

# Anatomy of a Spitfire.

This page is to give you a brief of the internal structure of the Spitfire Airframe as we manufacture them and a quick description.

- **Frame 5.** Also known as the Spitfires forward firewall or engine bulkhead. Contained at the bottom is the wing centre section or Main Spar carry through section. Well haven't made this yet. Have done all the 3D designs for it and the profiles are ready to be cut out. Check out our 3D design of the parts.
- **Frame 6.** This is the frame that sits under the bottom fuel tank and consists of a web for the bottom structure with a curved face channel on top to stiffen it. The side members are curved hat sections that go up to the datum longeron. Well this one is a bit of a problem as we haven't got the pressing drawing to translate it into a 3D design. Only the GA (General Arrangement) drawing of its structure.
- **Frame 7.** Frame 7 is very similar in design and shape to frame 6. We have the 3D design done of the bottom web and the profile is done for it as well. Awaiting snipping out by one of our slaves.
- **Rear fireproof bulkhead.** Attaching to frame 7 and is angled back to frame 8 to provide protection to the pilot in the instance of a fire in the fuel tank area. In the early Spitfires the design is of a patchwork of different panels, mainly in the foothole area, whereas the later ones have bulged inserts to provide feet clearance. Due to only having the GA drawing of the panel, this is something else we haven't done yet.
- **Frame 8.** The start of the cockpit area and more commonly known as 'that frame' under the instrument panel". This is also the first of the Spitfires "double frames". This is 4 webs broken into forward port, forward starboard, aft port, and aft starboard sections. Joined by small brackets by rivets. These are also known as Butt Straps in the British aeronautical lingo. Between the forward and aft webs small bracket spacers are riveted at intervals around the frame to give it strength and to keep it in alignment. Around the inside edge of the frame is a curved "C" channel that adds additional strength and to keep it aligned. At the top of the webs is a strip of aluminum with flared holes along its length. This is where the instrument panel is attached at the bottom to the frame. Offset at the inside of the frame sits the cockpits Compass mount .On the Starboard side sits the Spitfires Fuel Primer or "Kigass Primer" .This is the first frame constructed by us and the pictures are housed in the Airframe section of the photo gallery.
- **Frame 9.** This is a fairly intricate frame due to the large number of parts in it. The bottom member is a hat section, curved to suit the shape of the fuselage at the bottom. The side members are as well hat sections which continue up to the datum longeron. Added to that is a horizontal tube with various channels brackets and braces used for supporting the rudder bar assembly. Have a few parts made for this frame. You can view the 3D model of it in the photo gallery and some parts in the new parts gallery.

- **Frame 10.** This is a double frame which is shaped like a Horseshoe and is situated under the pilot's seat. Capping it is a curved "C" channel piece with holes along its length. Also along the inside are spacer brackets similar to those used in frame 8. This frame also houses on the outside bottom corners brackets to attach the wing rear spar. We have the webs being done at the moment and just need the right sized rollers to be machined up to curve up the channel.
- **Frame 11.** Also known as the big frame behind the pilot's seat and is one of the strongest frames in the aircraft. This is also one of our first frames to be started. A double frame with 4 webs with "C" channels running around the inside edge. Across the middle of the frame is a horizontal brace with two running diagonally off it down to the bottom centre of the frame. This framework is to first brace the frame and secondly to hold the pilot's seat armor plate in place. Down the bottom is also bracketry to house the elevator bellcrank. Up the top at the apex it is quite intricate with firstly aluminum block inside the webs with the web buttstraps in front and behind. On the outside "shoulders" of the apex is two "C" channels. Running vertically inside the apex is two reinforcing channels that run about 22 inches down the frame. At the back of the apex is the mounting brackets for the spine longeron and lower down is where the Spitfire's Voltage regulators are housed. At the inside top of the frame is a rounded channel which is used as a rub strip to prevent the Pilot's Sutton Harness from chafing. Pics of this massive frame can be viewed in the Airframe Gallery in various stages of being built.
- **Frame 12.** This is a single frame and has only the port and starboard sides as webs. Can be viewed through the glazing behind the main canopy. This is another frame we have limited info on so at the moment it is still languishing on the drawing board.
- **Aerial Mount and bracing.** This is the framing which holds the Spitfire's aerial in place. Starting at frame 12 this is a box section of "C" channels braced diagonally onto a plate which holds the aerial base with two angles. The channels have flared holes along their lengths. We have been given a section of this channel and will be using this as part of the pattern to build new parts.
- **Frame 13.** Another single frame. The forward part of the radio hatch and tray is situated here. This frame has had its profile done up.
- **Frame 14.** Yes another single frame. The rear of the radio hatch and tray is located here. Yes this is sitting ready to be cut out as well.
- **Frame 15.** Guess what. Yep another single frame. This one is awaiting a pressing drawing to be located for it so no work yet on the drawing board.
- **Frame 16.** Not going to tell..Ok..Single frame it is. We have the profile ready and waiting to be cut...when we can get around to it.
- **Frame 17.** Yes single frame. Between here and frame 18 is the rear hatch. And yes another one awaiting the cut out procedure.
- **Frame 18.** You are getting good at this. Yep single frame. Just the outside and inside flange as per all the single frames. And flared holes as well.
- **Frame 18a.** This is a funny little frame as it is only from the datum line up. Haven't really looked at this one as yet as a lack of a pressing drawing has eluded us from continuing too far with it.

- **Frame 19.** The final frame in the Spitfire fuselage and is the separation point for the tail assembly. This is a single frame and is divided into two parts forward and aft. The two frames are bolted together to make it easier to separate the tail structure. Quite heavy aluminum is used as huge forces are being put on it. The 3D design of it is done and awaiting the conversion to a profile drawing.
- **Intercostals.** Also known as stringers. These are of folded sheet metal into a "Z" section. These are used to keep the frames at a set distance apart and to help support the skin. These have a slight curve in them to help keep the fuselage shape and to stop the skin from wrinkling. We will be folding these up in full sheet lengths (2400mm or 8 feet) and then cut to length and curved where required.
- **Longerons.** The Spitfire has 5 longerons. A spine longeron, a port and starboard datum longeron which only extends back to frame 14. And port and starboard bottom longerons which extend all the way back to frame 19. The bottom and datum longerons are classed as "W" sections where two pressed angles are riveted together. The spine is made in one piece which is folded to profile. We are in the process of making this up in 3D.

