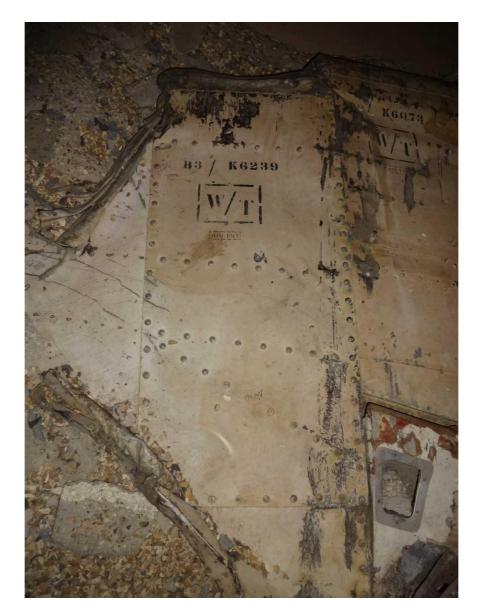
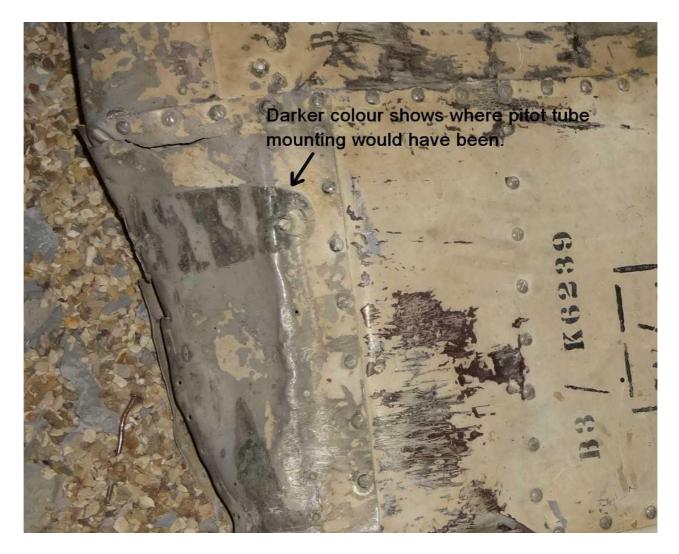
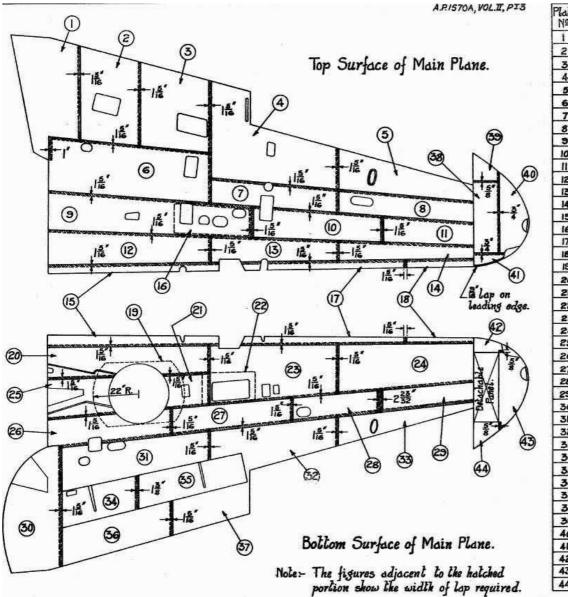


Photo 6: The removable panel on the underside of the wing tips was held in place by lots of domed, 1 cm diameter slotted fasteners. It must have taken ages to remove it.



This discolouration on the leading edge of the starboard wingtip shows where the pitot tube would have been mounted. The middle being 8 cm outboard of where the wing tips tilt upwards. The mounting would have extended further back on top of the wing.

More photos can be found at https://www.dingeraviation.net/skuaroc/skuawalkaround.htm



late YQ	5. W.G.	Size of Plate.	Remarks.	
1	24	3 0 x 5 4	Alclad	L38.
2	24	2'9'x 4' 6'	Alclad	L38
3	24	3'0'x 4' 3'	Alclad	L38
4	22	4'0'x 6' 6'	Alclad	L38
5	24	1 11 x 5 11	Alclad	L38
6	18	2'42 x6'11"	Alclad	L38
7	22	1'4'x 5' 6'	Alclad	L38
8	24	1' 3'x 5' 10"		L38
9	20	1' 10'x 8' 5'	Alclad	L38
0	22	1 62 × 5 3'	Alclad	L38
11	24	14 x4 1	Alclad	L38
2	20	2'0'x6'9'	Alclad	L38
13	22	1'9'x 5'6'	Alclad	L38
4	24	1'5'x 5'8"	Alclad	L38
15	18	16 x 7'0"	Alclad	1.38
16	22	1 7 x 3 52		L38
17	20	1 5 x 7' 10'	Alclad	L38
18	22	1'2'x2'4'		L38
19	18	2'2'x 3' 2"		L38
20	18	2'2"x 7 2"	Alclad	· L38
21	18	2'0'x 2' 6	Alclad	L38
22	22	1'7"x 2' 6"	Alclad	L38
23	22	2'10"x 6'0"		L 38
24	24	2'5'x 6'0'		L38
?5	18	2' 0' x 3' 4'		L38
26	18	1'9"x 5'8"	Alclad	L38
27	22	1'5'x 5' 4"		L38
28	24	1'4' x 4' 3'		L38
9	24	1'2"x 4' 2"		L38
30	24	2'8'x 5' 4"	Alclad	L38
51	18	2'2"x 6'8"	Alclad	L38
32	22	2'0'x 5'8'		L38
53	24	16'x6'0'	Alclad	L 38
34	24	2'0" x 3' 1'	Alclad	L38
55	24	2'0'x 5' 4'	Alclad	L38
36	24	1' 10 x 5' 5'	Alclad	L38
37	24	1'9"x 4' 0"	Alclad	L38
38	22	1' 41 x 3' 2'	Alclad	L38
39	22	1'3"x 1'4	and the second se	138
\$0	22	1'3'x 3'6'	Alclad	L38
11	22	9'x1'5		L38
12	22	10'x 1 62		L38
13	22	1'3"x 3' 5"	Alclad	L38
14	22	1'3"x 1' 44	Alclad	L38

The panel lines on the wings in this diagram from AP1570A match up exactly with those observed on photos of Blackburn Skuas and on the wrecked Skua in the FAA Museum except in one crucial place. There are two deeply recessed panel lines running from the outer diameter of the wheel recess to the wing fold line (see photo 3). Just why AP1570 appears inaccurate in this area is unclear.

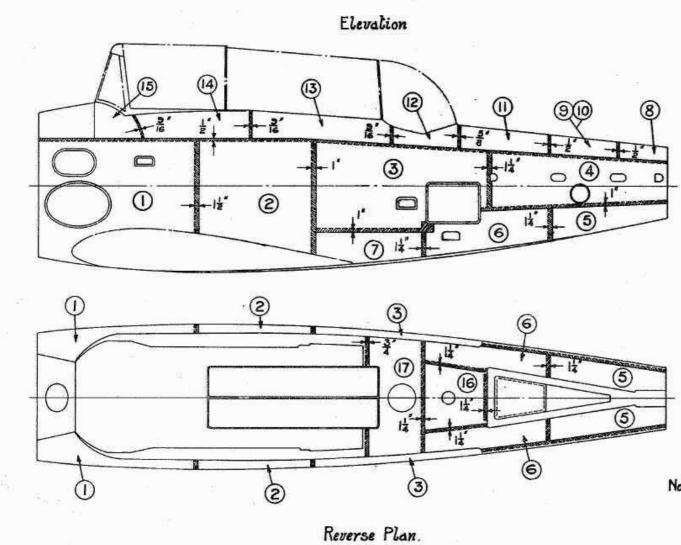
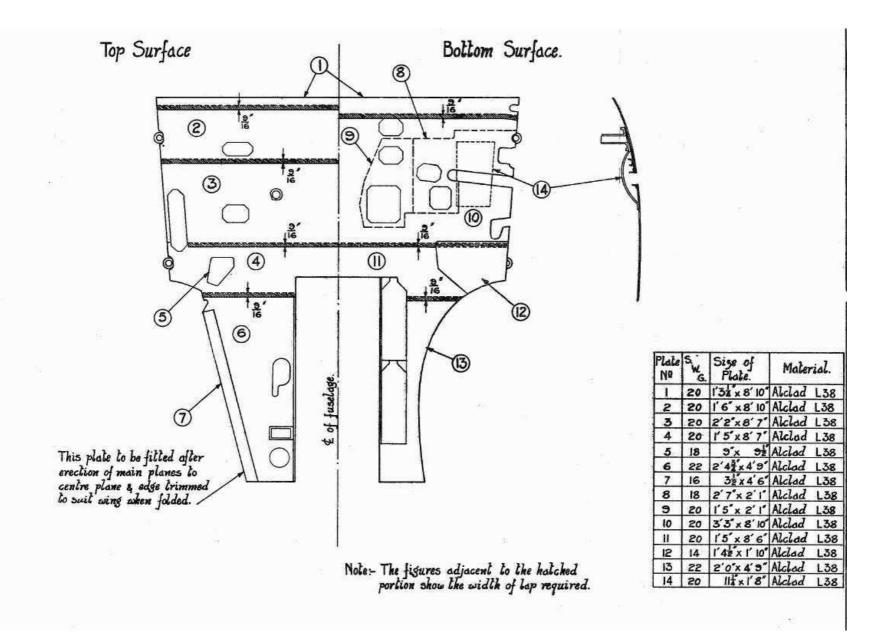
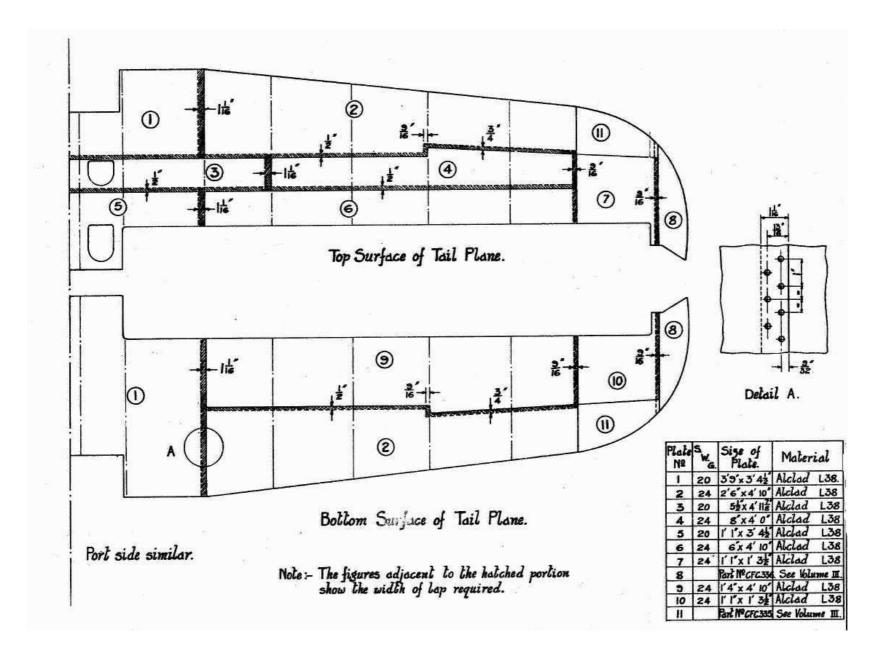
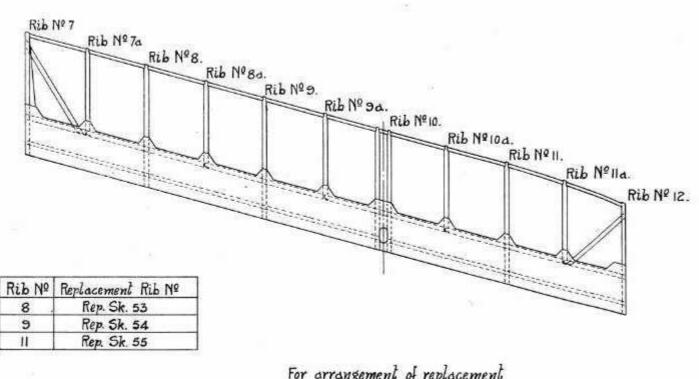


Plate Nº	SXO	Size of Plate.	Nº Off Pi Su	Remarks.
1	18	5'9'x 4' 0'	1 1	Alclad L38
2	20	4'6"x 3' 10	11	Alclad L38
3	22	6'0'x 3' 3'	1.1	Alclad L38
4	22	6'0'x 2' 3	1.1	Alclad L38
5	22	4'2'x 1'9"	1 1	Alclad L38
6	22	4'8'x 2'6'	11	Alclad L38
7	22	4'0 x 1' 3'	11	Alclad L38
8	20	1' 102 x2'4"	1	Alclad L38
9	20	2'6'x 1'72	1	Alclad L38
10	22	2'6'x 2'0'	1	Alclad L38
11	20	2'10'x 1'9'	1.1	Alclad 1.38
12	22	1' 0" x 2' 2'	11	Alclad L38
13	22	18'x 5'0'	11	Alclad L38
14	22	5'0'x 1' 4'	11	Alclad L38
15	22	3'0'x 1'5	1.1	Alclad L38
16	22	2'3'x 2'6	1	Alclad L38
17	22	3' 10 x 3'0	1	Alclad L38

Note:- The figures adjacent to the hatched portion show the width of lap required.







For arrangement of replacement rib see Fig. 32

12

Blackburn Skua – Aileron structure.

For anyone wanting to verify the plans against published photos, I would just point out that the construction of the two prototypes (K5178 and K5179) differed in some major respects to the production Skua Mk IIs. The Alclad skinning followed different patterns, many access panels are missing, and the tail was built as an integral part of the fuselage on the first prototype. The configuration of the rear cockpit was different, as were details of the undercarriage. Many of the more detailed photographs of the Skua on the internet are of the prototypes and therefore must be treated with caution as a guide when modelling a production Skua (or Roc).

For further information on modelling the Skua and Roc, including details of the interior, see mywebsite: https://www.dingeraviation.net/skuaroc/modelling the blackburn skua.htm

For more photos of the wreck of Skua L2940 at the FAA Museum, Yeovilton, see:

https://www.dingeraviation.net/skuaroc/skuawalkaround.htm

The best photo reference for the Skua and Roc is Matthew Willis' "Blackburn Skua& Roc", published by MMP books (orange series). ISBN 978-83-89450-44-9.

Check out Matthew Willis' other titles at https://navalairhistory.com/

To follow the reconstruction of parts for the Bodo Skua L2896 see the following website:

https://www.toredgarolsen.net/skuapage.htm