Spitfire Notes from Edgar Brooks

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In response to a compliment I paid Edgar regarding his Spitfire knowledge:
Thanks for the compliment, but I always quote the Service definition of "expert" i.e. "Ex" = "has-been," and "spurt" = "drip, under pressure." As far as I'm concerned, I'm simply a researcher; somebody asked me how I know so much (I did point out the error of that statement,) and I just told him that I'm an inveterate nosey-parker, where the Spitfire's concerned.

Spitfire Mk.I from Revell Mk.II kit
Tamiya Mk. Vb
Eduard 1/48 Spitfire Mk. IXc

General Notes

Crowbars

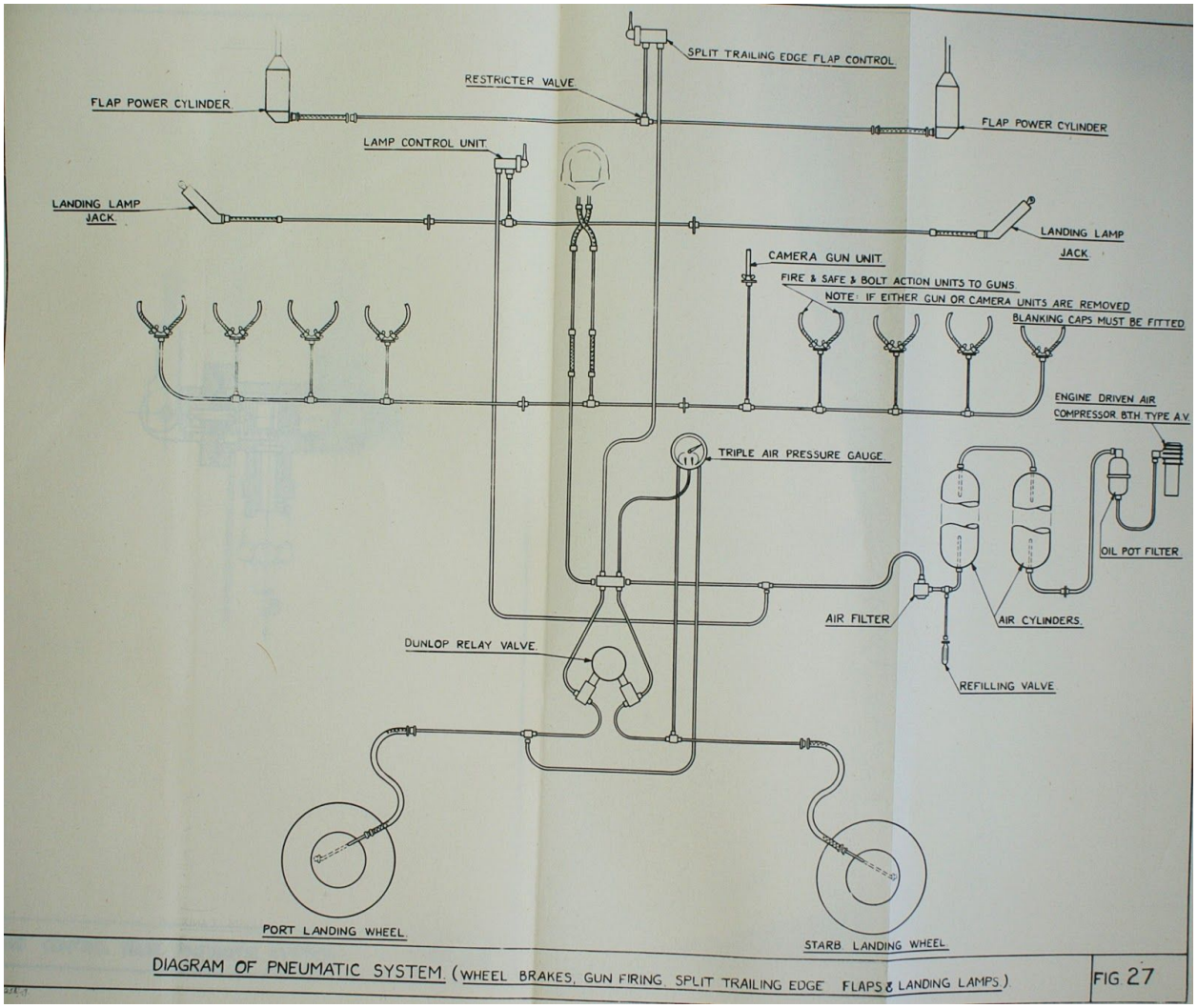
Fittings, for crowbars, were installed, on the I & II, from February, 1941, and the crowbars, themselves, were factory-fitted from January, 1942 (mods 320 & 483 apply.) I read (somewhere!) that the positioning of the stencils depended on the factory, and the Pilot's notes seem to bear this out, with Spitfires generally having two stencils readable up or down, with Seafires having a single stencil readable from the side. At a model show, many years ago, a man (obviously an ex-pilot) commented to me "All these lovely Spitfire models, but, you know, all the time that I was flying I never saw a red crowbar; green, black, or silver, never red."

Compressed Air Tanks

This has just come up on Britmodeller, reportedly from another website; all Spitfires had compressed-air tanks, since the air was used for cannon, machine guns, brakes, and flaps.

On the XVI, the tanks were moved into the wings, since the fuel tank, behind the pilot, took up the available space, and some other (late) Marks had the tanks flat on the floor, in the rear fuselage.

I've enclosed the compressed-air schematic, from the very first manual/pilot's notes in the first Mk.I (which had no cannon) manual, which should shed some light for you.



Fuel

The 170 gal tank was also drop-able. For the Spitfire there was also a possibility of having an under-seat fuel tank installed (closer to the CoG than the rear fuel tank), used on some early PR machines?

Not once you put the radio & IFF gear back in, plus armour, which the P.R. aircraft normally didn't carry.

There was also possibility of 10 extra gals in the front tank(s), that was used to that cause in Mk VIII and modified Mk IXs, among other

If you mean the tanks in the leading edges, they couldn't be fitted to the V, and were only on the VII, VIII, XIV & XVIII, not the IX (or XVI for that matter.)

Paint & Colors

Wartime aircraft did not have a coat of varnish; that was post-war. Squadrons had Aircraft Finishers, who were advised to do any necessary retouching, then sand smooth with wet-and-dry paper, followed by a wash over the whole airframe with clean water. The glossy patches under that aircraft have all the appearance of pools of water, which one could expect if it had been subject to a "bull" session before the VIPs arrived.

Any pilot who had his aircraft wax polished went totally against the advice of I.C.I. (who trained the Aircraft Finishers,) since the wax soaked into the paint making a retouch impossible, so that the whole paint had to be stripped off, and done again.

Do you know if RAF roundels were applied over any sort of primer, before the colour coats went down please or did they go straight on to the camo? (via Steve Budd)

Everything I've seen indicates that the roundels were mostly painted before the camouflage, then masked off while the camouflage was added. It's possible to find photographs of fuselages with roundels, but no camouflage. If the paint was applied using mats for the pattern, having one for each roundel would be just another item to position; it appears that some factories may have used a hand-held mask in a quarter-circle shape. Given the shortages of some paint ingredients, by mid-war, applying paint, which would only disappear under the roundel, would probably have been frowned on.

All components were primed before painting, either a grey in the case of metal items, or the basic red dope on fabric; the intermediate silver was basically discontinued during the war (except on the Mosquito,) probably to conserve aluminium, and wartime aircraft weren't expected to last 5 years (the usual anticipated life of the fabric) anyway.

Cockpit colors
Specification F.7/30, 1-10-31 for the "Single Seater Day and Night Fighter" prototype designated that the cockpit should be "painted internally with an approved grey-green paint," and some Hawker biplanes had green in (parts of) their interiors. The S6 seaplanes had green interiors, as did the Gladiator, so it was early 30s. I'd hazard a guess that the reason was simply pilot comfort; green has always been viewed as a restful colour.

Remember that the Hurricane was basically a structure of metal tubes, with everything built on to it; like the Spitfire, Hawker might have viewed it as internal structure, so it was painted silver. The Pilot's Notes, for the Hurricane II, show the tubes as much lighter than the main part of the cockpit, so it appears to have been general.

P.S. Anyone caught taking unofficial photographs, during 1940, risked being put on a "fizzer," hence the shortage.

Eau-de-Nil

BS216 Eau-de-Nil is a light green, not far from the Spitfire cockpit green, which started life as 6-071, in B.S.2660, which was first printed in 1955. The title, for B.S.2660, was "Colours for building and decorative paints," and it was superseded by B.S. 4800 in 1972. So far, I've found no evidence that Eau-de-Nil ever existed prior to those dates; it certainly has no relationship to wartime colours, according to the present issue of B.S.381C.

Paint finish

While I'm in my role as the theatre latecomer, who treads on everyone's toes as he enters, I have, unfortunately, to point out that the late Mark Spitfire is one airframe which is not suited to the pre-shading technique. From August, 1942, Supermarine (followed by Hawker and Bristol, at least) began to use synthetic "smooth" paints, rather than the dead matt hues of 1939-41. On the whole airframe, you had at least one coat of primer, followed by the camouflage colours, and the entire airframe was constructed with overlapping panels, the majority of which faced the rear, so dirt did not build up, nor did it ooze out of the joins. On the wings, the front 20-25%, back to, and including, the spar line, had all rivet "divots" and panel lines filled (just like the P-51,) then smoothed, then primed, smoothed, then painted with the smooth top colours, which were also smoothed again. Polish was not supposed to be used; if damage showed, the ground crew were supposed to smooth the surface with wet-and-dry, used wet, with the resultant sludge being cleaned off with plain water.

All this really means that Tamiya have done a lot of unnecessary work, since a 3/8" rivet, set flush with the surface, and covered with (at least) three coats of paint, reduced to 1/32 scale, would be virtually invisible. (*Email via Frank Daniels*)

Paint type & filling gaps (like the Mustang)

I've just answered a thread on Hyperscale, and thought that some of you might find it useful. I only discovered the instructional drawings during my last visit to Hendon, and they're something of an eye-opener, since you won't have to worry, too much, about all that scribing, if you want to convert Tamiya's IX to an VIII.

On August 7th., 1942, a meeting was held, to discuss Supermarine's proposal to use smooth, rather rhan matt, paints, and paints to D.T.D.517 were eventually settled on. This new finish started, under mod 697, from September 25th., 1942,covered by drawing 30000 Sht.28 (of which I have a copy,) and 30000 sht 54 (which I don't, yet.) These drawings originated in October, 1939, and, with various updates, lasted throughout the war, though I only have a copy of the 1942, and post-war, versions of sheet 28.

All of the airframe received an undercoat, of either U.P.1, or U.P.2 (haven't found them, yet,) grey undercoat, and special attention was to be paid to the front 20% of the wing l/e (top & bottom,) just like the Mustang.

On the Seafire, this involved a coat of SOBAC primer, thinned 10-30% with SOBAC thinner "applying the thinnest coat possible consistent with complete covering," with a minimum of 1hr air drying. "Rivet recesses, joints, etc., require to be levelled by the application, with a thin bladed knife, of I.C.I. putty 147-524. Air dry at least two hours: longer may be necessary in some shops."

After "dry scuffing" with grade 220 Gydro-durasil paper, two coats of I.C.I. grey filler 146-5 (not absolutely sure of the numbers, they're almost illegible)thinned around 10% with SOBAC thinners. One coat required 6 hours drying time; if two coats were needed, two hours had to be allowed between them. This was rubbed down again, although a heavily thinned coat of camouflage colour could be applied, first, as a guide. On the Seafire "D.T.D.517" drawing, it states that SOBAC Hard Grey Stopper could be used instead of I.C.I. Putty 147-524, and SOBAC Grey Oil Filler instead of I.C.I. Filler 146-5.

The Spitfire drawing just says that the l/e, back to the spar, must be "stopped" and filled....etc.

The minutes of the meeting stress this "20%" business, especially with regard to the span-wise panel line of the l/e-mainplane line. There's a copy of the draft minutes, of this meeting, in a file in Kew; should anyone want a copy, just ask. The RAF Museum holds copies of many Spitfire drawings, some of which I have, but they don't reproduce too well, since they're on 35mm negatives.

It was stated that this would add 50 hours to each Spitfire's production time, but obviously the extra speed made it worthwhile.

This means, I'm sorry to say, that anyone, advising restorers to leave big gaps in their Spitfire restorations, is really doing them no favours, at all.

Ocean Gray Adoption

Also, it is a fact that if you mix seven MSG plus one Black you do not get Ocean Grey, but Dark Sea Grey. (Edgar responded to this statement~ jb)

Sorry, but that is total nonsense; if the colour had been an already-available shade, they would have been told to use it, not mess about mixing it from other colours. Also, with DSG readily available, why would the letter (above) refer to "this new colour?"

On August 12th., 1941, Fighter Command sent a signal to the Air Ministry, repeated to Bomber, Coastal, Flying Training and Maintenance Commands, GHQ Home Forces & the Admiralty, with full details of the new scheme, as follows (the original is all in capitals, but I've reduced it to lower case, out of respect to everybody's eyesight):-

> *Operational experience in this Command has proved the necessity for a complete change in colour scheme for day fighters and the following camouflage scheme has been approved by Air Ministry (D.O.R.):-*
>
> *(i) Upper surfaces (a) Present Dark Green is to remain untouched (b) Dark Earth is to be replaced by a colour obtained by mixing seven parts of sea grey medium and one part of cellon night.*
> *(ii) Under surfaces are to be finished with sea grey medium.*
> *(iii) Spinner to be sky type "S"*
> *(iv) Squadron and aircraft identification letter are to be paintedin the standard size in sky type "S"*
> *(v) An 18" wide vertical band of sky type "S" is retained around the fuselage immediately forward of the tail unit*
> *(vi) Leading edges are to have a yellow strip applied on both wings from wing tip to half way along wing*
> *(vii) Standard national markings are retained*
> *(viii) Registration number remains untouched*
>
> *2. The change is commencing on 15 Aug 1941 with nos 10 11 and 12 Groups.*
>
> *The remaining Groups will change over in the following order of priority as supplies of dope become available. 13 - 14 - 9 - 82 and 81 Groups.*
>
> *3. You are requested to inform all concerned. A.A. Command being informed directly by this H.Q.*

Note that this "new colour" is the only one without a name, in this signal, and I've highlighted the part about supplies becoming available; that would hardly apply to DSG, a colour that had long been in existence.

Prior to that signal, on 8th August 1941, the Air Ministry, themselves sent a signal to various Commands, and, regarding fighters, it says "Upper surfaces - Dark Green and Grey camouflage," with all other areas, just like the above signal, having their colours named.

So far (and there are many more files to look through) the earliest reference, that I've found, to Ocean Grey, is in a letter to the A.O.C., Fighter Command, Stanmore, regarding nightfighter trials, which says "I am directed to refer to your letter FC/S.23594/Ops.3a, dated 29th January, 1942, and to inform you that the standard dark green and ocean grey colours are similar in

appearance to Nivo and dark grey, and when these paints are manufactured to give a mat finish, they have the same light reflectivity."

All of the above points to Ocean Grey being a totally new colour, especially as the director, at Farnborough, is asked, in that letter, to "prepare standards of this colour"? Standards = colour samples, and Farnborough would be hardly likely to have to prepare new ones, for an alrady-existing colour, would they?

In the letter, above, note that this Ocean Grey is given the number 36; Dark Sea Grey was 5.

Finally (I hope,) I have an explanatory letter, from the R.A.E. to the D.T.D., Harrogate, which says that light slate grey and dark sea grey, in Lanolin camouflage paints, have the same formulae as those given for the darker shades with the exception that slightly less carbon black is required to obtain the correct shade.

Doesn't sound like sea grey medium + black to me.

Underwing roundel application (1940)

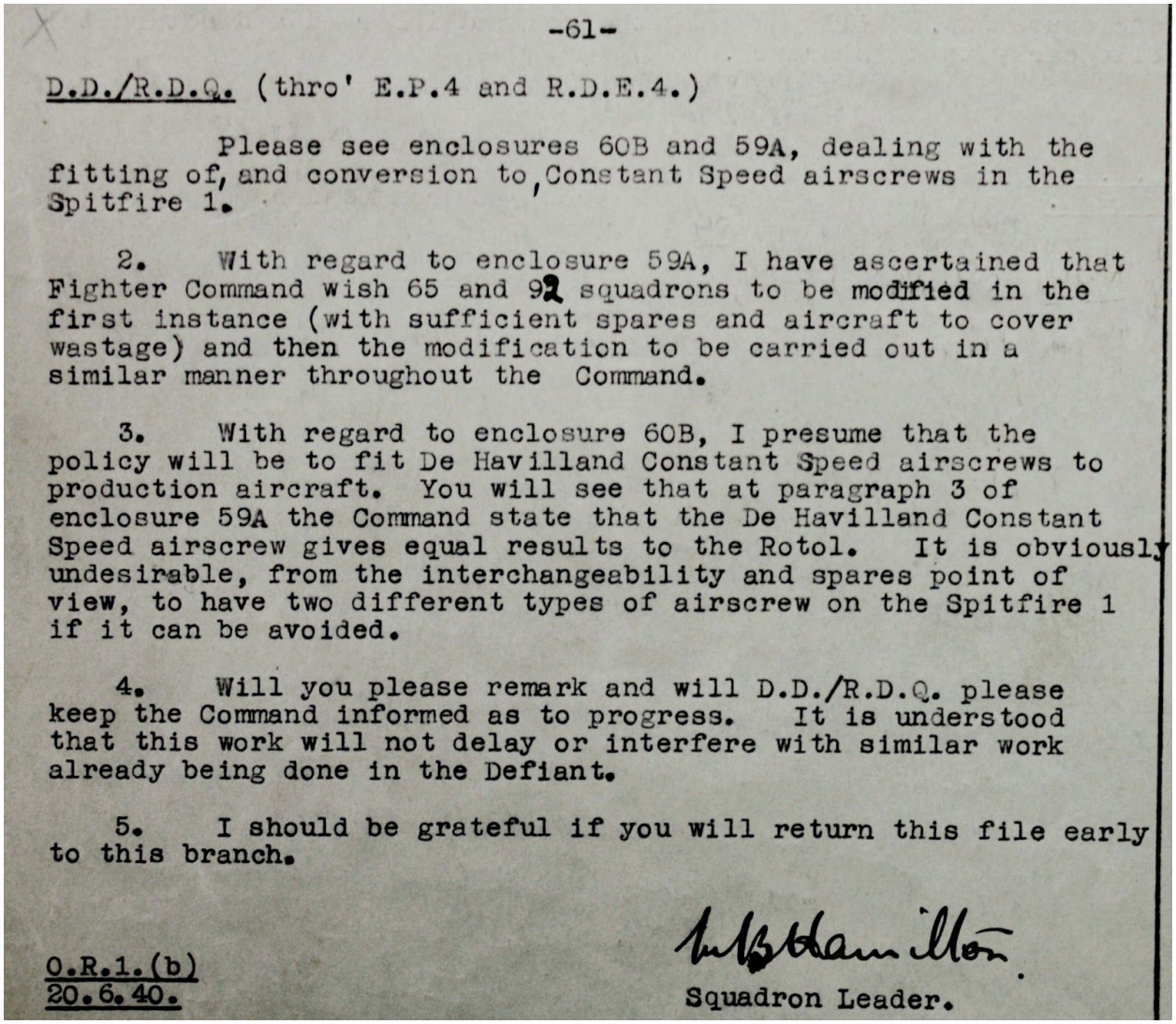
15-5-40 paint roundels
4-6-40 add yellow ring to port roundel
6-6-40 paint Sky, with no roundels
10-6-40 Insufficient Sky paint, so b/w continue
12-6-40 General signal, warning that both schemes would remain in operation.

Props

The de Havilland 2-pitch prop was installed in a number of Spitfires prior ww2 broke out, there is a picture of such Spitfire Is at the Morgan & Shacklady book, pg. 54, dated 8th June 1939. Constant speed props were installed in 1940?
The props were fitted by de Havilland teams, travelling across the country, just before the start of the Battle.

ORBs show the early use of the Rotol propellers in Spits and Rotol had begun the large scale production of its CS propellers with magnesium alloy blades in early 1939 according to an article in 23 March 39 Flight magazine.

Which ones, in particular? In all the ORBs I've read, the propeller never gets a mention, and the only Rotol fitted to (late) Spitfire Is, is the 3-blade 2-pitch Jablo, which wasn't available before 1940. Some may take the word of the press; I prefer government records:



-61-

D.D./R.D.Q. (thro' E.P.4 and R.D.E.4.)

Please see enclosures 60B and 59A, dealing with the fitting of, and conversion to, Constant Speed airscrews in the Spitfire 1.

2. With regard to enclosure 59A, I have ascertained that Fighter Command wish 65 and 92 squadrons to be modified in the first instance (with sufficient spares and aircraft to cover wastage) and then the modification to be carried out in a similar manner throughout the Command.

3. With regard to enclosure 60B, I presume that the policy will be to fit De Havilland Constant Speed airscrews to production aircraft. You will see that at paragraph 3 of enclosure 59A the Command state that the De Havilland Constant Speed airscrew gives equal results to the Rotol. It is obviously undesirable, from the interchangeability and spares point of view, to have two different types of airscrew on the Spitfire 1 if it can be avoided.

4. Will you please remark and will D.D./R.D.Q. please keep the Command informed as to progress. It is understood that this work will not delay or interfere with similar work already being done in the Defiant.

5. I should be grateful if you will return this file early to this branch.

O.R.1.(b)
20.6.40.

Squadron Leader.

From quite early in the war, all Rotol propellers were made from wood, either Jablo, Hydulignum, or (rarely) Weybridge Wood. However, the wood would not have been seen, so there's no need to have a weathered prop showing wood grain. Often the wood was covered by a fine metal mesh, then coated in one of three different (black) plastics, Rotoloid, Rayoid, or Schwartz. The leading edges of the blades had a brass sheath, which was still covered by the plastic. The plastic would dull, with weathering, and the l/e sheath could become visible (more at the tip than the hub,) as well, but, when it got that far, the prop was due for repair/refurbishment (remember that any wear/chipping could adversely affect the propeller's balance.) (*Email to Frank Daniels*)

RAF Code Letters

There shouldn't have been any grey codes on DG/OG/MSG aircraft (aka day fighter scheme,) but it'd be a brave man who said that there weren't any. The first mention of Sky codes appears in an AMO, dated July 2nd., 1942, which also saw the introduction of the (separate) day fighter scheme, but did every Squadron repaint brown into Ocean Grey, Sky into Sea Grey Medium, and codes to Sky, with immediate effect? With the well-reported shortage of Sky, and the need to cobble together Mixed Grey, for Ocean Grey, there must be doubts, but only a (properly printed, and in colour) photo can say.

Many people try to say that the Sky bands, and spinners, on day fighters, were also introduced at the same time, but they were much earlier (12-12-40.)

Restorations

Evaluating authenticity in restorations

When manufactured u/c legs were (painted) silver, but had to be regularly serviced. One operation entailed washing the parts in paraffin (kerosene,) to remove hydraulic oil and grease, which would have a detrimental effect on the paint, so, after reassembly, the rigger would have to repaint it, usually in whatever colour came to hand. Obviously this would not include the oleo strut.

It's also necessary to consider the airframe's history. The RAF Museum's X4590 was with 609, then 66 Squadrons, 57 OTU, 303 Squadron, 53 OTU, RAF Finningley (storage?); it then became a "maintenance" airframe 8384M, eventually going to Cosford, then, finally (we hope) to Hendon. In the Finningley, maintenance, and Cosford eras, anything could have happened, especially if apprentices were let loose on it.

Cosford are extremely proud of their Mark I, K9942, and are quick to tell visitors that it has been taken back to exactly how it was when built in 1939. It's had a complete rebuild, with paint matched to original shades, even the "pump-handle" u/c retraction gear has been refitted.

Unfortunately you can't actually look inside it, because the Museum's "Elfin Safety" people have decreed that the danger from radiation is too great (I was even told that it was against the law for me to go near it; total codswallop!) I wasn't the most popular man, in the universe, when I pointed out that the wings still had the stiffeners, over the wheel wells, and they weren't fitted before January 1942.

The Imperial War Museum's R6915 had a far less chequered career, going through one Squadron, two OTUs, a Development Unit, storage in Cardiff, then to Lambeth, so should be a

much more representative airframe. Unfortunately "Those in charge" have hung up every complete airframe, out of reach, so it's no help at all.

I'm sorry if I appear to have rambled on, a bit, but I'm trying to illustrate that care needs to be taken, before taking any museum piece as gospel.

Seats & Harnesses

There were no plastic seats until mid-May 1940, and no seat armour before June. As the armour was rushed into service, it could easily have been unpainted steel (initially at least,) and black (metal) seats have been found at wreck sites.

Seats were interchangeable; the plastic seat was an alternative, not a replacement. It's not generally known, but the plastic seat was originally intended solely for Castle Bromwich, but the destruction of the Supermarine works probably changed everything.

In response to a question regarding Spitfire seat color:
There isn't a truly "correct" colour, since the material could vary, quite substantially, in colour, even on the same seat. It wasn't Bakelite, either (some mandarin, in Whitehall, has a lot to answer for, for using the name,) but a resin/paper (yes, really) mixture, and the colour depended, quite a lot, on how the material was made.

Regarding the material the seats were made of:
"Close enough for government work" is an often-used expression, and too close, at times, for comfort. Why "Bakelite" appeared in the manual is a mystery, but, having talked to someone, who's worked with the stuff, the seat would have been far too big in area for the required pressures, and critical temperatures, needed for acceptable moulds. Making an instrument case is bad enough; an item the size of a seat would have been impossible.

Tufnol Composites Ltd.(who've been in existence since the 1930s) are in James Watt Place, East Kilbride, Glasgow. Aeroplastics Ltd.(who made the seat) were in Earl Haig Road, Hillington, Glasgow. Same city, different companies, and I can't see Tufnol allowing another company to use their name, or Aeroplastics actually asking for permission, either; it's possible that Tufnol bought out Aeroplastics post-war, because they simply disappeared, but an enquiry, about that possibility, went unanswered.

Other
Plastic (not Bakelite, not ever, nohow) seats were introduced onto the production line 14-5-40; they were intended to be used earlier, but were delayed due to problems with the material cracking. Castle Bromwich were to be the recipients, but it's likely that the bombing of the Supermarine works caused a change of plan. It's doubtful that they were painted, at least in

wartime, and their use extended beyond the end of the war, since there's an order demanding that they be rescued for future use; Hornets, Vampires and Meteors used plastic seats, as well, and I've found reference to a "comfort" seat, for bombers, but never found one.

Seats were made of Synthetic Resin Bonded Paper (SRBP)

More regarding seats
Once, and for all, please ditch this "bakelite" thing; some twit, in the Civil Service/Air Ministry/whatever called it that, in a manual. It was a mix of resin/paper, made by Aeroplastics, a Glasgow-based company (now defunct, as far as I can tell,) and was simply known as the "plastic" seat. Neither was it Tufnol, which is a different company, in the same city; it's possible that they took over Aeroplastics, since they make a similar-sounding product, but are singularly unforthcoming, when asked.
The plastic seat was mooted, and planned for, way back in 1938, with Castle Bromwich to be the main recipients, but there was a long litany of problems, with cracking, and breakages, during testing, with the result that it was only accepted into service during the Battle of France, and was introduced into production, under mod 189 "To introduce plastic seat as alternative design to assist production and provide alternative manufacture," from 14-5-40. Note the double use of "alternative." As late as 1944, references can be found to metal, or plastic, seats, and there's a drawing, for late Seafire seats, which specifies a certain thickness of duralamin. So, in answer to your question, since the seat could be replaced, at any time, the choice is yours.

The "plastic" seat first appeared in May,1940, and was always viewed as an alternative, not a replacement, though metal seats would have been few-and-far-between once Supermarine's factory was destroyed in 1940. They stayed with the Spitfire right up to, and including, the 24, and, certainly, the Seafire 17. Post-war, they were rescued, and used in other airframes like the Provost, Vampire, Meteor and Hornet. They were produced by Aeroplastics Ltd., a Glasgow-based company, now defunct, though Tufnol (another Glasgow company) advertises a similar-sounding product. The seat was never made from Bakelite (may curses rain down on the Whitehall mandarin who used that name in a Spitfire manual,) nor Tufnol; it was always known, simply, as the "plastic seat."

The "lozenge" recess on the plastic seat was designed to accept the air bottle, which inflated the dinghy (not carried during 1940, hence the simpler undulating base.) In 1940, the pilots had a thin sheet of sorbo rubber between parachute and bum, which they forfeited when the dinghy arrived, so discomfort increased, and became a way of life. At least they didn't suffer as long as Mustang pilots (lack of fuel can have its benefits.) (*Email via Frank Daniels*)

Sutton Harnesses
The Sutton harness was used throughout the war. There was a "QK" harness, but it was still a Sutton. The only aircraft, that I've found, which used a box-type harness release, was the Tempest, and it was so innovative that it gets a mention in the Pilot's Notes. The "QS" harness (which did have a parachute-style release box) was not fitted to any Mark of Spitfire until post-war.

Much has been made, in some circles, about the VII, in an American museum, which has (or appears to have) a "Q" harness, but this ignores the possibility that an airframe, earmarked to be used in America, by American pilots, might have been fitted with a harness, to which they would be more accustomed. So far, I've found copies of the Inspection Schedule, for the VIII, IX, XII, XIV, all for late 1944, or early 1945, and they all call for the pin and triangle, on the harness, to be inspected for distortion and cracking; this cannot apply to the later harness. Modification leaflets, detailing how to replace the Sutton harness with the "QS," are all dated post-May, 1945.

Likewise, one photograph, of the "Y" strap feeding through the handhold in the backrest, has led to the pronouncement being made, that all Spitfire harnesses were mounted in the same way; for this to happen, the seat had to be specially strengthened, and did not apply to any Mark up to, and including, the VI. So far, I cannot find any reference to the stronger seat being introduced before September, 1944. I believe that it was forced by changes to the mounting of Seafire (from the II onwards) seat, but haven't found absolute proof.

Sorry, missed out one (fairly important) bit; the Sutton's straps were numbered 1-4, at the ends, and the order was important.
It went as follows:- 1 (which had the pin fixed to it) over the left shoulder, 2 over the right thigh, 3 over the left thigh, 4 (to which the triangle was attached via a piece of thin cord) over the right shoulder. (*Email via Frank Daniels*)

Sky Color

I've E-mailed the author of that, so let's hope that he can be straightened out, a little. There are a few too many assumptions, on here, too. I have never seen official references to Sky Type S Grey, or Duck Egg Green. The photo is part of a series by "Life" magazine; I doubt that exposure, film, or development would be an issue, for a company of their standing.

"Sky" did not exist, by name, before 1940; Sidney Cotton invented (and patented) his pale green "Camotint." This was made by one company, Titanine (in Uxbridge, just up the road from Heston.) In a letter, dated 20-4-40, Bristol are told "As regards colour the pale blue-green which has been called Camotint is now defined as Standard Sky..." (my underline.)

7-6-40, the Air Ministry instructed that fighters should be Sky type S; three days later, they had to amend this, as follows:- "....only limited supplies of Sky type S dope DTD 63 at present

available. Fighters will continue to operate with black and white colour scheme until sky type S becomes available." If only Titanine had the (patented) formula, until April, 1940, any shortage is (or should be) understandable.

Ian Huntley (funny how people can quote him, then forget him at the most inopportune times) said that some Sky was little more than distemper, which faded (and would have "chalked," too I would think) very quickly.

That's not quite the full story; B.S.381C first appeared in 1948, and was a revamp of B.S. (sometimes written as B.S.S.) 381, which began in 1935. Sample cards, for B.S.381C:210 Sky, have the legend, "This colour is correlated with colour 5-059 (B.S.2660) and also corresponds to that formerly known as colour 9A of H.M.G. Aircraft series." 9A appeared in B.S.381, and the RAF Museum have a set of those cards, and it includes 9 [also Sky] and 9A, so it's actually a fairly simple exercise to check on the similarity.

Since 9A was in B.S.381, and B.S.381C didn't exist until 1948, the inference is that it was simply renumbered, along with:- 4 Medium Sea Grey (641,) 7 Dark Green (641, later changed to 241,) 13 Dark Earth (450,) 6 Extra Dark Sea Grey (640,) 5 Dark Sea Grey (638,) 14 P.R.U. Blue (636,)
204 R.A.F. Blue-grey (633,) 8 Night (642.) These are all of the cards, which I own, and are dated either 1964 or 1971. The best course of action would probably be a letter to the British Standards Authority; I just dig this information out, which makes me only a messenger, and I'm getting a little tired of continually being shot at.

Adoption of Sky
The order went out on the 7th. June, to be followed, three days later, by another signal, saying that, due to shortage of paint, the original scheme might still be seen.

Sky Band

The order, for the band and spinner was issued 12-12-40, under AMO 926/40, and said," by day fighters, which carry an 18 in. band of duck-egg blue (Sky Type "S") right round the fuselage, immediately forward of the tail plane, and have the airscrew spinner painted duck-egg blue (Sky Type "S") There is no mention, anywhere, of Sky Blue. The first orders, for the use of Ocean Grey aka (unofficially) mixed grey, were not issued until August, 1941.

Sky Blue
This is by way of an update on what I've been discovering (and rediscovering, in one case.) It is, by no means, an assertion, but I'm beginning to see a pattern emerging, which will probably disappear, in a puff of smoke, during another Kew, or Hendon, visit.

During a recent enquiry, on Spitfire Vs, in the desert (of course,) I decided to check back on something that I'd read, years ago. Those of you, who don't have the Aircam series, will perhaps feel a little lost, but, in no.4, on the Spitfire I - XVI, an insert was included, which was written by Ted Hooton; sadly, Ted died about 10 years ago, so I can't ask him about the leaflet, but I knew him well, his knowledge was vast, and his research was extremely thorough (he, it was, who found out which early Spitfires did not conform to the odd/even camouflage pattern rule,) so I believe that he must have gained access to Supermarine records, that I've never seen.

On the Mark V, he wrote the following:- "Some initial deliveries to Malta early in 1942 in temperate (sea scheme?) green/grey. Remainder, and those to Egypt, repainted dark earth and middle stone on upper surfaces; azure or sky blue under. Azure seems to have been more common up to 1943, and a few aircraft had Mediterranean dark blue. However, from 7/42 onwards, all Mk.Vs leaving Castle Bromwich (about EP380) were painted in the desert scheme with sky blue undersides. Does this indicate that, with an invasion of Italy to come, it was decided to use a lighter blue than in the desert?

Mark IX. all delivered in green/grey, but some locally repainted in the desert scheme with sky blue (e.g.232 sqn.)

Mark VIII. All early aircraft, up to and including the MD serials, delivered in the desert scheme (he doesn't say if the underside colour was sky blue.)

Far East and Australia. All Mk.V and VIII delivered in desert schemes were repainted so that dark green replaced the middle stone, leaving the dark earth and sky blue."

Note the continual references to sky blue, as well as azure.

During a recent Kew visit, I found a few instances, where Fighter Command referred to a sky blue, which, in reality, had to be sky (the 1945 order, to remove the tail band, refers to it as a sky blue band.) A classic possibility for confusion?

During my last visit to Hendon, I found an (undated) update, containing colour samples, for D.T.D.83A; since this was (as I then thought) only for fabric, I largely passed it by, but it included a sky blue.

During a(nother) Kew visit, I found a short series of signals, concerning the merger of DTD83A with DTD308, since they had the same ingredients, with 83A taking on a dual role, but with only one set of stores numbers being necessary. This merger occurred at the end of 1941, before Supermarine began using synthetic paints in the DTD517 range. This sent me back to the Hendon update, since it could, might, possibly, perhaps, indicate that the Hendon update came sometime in early 1942, or just after, and although listed as 83A, could have been for fabric and metal surfaces.

The other colours, in that update, are azure blue, light and dark mediterranean blues, extra dark sea green, and middle stone, all middle, or far, eastern colours; does this indicate that sky blue, too, was only for those theatres?

All of this is purely circumstantial evidence, and it's all too easy to make a seemingly watertight case, only for it to turn to dross (pardon the mixed metaphor) in a moment, but I'm beginning to harbour a sneaking suspicion that sky blue was not used (officially) in the U.K., and the occasional use of the title, in place of Sky, by Fighter Command, didn't help. When I get the chance, I intend to visit Hendon, again, and check their sky blue sample against my set of BS381C samples, (hopefully) a set of 1935-48 BS381 cards, and the Australian sky blue (incidentally, in May, 1943, the RAAF notified the Air Ministry that, in future, the undersides of their day-use flying boats would be sky blue.)

Also, on at least two occasions, the Ministry ordered Sky Blue (in different contexts,) and had to, very quickly, issue a corrective order, saying that "Blue" should be deleted, leaving only "Sky." As for the Airfix model being in desert scheme on top, how about the possibility of aircraft, intended for the desert, being redirected to Malta who were desperate to get them? As this all happened before Azure Blue came into use, desert-bound aircraft would have been in Sky, since that was how the Ministry had ordered ALL fighters to be painted, wherever they were bound, in June 1940.

As far as I'm concerned, research means leaving no piece of paper unread (though with over 1000 files on wartime Malta that isn't easy,) and it's surprising how often two or three pieces come together to make a more complete story, for instance we now know that it's very unlikely that Wasp had to repaint all of her Spitfires, since orders were placed for some to be painted while they were still in the factory awaiting delivery.

Wheel wells & Undercarriage

Regarding wheel well color
It's one of those "it depends" subjects; it's the one area missing from the drawing containing the painting instructions. If you consider them to be part of the exterior (even though they're covered by the wheels/covers,) then exterior colour is the way to go. If they're part of the interior, then silver was normally advocated. I've seen untouched wells in silver, and, believe it or not, cockpit green. Then, of course, if the airframe is repainted in an M.U., with it standing on its wheels, would the sprayer go for the hassle of masking off the wells? As far as I can tell, it's the one area where you cannot be too pedantic. The same thing applies to the covers and legs; both were supposed to be silver, but, if a door's being resprayed, would the painter do both sides? An oleo would lose its paint, during servicing, since it was soaked in paraffin, to remove grease

and hydraulic fluid; after reassembly, the rigger could (and possibly would) use whatever paint came to hand.

No Spitfire parts were natural aluminum, they were painted the necessary colours over a light, or medium, grey primer.

The specification was for all interiors (apart from the cockpit, firewall, and engine bearers, which were green)to be silver, but the problem comes with deciding if Supermarine viewed the wells as part of the interior, since they don't actually say.

Since the oleos were part of the wings' "furniture," it seems fairly logical that the wells might have been painted (therefore silver) before they, and the wheels, were fitted, after all, they would need to make sure that the wheels didn't foul any part of the wings as they retracted.

I've never been able to make my mind up, on this particular item, but I'm leaning, more and more, to silver wells, since, late in the Spitfire production run, interior colour changed to cockpit grey-green, and I've seen a 22 with green wheel wells and door interiors. Moving backwards, with logic, if late interiors and wells were green, early wells could have been the same silver as early interiors.

Of course, once an airframe has gone to an M.U., for a major service, there's the very real possibility that a respray might have been done with the aircraft on its wheels, and the sprayer just sprayed straight over the wells, leaving them in the underside colour; he would not, however, have sprayed the area where the oleo legs fitted.

Oleo legs and leg cover interiors were normally painted silver, so it's very likely that the same applied to the tailwheel doors, and since the well was completely enclosed, and therefore interior, it, too, was probably silver. (*Email via Frank Daniels*)

When manufactured u/c legs were (painted) silver, but had to be regularly serviced. One operation entailed washing the parts in paraffin (kerosene,) to remove hydraulic oil and grease, which would have a detrimental effect on the paint, so, after reassembly, the rigger would have to repaint it, usually in whatever colour came to hand. Obviously this would not include the oleo strut. (*Email via Frank Daniels*)

Wings

Early Mk.IXs, which were converted from Vc airframes, often retained the old-style walkway lines of the Vc; later aircraft had the usual "backward L" on the port wing, but also had a mirror "L" on the starboard wing.

As for getting at the fuel tank, that had always been possible from the port walkway, and groundcrew tended to lie down (thereby spreading the load) when they needed access to the wingroot fairing.

And the previous poster mentioned that this area of the wing was altered AFTER the second radiator was fitted.

Which was on the PORT side.

So they took the opportunity to make the top surface of thicker material on both sides.
On early marks it was 24 s.w.g; on the IX, and other later Marks it was 20 s.w.g.

Missing outer cannon stubs on C wing Spitfires
Regarding missing stubs, on the Spitfire, there was a modification issued, for the V, IX & XII, to "Remove the outboard cannon front mounting casting." I don't have a date for it, and have no idea how many had it, plus it was cancelled mid-November 1943, probably in anticipation of the E armament. That mod could be responsible for so many reports of B wing IXs, I suspect.

Gun cover patches

Did Spitfires always use the patches over the muzzle openings?

According to Vickers, not before 24-9-40, though erks might have cobbled together something similar (one armourer said how he used sticking plaster from the infirmary, plus newspaper pasted over the exit holes underneath.)

The early items were circular pieces of metal, curved to follow the shape of the l/edge, and clipped inside the muzzle tubes; few (if any) examples exist, so it isn't known if they were even coloured red; the fabric patches were not red-doped, but pre-coloured red and clear doped.

Early Spitfire gun port cover

Downward facing ID lights

Just to "help" things along, it appears that the answer is "Yes" & "No." It involves the VII & VIII, both of which were planned to be high-altitude fighters. Both are illustrated as having red and green (blue glass + yellow bulb = green,) so it seems that they were designed to carry the extra identification lamps, but, for some (unknown) reason, they were deleted on May 1st., 1943. There were plans to add the lights to the V, IX & XII, but that was cancelled; the VII was slated to have the lights back, from 15-11-44, and the VIII & XIV from 7-12-44, but there's no absolute certainty that it did happen.

If the VIII's lights were deleted from May, 1943, it seems likely that your airframe didn't have them. (*Email via Frank Daniels*)

Wing Walk Stripes

Official instructions were that nothing should encroach onto the roundels. Remember that the line ran along the line of the mainspar, so you're probably seeing that panel line showing through, not the paint.

Do you know if the layout for the wing walk markings changed over time? I've just been comparing the Airfix Spit Mk 1 pattern with the Tamiya Mk IX and they're quite different. Or is that just poor research on their part? I can imagine them varying after repaints in the field.

On early aircraft, the emphasis was on keeping the erks' boots (rubber-soled, by the way) off the area of the radiator, since a dished top surface, in that area, meant a replacement wing. This meant that the port wing lines ran like a backward "Z" up alongside the cockpit, then left along

the mainspar, then right out to the leading edge at the wingtip joint. The starboard wing's line went straight from wingroot out to wingtip.

When the set-up went to two radiators, the wings' top surfaces were strengthened, so that erks could walk either side of the cockpit, but still had to keep off the radiators' area. You then had two sets of lines which were identical, but mirror images of each other, i.e. the original backward Z to port and Z to starboard.

Version Notes

K5054 Prototype

There are a few things, that I've found, which you might consider relevant. The wings were planked overlapping front-to-back; "clinker-built" is how Gordon Mitchell described it, and one set of wings remained that way for some time, since there's a very good photo of K5054, after it was camouflaged, and the lines can be faintly seen through the paint ("Spitfire, The Illustrated Biography," by Jonathon Glancey pp 56 & 57.) Those wings had no separate wingtips.

There is no guarantee that K5054 had fabric control surfaces; except for the "new" rudder, there isn't even a hint of ribbing visible, and the specification laid down that it had to made, entirely, of metal.

Also, in the first-flight photos the rudder is the same darkish shade as the rest of the fuselage, which hints at it being green, which was not, ever, a fabric primer, and an artist, who I now know to have been Mitchell's nephew, told me that K5054 was painted "a mucky green."
K5054 had no transport joint forward of the tail section, nor did it have the starboard access hatch (an RAF test pilot recommended that one should be added.)

Judging from (rather small) photos, K5054's elevator trim tab horns were under the elevators, not above.

I believe that the first-flight wings were removed, soon after, to have the guns fitted, and another gunless set fitted; 6-3-36 gun muzzle holes can be seen in the wing l/e (someone has claimed that they're black paint, but I can't accept that); after its first repaint the holes are gone. "They were filled." So why put them there in the first place, and why, if they were to disappear immediately after the first flight, paint them, either?

Gordon Mitchell said that the first paint was cerulean blue (note the lack of capitals, which infers a description, rather than a name.) Much is made of it being "A Rolls-Royce car colour," but, at that time, R-R didn't build complete cars; they did the engine + chassis, while coach-builders made the bodies. I have learnt that R-R did have their own "house" colour, which was used on all of the company vans and lorries, and was matched to the blue of the Mediterranean sky,

and, to me, that seems to be a more likely candidate. If there's 1930s/40s R-R company vehicle, preserved in its original colour, it might give the answer. We constantly hear how the colour must have been a light blue, because it looks almost white in photographs; however any photographer will tell you that, in a b/w photo, blue sky, however dark, will appear as white, and has to have a filter on the lens before it will darken.

The best source for the wing panel lines is Harry Robinson's drawing in Alfred Price's "The Spitfire Story"; "clinker built" was how Michell's son described it. The shape of the upper cowling was more rounded than later airframes; the wingtips were not separate; there was no starboard inspection hatch; there was no transport joint in front of the tailplane; elevator trim tab pushrods were underneath, not on top as in all other airframes; impossible to tell from photos, but control surfaces might have been metal, rather than fabric, covered; pilot's seat was metal, and had no cartridge rack on the front; there was no armour on the headrest or behind the seat; there was no radio, or mast; there was no gunsight; there was no underwing pitot; the u/c retraction was the original push/pull type; there were no destructor buttons on the starboard cockpit wall; the joystick had no gun button; the compass was mounted in the instrument panel, not under it; the rudder pedals had only one crossbar; can't tell, for sure, but there might have been no oxygen.

Early Mk. Is

Seats were metal until the introduction of the plastic (not bakelite) seat in May, 1940. They could have been green, or I've seen reports of black ones. As well as no armour behind the seat, there was none on the headrest, either (until February, 1940.) Rudder pedals only had a single crossbar; the wire "thingy" fitted to the fin was a deflector for the planned braking parachute, which was never fitted. The fin colour could be a problem, without looking at the ORB, in Kew. Dowding's original plan was for the Squadron number to be painted on the fuselage, in the colour of the Flight to which each airframe belonged, so it's likely that this was done with 19's aircraft.

Mk. II

Oil cooler differences

Original source:
http://www.ipmscanada.com/ipms/Reference_%20Article/Aircraft/Aircraft_Page/SpitIvsSpitII.html

Early Mk.II Spitfires were identical to the Mk.I, except for the small Coffmann starter bulge, but later aircraft also had the larger oil cooler intake which everyone associates with the Mk.V.

Another person questioned the source of that information.

The first indication I had was contained in the Mitchell Memorial Symposium, organized by the Southampton Branch of the Royal Aeronautical Society, in 1976, on the Spitfire's 40th anniversary. In the notes, from originals by Joe Smith, it states that the oil cooler area, for the Mk.II, increased from .2 square feet, as in the Mk.I, to .35 square feet, exactly the same as the Mk.V. Also, on page 107 of "Spitfire, the History," there is a picture of a Mk.II, used for LOX trials, in 1942, with the larger oil cooler clearly visible underneath. Don't get the idea that I'm saying all Mk.II Spitfires were like this, in fact I doubt if the first were anything but identical to the Mk.I, since they were built from kits supplied by Southampton.

There were further questions & discussion about the possibilities.

The only clue, that I can find, also comes in "Spitfire, the History," where a mod, to fit the oil cooler Mk.III, is stated to have been instituted 11-4-41 (remember, over here, that means April!) Whether this was the new size oil cooler I have not been able to ascertain, but it was certainly important enough to rate a mention. I also have a copy of the Air Publication for the Spitfire V, and cannot find any mention, in the list of mods to the Mk.V, of a change to a larger oil cooler. It is very difficult to find any photos of operational Mk.II Spitfires, especially those built after April 1941, but I doubt that a Mk.II would have been taken off the production line, and fitted with Mark V wings, solely to carry out engine tests. Also, I find it hard to believe, with Mk.II and Mk.V aircraft being produced at the same time, on the same production line, that a mod to one Mark would not have been incorporated in the other.

Edgar then offered a clarification:

I really must learn to read all of my messages before replying! The Mk.III was a totally unique variant, fitted, originally, with the Mk. XX Merlin, as fitted to the Hurricane II, and, as with the Hurricane, it was 4 inches longer (takes some finding, does that information!) Since the Merlin 45 installation was so successful, this was not continued. Incidentally everyone continually states that the Merlin 45 was identical to the Merlin III, in length; it wasn't, it was actually longer, but, due to some inspired fiddling with the mechanism on the carburettor (they turned it through 180 degrees,) they were able to fit it into the same space. It is impossible to spot in photographs, but the carburettor intake, on the Mark V, is2-3 inches further back than on the Mk.I.
Regarding the oil cooler, according to the Symposium notes the frontal area was identical in the II, III, IV, V, VI, XII, Seafire I, II, III, and the part number, for the Seafires, was S.799-3C-528, for what that's worth, but the number 3 appears again.

Another person challenged Edgar's assertions.

I'm not saying that the change was due to the Merlin in the Spitfire II, just that it would make no sense to stock a different oil cooler, for the Merlin on the Spitfire II, when the Spitfire V is coming off the production line, at the same time, with the same wings, and it seems strange that a new oil cooler is slated as being introduced on the Spitfire II, just as the first Spitfire V comes off the production line. The big problem, of course, is that the introduction of the Spitfire V relegated the Mk.II to obsolescence, and, almost certainly, a training role, hence no photos of service Mk.IIs with a different oil cooler. Remember, too, that Castle Bromwich had their own test staff, with the likes of Alec Henshaw, who would have been trusted with any mods required. Funnily enough the photo on page 95 of Westland-built Mk.I AR238, in "Spitfire, the History," appears to have the larger oil cooler fairing.

Didn't want to say anything, until I was absolutely certain, but we have a Mk.I, AR213, based near here, which is exactly as it was when released at the end of the war. It has a Mk. V oil cooler, and the Battle of Britain Memorial Flight's Mk. II, allegedly unrebuilt, also has the large oil cooler. That has to be a conversion, at some time, though, since it was the 14th Mk.II ever built.

Sorry I couldn't get a reply to you sooner; somehow I suspect that we're actually of like mind. I don't think that many modified Mk.IIs went to active Squadrons, but training Squadrons might well have received them, and it would not have been a difficult mod, just a new housing, since I think that it was only the frontal area that changed. Actually I begin to wonder how many photographs, allegedly of Mk.Vs, could have been of earlier Marks. How can you tell, if you can't see the serial no., and it still has the earlier externally-armoured windscreen?
I take your point regarding the stock, but 100 aircraft would require far more than 100 oil coolers. There would need to be replacements for any possible damage, e.g. a wheels-up landing, + replacement for clogged, worn-out, cores. It would make far more sense to try to stock only one type for all Marks, wherever they were.
Incidentally, can you imagine how it felt to read the information, and realize its possible import, after all those years? It's rather like finding out that your uncle is actually your father!

In response to a reply by another poster:

Graham, I think that you're absolutely right; if the new oil cooler would fit the old wings, only requiring an easy-to-fit housing, why keep stocks of the old type, when Seafires, Mk.IV, V, VI, XII will all be using the new size?

LR Mk. II

Document from Edgar Brooks regarding performance of the LR Mk. II.

To: Officer Commanding R.A.F. Station, WARMWELL.

From: Officer Commanding 234 Squadron, WARMWELL.

Date: I3th. July I94I.

Sir,

I have the honour to report on the performance of the L.R. Spitfire in action for the first time with 234 Squadron in operations on Cherbourg on the I0th July I94I.

The Squadron was returning from the target at 4 pounds boost and at 220 mp.h. when I saw S/G Pearce whip round in a tight turn to the right and his machine begin to spin, he was then seen baling out. S/G Pearce who was a clever pilot is missing, and I am of the opinion that it was not due to his being fired at that he left his aircraft but the fact that his aircraft would not come of its spin.

P/O Wilford also reports that in turning to the right in an attack on an E/A which dived past him his aircraft began to s without any warning shudder and it was not until he had lost feet that it finally responded to his controls.

The L.R. Spitfire has a greater tendency to spin at a higher speed than the Normal Spitfire and the trim varies with the tank full and the tank empty in such a manner that renders it less manoeuvrable at high speed and is very prone to spin a low speed The turning ability is also greatly impaired, robbing it of a better quality in dog fights and in fact gives one the impressi of not wanting to be thrown about. These are views also expres by my pilots taking part in the operation.

941

I have the honour,

Your obedient S

ADJUTANT
14 JUL 1941
R.A.F. WARMWELL

M.T. Slade

S

OFFICER
234 Squ

Mk V

Gun heating piping

The likeliest candidate for the relevant modification is 420 "To provide additional heating for Browning guns." Interestingly the ledger lists it for the IIb & Vb, but an issued leaflet states that it was for the V, which implies that the Vc might have been added. The work involved running the tubes through the leading edges of the wings, and out to the .303s, and it's interesting that putting it in a leaflet indicates that the work was thought to be within the capabilities of Service units, though it did say that the work was to be done when the "aeroplane is stripped for repair," and 30 man-hours were allowed for the task. With the heights flown in the Med, it's possible that the mod was deemed unnecessary for the desert (and Malta?), which is why a photo is really vital.

Mk. Vb carrying bombs

The caption to the main photo says that it's 452 Squadron, but there's something not right about it; 452 ceased operations in March 1942, in preparation for sailing to Australia as one of three reinforcement squadrons (where they used the Vc.) The order, for the "C1" roundels on the fuselage of day fighters, wasn't made until 30-4-42, and, also, the aircraft doesn't have a Sky spinner. I also have grave doubts about the airfield, which has a background looking remarkably like that at Ta Q'ali; even if that isn't Malta, Kenley and Andreas (452's last two U.K. airfields) were grass, and not built on white sand.

The conversion kits that Park required were not bomber conversions, but "de-tropicalising" sets, to get the V back to a position where it could face the 109G, since it was struggling against it, while still carrying the Vokes filter.

The photo isn't clear enough to be sure, but there seems to be a chance that it's a Vc, not Vb, since the cannon fairing, on the Vb, had a strengthening plate around it on the wing's leading edge, and I can't see it. Park, in his report on how they'd cobbled together their conversions,

said that they favoured the Vc, because they could move the cannon out, to the outer position, and use the inner bay for the bomb-carrying mechanism; the bombs had no sway braces, since they just used rods, which went into slots cut in the wing and holes partly drilled into the bomb casing. When released, the rods went with the bombs leaving a virtually clean wing. Park also said that they had problems with this idea, due to a wing modification, in which the outer cannon mounting, in the wing l/edge, had been cut off (Supermarine mod 820.)

This gives rise to the intriguing question as to whether all the "Vbs" sent to Malta were actually Vb, or misidentified, modified, Vc, especially since Malta were promised, in May 1942, that, henceforth, they would only get the Vc.

The Air Ministry didn't like Malta's mod, and asked Supermarine to come up with something different, but "an interim scheme for bomb-carrying" didn't appear before May 1944.

Wing stiffeners

The modification went onto the production line from 16-7-42, so, even if BM243 didn't have it when built, it should have been fitted during a major service, and it is, in fact, shown as having wing stiffening fitted before going to 453 Squadron.

Just to clarify- Edgar, do you mean that the external stiffener mod was done, or some other mod that rendered the external stiffeners unnecessary?

I mean only that the aircraft had wing stiffening carried out. As far as I know, the Vb only had two wing stiffening mods; there was 455, which added only 4.8 ounces in total (which implies only a thicker grade of aluminium,) and 532 (which cancelled 455,) which added 6.3 pounds, and incorporated the over-wing stiffeners. There is no record of 532 being withdrawn, or cancelled, and there are aircraft, here, which still carry the strakes, which implies (nothing more) that the mod remained.

Mk. VIII

Wing tank panel lines
Don't overdo (or do, at all) the wing tanks, just the filling points really need attention. From late 1942, the paints changed to smooth finish, and the front 20% of the wings was "stopped" (i.e. filled,) rubbed down, primed, painted, then rubbed down, again, with special attention being given to the rivets, and panel lines, especially the line of the main spar. This added 50 hours to Spitfire production, but added to the top speed. (*Email via Frank Daniels*)

Recognition lights

The VIII (and the VII) originally had red and green downward recognition lights, one in each wing, but they were deleted from May 1943. (*Email via Frank Daniels*)

Wing gun blisters
In December, 1943, the VIII's cannon cover had two small blisters (rather like the 22/24 later,) instead of the single large, since it was envisaged as carrying four cannon, but this didn't happen, probably due to weight (and possibly wing strain) considerations, so the single small blister became standard, but I can't find out when. Certainly, as late as 1944, there was still talk of the VIII having 4 cannon, or a combination similar to the "E" wing, but, as far as I can tell, it never happened. (*Email via Frank Daniels*)

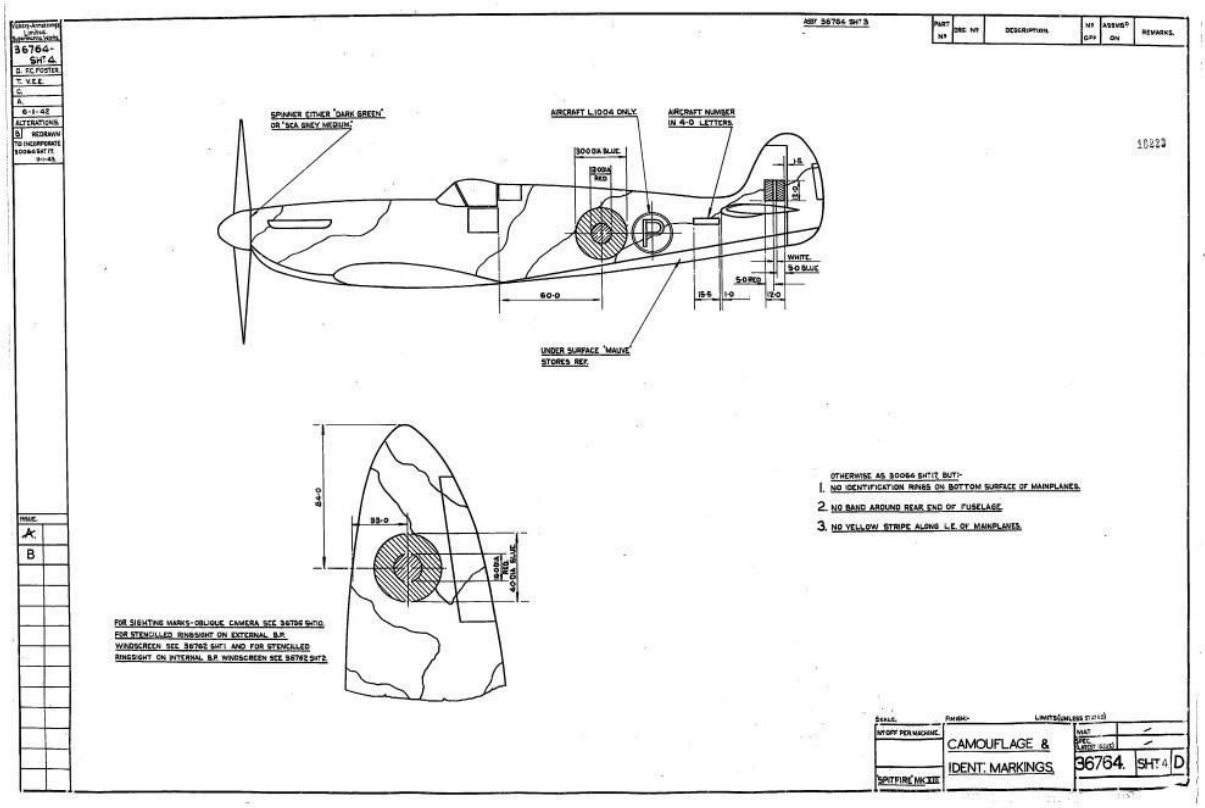
Mk. IX

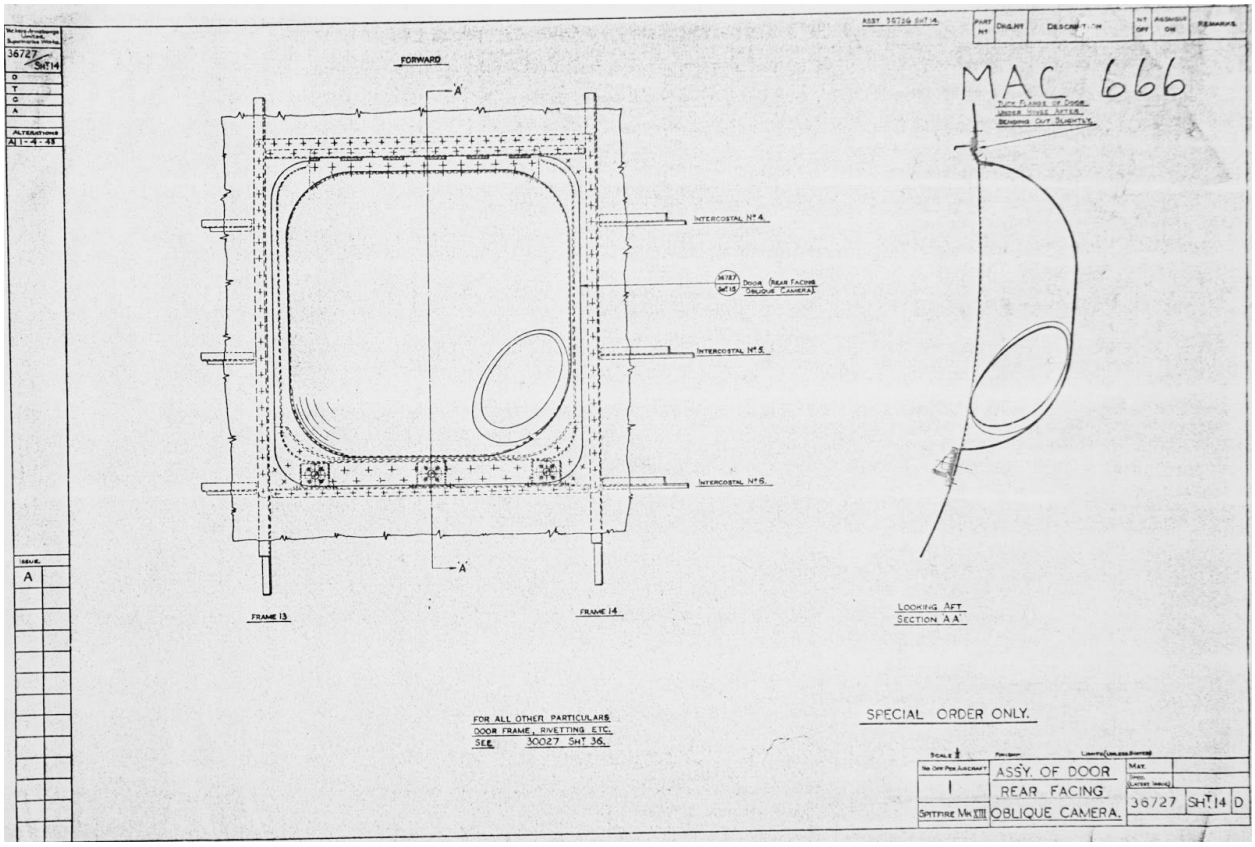
Response to Wheel well bulges on Spitfire IX/ XVIs - post-war/warbird additions or not?

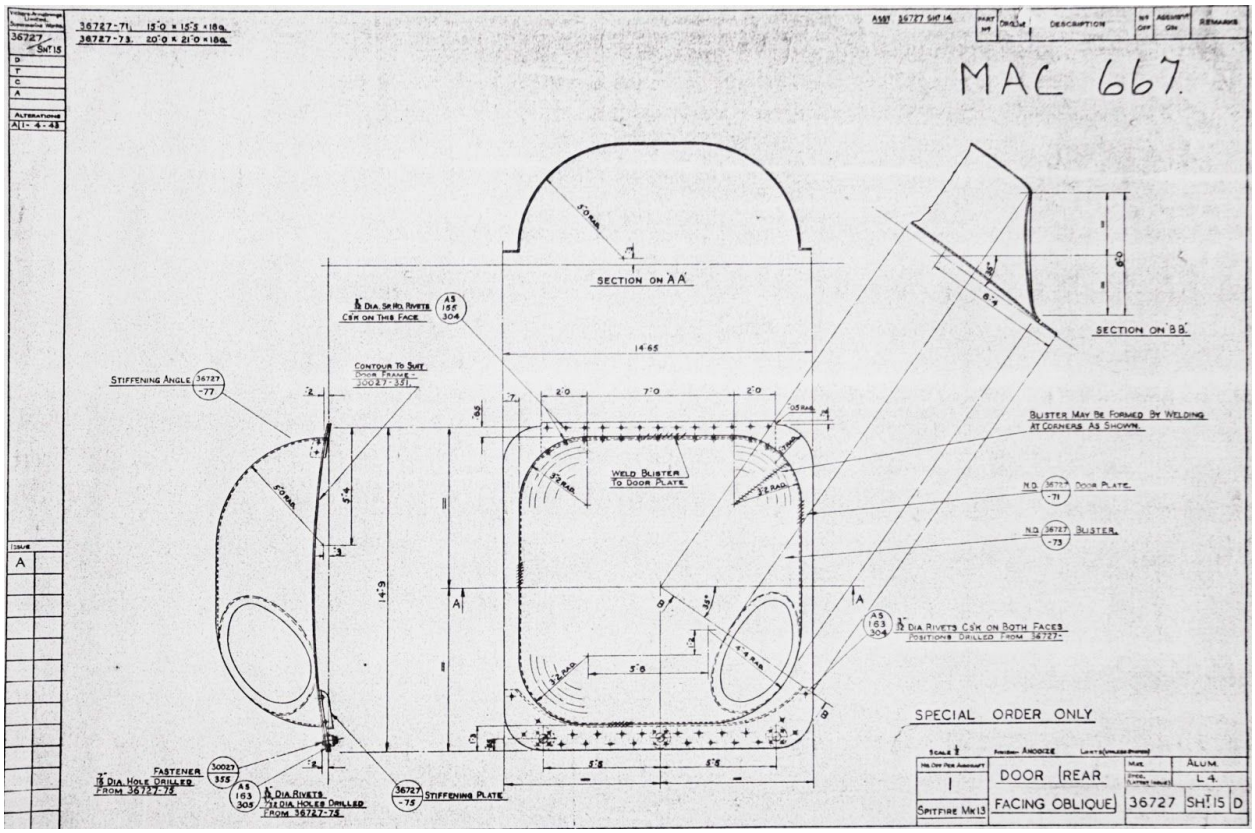
The bulges were not just for larger tyres, but also a change in tracking, going from grass airfields to proper runways. If the tyres didn't run straight, the tread would have been scrubbed off. Spencer Flack discovered this, on his Mark XIV, when the u/c jammed, while on test in the hangar. He'd used the wrong legs with a flat upper wing surface. The outer access hatches were still in place, on Mark XVIs' "E" wings. On the later, cut-down, fuselages the outer hatch covered the oxygen bottles, the inner pair had the compressed air. There's a photo, of the production line, which turns up time and again, which clearly shows this. No l/e holes, or used link chutes, though, you're quite correct.

Mk. XIII

Detail documents from Edgar Brooks




MAC 666
FORWARD
A
A
INTERCOSTAL Nº 4.
36727 SHT 15 DOOR (REAR FACING OBLIQUE CAMERA)
INTERCOSTAL Nº 5.
INTERCOSTAL Nº 6.
FRAME 13
FRAME 14
TUCK FLANGE OF DOOR UNDER SIDE SKIN, BENDING OUT SLIGHTLY.
LOOKING AFT
SECTION A A
FOR ALL OTHER PARTICULARS DOOR FRAME, RIVETTING ETC. SEE 30027 SHT 36.
SPECIAL ORDER ONLY.
ASSY. OF DOOR REAR FACING OBLIQUE CAMERA.
SPITFIRE Mk XIII
36727 SHT 14 D


MAC 667.
36727-71. 15'0 x 15'3 x 18g.
36727-73. 20'0 x 21'0 x 18g.
SECTION ON AA
SECTION ON BB
STIFFENING ANGLE 36727 -77
CONTOUR TO SUIT DOOR FRAME 30027-331
WELD BLISTER TO DOOR PLATE
BLISTER MAY BE FORMED BY WELDING AT CORNERS AS SHOWN.
NO 36727 -71 DOOR PLATE.
NO 36727 -73 BLISTER.
A5 163 304 DIA RIVETS C'SK ON BOTH FACES POSITIONS DRILLED FROM 36727-
FASTENER 30027 355
DIA HOLE DRILLED FROM 36727-72
A5 163 305 DIA RIVETS 7/32 DIA HOLES DRILLED FROM 36727-72
36727 -75 STIFFENING PLATE
SPECIAL ORDER ONLY
DOOR REAR FACING OBLIQUE
ALUM. L4.
SPITFIRE MK13
36727 SHT 15 D

Mk. XVI Notes

All low-back XVIs had the “E” wing; the fuel tank, behind the pilot, displaced two oxygen bottles, which went into the compartments where no.4 Brownings had been, plus the compressed-air bottles, which went into the no.3 compartments. If the fuel tank was used (wartime only,) the elevators had to be metal-covered, wheels had to be stronger 4-spoke, and the rudder the pointed “Spitfire XII”type.

As to whether a high-back XVI was “E” type, only a photo will tell, though it certainly seems likely.

The teardrop-shaped bulges, over the wheel wells, remain something of a mystery, since Supermarine do not seem to have fitted them, but simply issued how-to-do-it leaflets, probably indicating that it was left to each unit to fit them, or not, as it saw fit. The bulges were necessary, if the tracking was changed to fore-and-aft due to excessive wear to the tyres, caused by hard runways. If the Squadron remained on a grass airfield, they wouldn’t have needed to change the tracking, so no bulges.

The XVI is turning into something of an enigma, since I’m beginning to suspect that it was a case of finding them something to do. The engine started life as a Merlin 69, designed for Canadian-produced Mosquitoes, but was eventually surplus to requirements, so it was decided to convert them into the equivalent of the low-level Merlin 66.

One mandatory modification, fitted to the low-back XVI, was the gyro gunsight, and I’ve often wondered why it was thought essential for a ground-attack aircraft. I don’t have the kit, but, if the gyro gunsight is supplied (as it should be,) there should be a more complex design throttle lever, with two wires leading to the gunsight (early version of HOTAS.)

There was also a Merlin modification, named “Basta,” which enabled short bursts of 25lb boost to be applied to the Merlin 66, all of which is making me begin to ponder that the XVI might have been originally intended as a counter to the V1, for which the gyro gunsight, and extra speed, would have been a real asset, but the threat was over before they could be used, so they had to have different work allocated to them. This involved more mods, hence the delay until March/April/May 1945.

Regarding “metric” Packard-built Merlins

I have no idea where this metric business came from; maybe somebody heard about our government’s post-war obsession with going European, and assumed too much. Packard built the Merlin 28, 29, 31, 33, 38, 68, 69, 224, 225, 300, 301, plus those for the Mustang and P-40, so why would a single engine be metric, while all the others were Imperial?

In fact there really was no 266, since it came from surplus 69s, originally intended for Canadian Mosquitoes, which were modified (here, initially) to Merlin 66 standard, with provision for Rotol propeller oil pipes, changed supercharger reduction gear ratio, 12-volt starting, modified Bendix carburettor, plus other items. “266” came about simply from a need to differentiate, since the engine, among other differences, had its coolant header tank built-on, while British-built 60-series had it separate, on the firewall. Packard also used fewer, but bigger (non-metric) bolts to attach the supercharger housing to the engine.

Response to Wheel well bulges on Spitfire IX/ XVIs - post-war/warbird additions or not?

The bulges were not just for larger tyres, but also a change in tracking, going from grass airfields to proper runways. If the tyres didn't run straight, the tread would have been scrubbed off. Spencer Flack discovered this, on his Mark XIV, when the u/c jammed, while on test in the hangar. He'd used the wrong legs with a flat upper wing surface. The outer access hatches were still in place, on Mark XVIs' "E" wings. On the later, cut-down, fuselages the outer hatch covered the oxygen bottles, the inner pair had the compressed air. There's a photo, of the production line, which turns up time and again, which clearly shows this. No l/e holes, or used link chutes, though, you're quite correct.

Additional XVI/IX notes
Papers, in the National Archive, at Kew, give a few answers to the queries. The XVI, as a Mark no., did not exist until August, 1944, when it was realised that separate listings, for spares, etc., were needed, and the Air Ministry finally unbent, and acceded to the requests for a new Mark. Since other Marks had been introduced into production, in the meantime, it explains the wide gulf between the numbers. It’s also the reason why it’s impossible to find mention of the XVI any earlier; L.F.IX was the usual designation, whatever the engine.

All low-back aircraft had to have the “E” armament, since the planned fuel tanks, behind the pilot, entailed the relocation of the compressed-air bottles, which went into the no.3 Browning’s compartment; at the same time the extra fuel meant longer flight times, so three oxygen bottles became necessary, two of which went into the no.4 gun compartments.

Another reason for the delay in the introduction of the XVI/low-back XIV was the reluctance of the Air Ministry to replace 4 x .303″ with 2 x .5″; it was found that, from the rear, the .5″ had no extra penetrative power over the .303″, and the general (lack of) shooting ability, by the average pilot, meant that the hosepipe effect of four guns, in a deflection shot, had a better chance of disabling the enemy pilot.

The arrival of the gyro gunsight changed all that, since the pilots’ aim improved beyond all measure, so the A.M. finally went for the “E” wing. There was a further delay to the low-backs, though, since the electrical boxes, for the G.G.S., had to be installed before the fuel tanks, otherwise the tanks would need removal, for the sight to go in. All of this is the reason why the low-backs did not see service until 1945.

More on the XVI wing
The XVI wing panel lines were identical to those of the VII, VIII, IX & XIV. The two housings, protruding just outboard of the wheel wells, remained in use, but the cannon (with a shorter fairing) moved to the outer, and the .5" Browning moved to the inboard. There's no need to do any "opening up," since the .5" muzzle was usually covered with the same red fabric patch as had been used on the .303" muzzles.

Since the fuselage had a fuel tank behind the pilot, the compressed-air, and two of the oxygen bottles (there were three on the XVI) were moved into the redundant outer compartments; this should have (and usually did) led to the leading edges having no holes where the .303" guns used to be, and completely smooth, hole-less, covers over, and under, the outer compartments.

In answer to a query regarding the performance of which performed better- the Packard or Merlin engines
Neither; there's a report, in the National Archives, and, in tests, the A.F.D.S. could find "no practicable difference."

Mk. 22/24

In the 24s, at Duxford and Hendon, both seats are the dark red of the plastic (not bakelite - some civil servant should have been shot for calling it that) seat. Strengthened seats had green buckets; normal seats were all red. Two straps were attached to the corners, the left one normally had the parachute-style connection box. Two more straps went through a bracket, behind the pilot's neck, on the head armour, then dropped down behind the seat. This was the "ZB" harness, and, by the time of the 22/24, the straps were probably a medium blue.

Modeling Notes

General

The following section is a series of emails sent to Frank Daniels regarding stencils, wingwalks, etc.
Although it's a bit too simplistic, as a general rule, if you can read the stencil, even in 1/32 scale, it's probably too big. The instructional lettering was 1.5", with the walkway/trestle lines half that at .75", which, even in 1/32, scale down to 3/64" & 3/128", or about 1mm & .5mm. In 1/48 it gets even worse, marginally easier in 1/24.

Items like "Walkway forward/inboard" would have remained unchanged, as would the under-wing trestles. The octane rating, across the fuel tank cover, would, very likely, be different, and, while the W/T inspection stamp didn't change, the DTD marking, for the paint type, would have changed, in late 1942, from 83 or 308 to 517, signifying the change to synthetic paints. Also watch the walkway lines; on the I-V, on the starboard wing, the spar line ran from wingroot to wingtip, while, on the IX, it was a mirror image of the "backward L" on the port wing, signifying the stronger upper surfaces.

Depends. There are 'early' Spit IXs and 'later' Spit IXs. The 'early' Spit IXs (1942 - mid 1943) stencils were nearly identical to the Mk Vs. The most noticeable stencil would be the wing walk line on the starboard wing (which is ALWAYS wrong on kit stencils of Mk Is and Mk Vs). The walkway line on the starboard wing ran straight to the wing root. It did not make a 90 deg turn and angle back to the trailing edge like the port wing wing walk line did. Some of the Mk XIIs were this way, too. It wasn't until 1943 that the wing walk lines were a mirror image of each other.

Before going too far, it might help (or not,) if I point out that the decals are the wrong size, for a Spitfire, anyway. Fighter codes were 24", not 30", and Spitfire Squadrons were given a special dispensation, due to the lack of vertical space between the top of the root fairing, and the base of the (open) canopy, to use 20" characters, if they wished.

At first sight, the Xtracolor offerings do appear too dark, and certainly not green enough; Colorado 32006 & 32007 look closer, being 20" & 24" as well, but personal inspection is always preferable, rather than trusting to a monitor screen.

Jennings is absolutely right, regarding the serial nos; remember that there were (at least) 4 factories turning out Spitfires, working 24-hour 2-shift days, so, even though "day shift" Fred might be a trained signwriter, "night shift" Harry might only just have known one end of a brush from the other, so had to use stencils. The dimensions (of 8"H, 5"W, 1" between, and 1" brushstrokes) were mandatory, but the style wasn't. The same "system" applied to code letters, with 24", 12", 3", 3" being the standards.

If you don't like the decals on offer, it's always possible to use Peter Cooke's method, using Letraset (or similar pressure-sensitve letters.) First find a (must be matt) paint which looks right, and spray it onto the model, then find 3/4" (19mm) letters for 24", or 5/8" (16mm, as near as dammit) for 20", and (lightly) burnish them into place. Spray the camouflage, peel off the letters (so much easier with matt paint than gloss,) and they're done.

Revell’s 1/32 Spitfire Mk. II Notes

1. it needs a "Mk.I" oil cooler.
2. it needs the crowbar deleting, unless your model dates after January 1942 (the fit was retrospective.)
3. 2-bar rudder pedals are o.k., but need the fabric straps over the top.
4. gun button was brass, with a silver surround, not red (post-war elfin safety?)
5. Very pistol cartridge rack was normally left off, and Castle Bromwich had (red) plastic seats, not (green) metal.
6. seat armour is missing.
7. seat backrest has an odd depression moulded in, which I've never seen.
8. I have no idea what part 40 is, and 41 (oxygen bottle) should be black, not green.
9. part 42 (compressed-air bottles) was silver, not green.
10. rudder and elevators' "stitching" is overdone.
11. I have no idea what the two "lozenges" (on the top of each wing) are.
12. unless your Mk.II dates from 1940, the rudder "prong" shouldn't be there, neither should the aerial.
13. post 1940, IFF aerials were fitted, and the position of the discs is marked.
14. if you drop the flaps, the door, in the top of the wing, needs to be cut out, and opened.
15. 50B is/are/were "station keeping lights," which might have been coloured like the navigation lights, but that remains a mystery, for now.
16. while over-prominent, the "rivets" are nowhere near as bad as the photos appeared to show.
17. the fuselage is about 2mm shorter than the Hasegawa Vb (all at the spinner end,) but it doesn't "shout," and it appears to have better curvature than the (somewhat slab-sided) Hasegawa fuselage.
18. wingspan and chord (minus wingtips) are identical to the Hasegawa Vb.
19. Revell have matched Tamiya, in the wheel wells, by providing back-sloping walls - very well done - but the "orifices" are too oval.
20. there are three oblong "protuberances" on the spinner, but Revell do tell you to file them off.
21. Revell have confused Sky with Sky Blue (oh, yes, they have.)
22. instrument panel is fixed, but is missing the landing lights control.

The air scoop on top of the kit’s upper cowl

It wasn’t for the Heywood compressor, which wasn’t introduced until March 1942, on the Mk.V, but the Spitfire already had a compressor, which was fitted once the Mk.I went from the “pump-handle” u/c retraction system to the hydraulic type. From what i can tell, the early

compressor had a small, almost invisible, scoop, while the Heywood needed a larger type, which was more prominent. As Revell seem to have measured a preserved warbird (hence the wrong oil cooler housing,) it's possible the airframe also had a too-large scoop, as well.

Spitfire Mk.I from Revell Mk.II kit

BoB Spitfires did have the armoured glass (Stanford Tuck told how his was fitted during Dunkirk, and immediately saved his life.) You'll need the early (circular) HF radio controller in place of the push-button VHF type (37/38); the rudder pedals were single-bar, with a loop of canvas over the top; armour plate (possibly black) needs to go behind the seat; part no. 36 should be left off, as Spitfires didn't have IFF until the end of 1940; 42 is silver, not green; 25 should be replaced by a circular item, rather like the headrest; 40 should be fitted to the instrument panel above the pilot's left leg, not on the starboard wall; leave 16 (Very cartridge holder) off; ailerons should be fabric-covered, though that isn't as noticeable as some make out (just fine lines where the stitches go); there should be two fuel **** levers to the right of the compass (which, incidentally, is black inside and greenish-grey on the outside); the throttle quadrant has one lever too many (the one pointing forward); the door had no crowbar; fill in the holes where 50B should fit, since the lights didn't exist before November 1940; if you leave the flaps down (naughty) the insides were silver. not Sky; leave 176 off; fit the radiator flap-operating lever beside the seat (left side,) pushed forward, if you have the flap open, back if you don't; (probably the most difficult) replace the single fuel gauge (bottom RH corner of the instrument panel) with two smaller items; aerials were stainless steel, not black or copper.

That's all I can think of, at the moment. (*Email via Frank Daniels*)

Tamiya Mk. Vb

Vb AB968 ZF-H of 308 sqn Oct 1941
1. Armoured windscreen or not?
2. Should the wing strengthening strips be removed (as indicated in Tamiya's instructions)?

1/. Yes, but whether internal, or external, is a moot point; internally-armoured windscreens were fitted from 26-4-41, so you'll need a photo, to be absolutely sure.
2/. Yes, mod 532 didn't go into production until 16-7-42.

Eduard 1/48 Spitfire Mk. IXc

If you haven't put the cowling on yet, you should know that the bulged cowling Eduard wants you to use on this kit didn't appear on Spitfire IXs produced before August 1944. Also, by fall of

1943 at the latest, all surviving Spitfire IXs were getting the narrow-chord cannon covers as replacements for the early wide ones. Also the only ones that had the early small air filter/intake were those converted from Spitfire V airframes (BS/EN range mostly), and the AeroVee filter was on all of those produced as Spitfire IXs from the beginning (early 1943 for sure). *(via Tom Cleaver, quoting Edgar)*