The sharp-eyed among you will have noticed that pages 325-330 of our He 115 book are 'missing'. This is not the case! We decided to eliminate this small sub-chapter, but due to a miscommunication with the printer, they didn't get the message.
Rest assured though that everything that we wanted to be included in the book, IS included, it's just that the page numbering is messed up.

For the sake of completeness, please find below the 'missing' chapter, in which the He 115 is compared to other seaplanes of the era.

Chapter 10 The He 115 compared to contemporary seaplanes

The seaplane attack aircraft fitted with floats and carrying an aerial torpedo has long since disappeared from the armed forces of the world. Indeed, excepting specialised anti-submarine versions, the air-dropped torpedo itself has now passed entirely into history.

Although the world of 1939 was a very different place, even then the path to what has come to pass was starting to become dimly discernible. When the Second World War in Europe began, professional opinions were already sharply divided both as to the efficacy of the aerial torpedo and the attack seaplane fitted with floats. In practice, pairing the two characteristics had now become a rare combination.

The great majority of torpedo-dropping aircraft designs then in service and to follow came with retractable wheeled undercarriages, and were designed to operate from aircraft carriers. Adherents to this portion of the torpedo aircraft doctrine included all navies of the major powers with, or planning aircraft carriers: America, Japan, Britain, France and Germany.

When it came to aircraft types that would not operate from aircraft carriers, pre-war only Britain (with a view primarily to the defence of the Singapore naval base) and the Japanese Navy invested significantly in torpedo aircraft. During the war they were joined in 1940 by the Italian Air Force and in 1941 by the *Luftwaffe* (mostly using Italian torpedoes), and in due course by the Soviet naval air forces. Without exception however, all the designs employed were land-based.

Most other air forces though begged to differ strongly, seeing the disadvantages of the aerial torpedo (expense, complexity, weight, limited warhead size, unreliability and very heavy maintenance requirements) as far outweighing any possible benefits gained. Consequently, the *Luftwaffe* (initially), the French air force and the Japanese Army air force had no torpedo aircraft, and although the US Army Air Forces made provision for a limited land-based torpedo dropping capability, in the whole of the Second World War only in June 1942 at the Battle of Midway and off the Aleutians were B-26 Bs briefly used in combat against Japanese ships with torpedoes. The later USAAF development of skip-bombing to attack vessels at sea entirely justified the earlier US decision not to pursue the torpedo bomber, or indeed any form of floatplane attack aircraft.

Apart from the far greater flexibility and the lower costs of bombs compared to torpedoes, the evolution of aircraft development had now fundamentally and

inescapably handicapped the floatplane configuration, especially for the attack role. In the days when land-based aircraft were fitted of necessity with fixed undercarriages, for the same engine power and endurance, a floatplane could partially offset the impediment of its floats by carrying most of its fuel there, whilst in the land-plane equivalent fuel had inevitably to be accommodated within the fuselage. Hence it was possible for a floatplane design to either be rather smaller than its land-based equivalent, or alternatively to have a far longer endurance. In a particularly clever floatplane design, such as Ernst Heinkel's Brandenburg W 29 monoplane of 1918, eliminating the second wing and using very efficient bracing, a floatplane could produce a performance comparable to that of a land-based, fixed undercarriage biplane counterpart, whilst having a greatly increased endurance. Thus the W 29 had a top speed of 175 km/h compared to the Sopwith Camel's 182 km/h, but the Camel had only a two and a half hour endurance compared to the four hours of Heinkel's W 29.
However, by the second half of the 1930s there had been a notable change. The progressive introduction of streamlining, flaps, leading edge slots and retractable undercarriages had fundamentally changed the equation to the permanent disadvantage of the floatplane. This was an obvious enough culmination of developments to most contemporaries, and the new handicap was recognised promptly by most air forces; for them all, attack designs including torpedo-bombers would now be land-based.

Amongst the naval air arms of the world, however, the responses would come much later and be far more nuanced, several navies remaining wedded a good while longer to the concept of the floatplane torpedo bomber (when they were though, this was often linked to particular local circumstances. For example the choices favouring the floatplane attack aircraft made by the Swedes, Norwegians and Dutch for the Netherlands East Indies, were all influenced by the need to defend extensive coastlines, heavily populated with island archipelagoes, and—at the time—with very few land bases available).

Amongst the navies that continued to actively develop the floatplane attack aircraft, a complete outlier to all other lines of development in 1939 was the only operational French purpose-built torpedo aircraft. This was a single-engined monoplane floatplane developed for the *Marine nationale* (French navy), the advanced and aesthetically pleasing single-engined Latécoère 298, which entered series production but never dropped a torpedo in anger, and was then not useful enough for the *Luftwaffe* to show any interest in the design.
However, three prototypes of twin-engined floatplanes were also being built in France. These were the Bloch MB.480, the SNCAC NC.-410 and the Loire-Nieuport 10.

In 1937, the *Marine nationale* issued a requirement for a twin-engined torpedo bomber/reconnaissance floatplane. As a result, three prototypes of twin-engined floatplanes came to be built: the Bloch MB.480, the SNCAC NC.410 and the Loire-

Nieuport 10. The Bloch had a crew of five and was powered by two 1,060 hp Gnome-Rhône 14N radial engines. It attained a maximum speed of 330 km/h and had a range of 1,996 km with two torpedoes or a bomb load of 1,125 kg. The SNCAC had a crew of four/five and was powered by two Gnome-Rhône 14Knrs/ors engines (supercharged with reduction gearing but with just 890 hp) attaining a maximum speed of 326 km/h and a range of 2,000 km with two torpedoes or a bomb load of 1,125/1,230 kg. The Loire-Nieuport, powered by two 1,600 hp Gnome-Rhône 14R engines, was the largest, with a crew of six, attaining a quite impressive top speed of 430 km/h and with a range of 3,300 km with two torpedoes or a bomb load of 1,175/1,230 kg.

Although testing was relatively successful, the French, like the British and Japanese, eventually decided that the role could be better met with a land-plane, the much faster Lioré et Olivier LeO 451, and in December 1939 the attack floatplane programme was finally wound up.

To the east, in Poland, the government issued a request for a torpedo bomber in 1930 and all major Polish aircraft companies accepted the challenge. It was only in 1933 that the Defence Minister selected the R-XX project of *Plage i Laśkiewicz* (Plage & Laśkiewicz, which manufactured aircraft under the name 'Lublin') for prototype development.

Although the initial specifications required a single-engined aircraft, this was revised to a twin-engined configuration, the result now being powered by two 635 hp Bristol Pegasus II L2 engines. Lublin completed the design in 1934 and built the prototype in 1935. However, the company were forced into bankruptcy in late 1935 and then were nationalised as part of LWS (*Lubelska Wytwórnia Samolotów*—Lublin Aircraft Factory) in February 1936.

Even as this painful process was underway, the design team continued improving the aerodynamic characteristics of the design project and even proposed a land-based version, designated R-XXA, although this was never to leave the drawing board. The top speed of the floatplane version was estimated as 250 km/h, and the ceiling 4,000 m with a range of 1,200 km. Armament would comprise either a 1,000 kg bomb load. or a 750 kg torpedo There was also an R-XXB variant, with a single fin replacing the original twin tail. When Lublin became LWS, the R-XX project was re-designated LWS-1. Although development continued for some time longer, LWS finally shelved the project and opted for a navalised version of their own design, the LWS-6 Żubr bomber, which had already secured substantial orders. The final irony however was that neither the Lublin R-XX/LWS-1 nor the navalised LWS-6 Żubr even progressed to the prototype stage, since the Polish government instead opted to buy the CANT Z.506B 'Airone' from Italy.

Thus in the final event there were just two other series production, twin-engined monoplane floatplane torpedo-bomber designs that actually entered service and were in any way comparable to the Heinkel He 115. One of these was the Dutch Fokker T.VIII W/G, a three-seat torpedo bomber/reconnaissance aircraft that was significantly smaller and lighter than the Heinkel, and intended primarily for employment in the Dutch colony of the Netherlands East Indies.

The Fokker T.VIII W/G was a mid-wing monoplane with a three part fuselage of ovoid cross-section, designed by a team led by Fokker engineer Marius Beeling. The glazed nose housed the aimer/observer's post and immediately behind the pilot's seat was the radio operator's compartment. It had a light alloy nose, a wood centre section and a fabric covered steel tail frame. The wing was made up of two cross-beams with Bakelite ribs and plywood skinning. In the T.VIII W/M series, the tail and wings were made from light alloy. The rustproof duralumin floats had six waterproof compartments and a fuel tank in each. The aircraft was powered by two 9 cylinder 450 hp Wright Whirlwind R-975-E3 radial engines, which afforded a top speed of 285 km/h and gave a range of 2,750 km. Armament consisted of two 7.92 mm FN -Browning machine guns and 600 kg of bombs or torpedoes, which were carried in the bomb bay. Production started after the first flight in 1938 and eleven aircraft soon entered Dutch service. The Finnish Air Force ordered five larger and more powerful T.VIII W/Cs fitted with 890 hp Bristol Mercury XIs, but none of these were delivered to the original customer. A land-based derivative of the floatplane with fixed landing gear, the T.VIII W/L, did not see series production. Total production reached 36 aircraft. With the German invasion in May 1940, nine aircraft moved to France and finally retreated to the UK, where they formed the basis of No.320 (Netherlands) Sqn. RAF at Pembroke Dock in South West Wales until lack of spares made them impossible to operate. The Germans completed those T.VIII Ws still at the Fokker factory, including the larger aircraft ordered by the Finns, tested them at Travemünde and operated them in the North Sea, the Mediterranean and Aegean with *Seeaufklärungsgruppe* (SAGr) 126 in the reconnaissance, air-sea rescue and anti-submarine roles. In May 1941, a Dutch pilot managed to steal a T.VIII W in Amsterdam and flew it to England with three passengers. Although intended as a torpedo bomber, the Fokker T.VIII W never dropped a torpedo in action.

The other comparable aircraft was the three-engined C.R.D.A. CANT Z.506B which was significantly larger than the He 115 (CANT indicating *Cantieri Aeronautici e Navali Triestini*). Derived from the larger and heavier Z.505 by chief engineer Filippo Zappata, the Z.506B was first conceived as a 12 to 14 seat transport floatplane which entered production in 1936 as the Z.506A, powered by three 750 hp Alfa Romeo 126 R.C.34 nine cylinder radial engines, giving a maximum output of 780 hp for take-off. The fuselage and strut-braced wings comprised a wooden structure covered in tulipwood and plywood respectively. The duralumin floats were covered in Chitonal, a composite material consisting of a copper-magnesium-silicon wrought aluminium alloy sheet, plated with pure aluminium. The aircraft entered service with *Ala Littoria S.A.* in the Mediterranean. It was produced at the CRDA and CANT factories, and also by Piaggio under licence. A larger version of the Z.506A powered by three Fiat A.80 R.C.41 radial engines and fitted with a larger wing, designated as the Z.509, was built in 1937 for use on *Ala Littoria's* transatlantic postal service to South America, with three examples being built (this was the CANT design that had so quickly bested all eight of the world records set by the He 115 V-1 on 28 March 1938 – see Chapter 1). The Z.506A had itself also set a number of altitude, speed and distance records between 1936 and 1938.

A five-seat torpedo bomber, reconnaissance bomber and rescue floatplane military version was developed as the Z.506B, with a stepped, glazed tandem two-seat cockpit with a ventral gondola containing the bomb aimer's position and bomb bay, immediately behind which was a gunner's station. It was powered by 750 hp Alfa Romeo 127 R.C.55 engines and entered service in 1939. The armament consisted of a 12.7 mm Breda-SAFAT machine gun in the dorsal position and three 7.7 mm machine guns, one in the ventral position and two on the fuselage sides. The bomb bay could accommodate an 800 kg torpedo or a combination of smaller weapons totalling a similar weight, while later versions were able to carry a bomb load of 1,200 kg and were equipped with two 7.7 mm Breda-SAFAT machine guns in waist positions and a Caproni Lanciani Delta E turret replacing the Breda turret. Production of the Z.506B totalled 324 aircraft. Poland, as mentioned above, ordered 30 aircraft, which remained undelivered bar one machine as a result of the German invasion, the remainder being taken over by the *Regia Marina*. The Z.506B was first used as a reconnaissance aircraft and torpedo bomber in the Spanish Civil War, the rebel forces being supplied with five aircraft in 1938. The *Aviazione Legionaria* (Italian Royal Air Force expeditionary corps) also evaluated the early Z.506B aircraft in Spain during 1939. At the outbreak of World War Two, 97 aircraft remained operational in Italy. Due to its vulnerability to fighters, it was now only allocated to reconnaissance units. Later in the war, it was used on maritime patrol and air sea rescue missions.

When Italy surrendered to the Allies in 1943, around 70 CANT 506s remained in service with the *Regia Marina*. Some surviving aircraft then served with the Italian Co-Belligerent Air Force. The Germans captured some CANT 506s and started using them in small numbers with the *Luftwaffe* in Italy, Germany, France, Yugoslavia and even the Greek islands. In addition, the CANTs of *171a Squadriglia* kept on operating air sea rescue and patrol missions from the military port of Toulon, with mixed Italian/German crews. Some of the Z.506s captured by the Germans were also flown by Italian volunteer crews over the Baltic Sea in 1944, patrolling the area around Peenemünde. A special air-sea rescue version, the Z.506S *Soccorso*, was also produced. Some examples survived in post-war service until 1959. There was one other contemporary Italian twin-engine floatplane design of note but this was never intended to carry a torpedo. This was the elegant Fiat RS.14 was designed by Manlio Stiavelli's team at the *Costruzioni Meccaniche Aeronautiche Società Anonima* (CMASA) works at Marina di Pisa in Tuscany, central Italy. The first of two prototypes made its maiden flight in May 1939. The pilot and copilot sat side by side, with the radio operator's compartment behind them. The bomb aimer/observer sat in a glazed nose. The bomber type RS.14 was fitted with a long ventral gondola to carry depth charges. It was powered by two 840 hp 14 cylinder Fiat A.74 RC 38 radial engines. The RS.14's performance included a maximum speed of 390 km/h, a range of 2,500 km and a service ceiling of 6,300 m. Armament consisted of one 12.7 mm and two 7.7 mm machine guns and up to 400 kg of bombs/depth charges. Total production reached 188 aircraft. A derivative of the floatplane version, the land-based AS.14 ground attack bomber with retractable landing gear which was built in 1943, did not enter series production. The RS.14 went into service with the *Regia Aeronautica* (Italian Royal Air Force) with several maritime strategic reconnaissance

squadrons, which used them in convoy escort duties and anti-submarine patrols. A few survivors were operated by the Italian Co-Belligerent Air Force. At the end of the war, they were used for liaison duties carrying up to four passengers.

For completeness, it is worth mentioning one other contemporary seaplane with floats developed during the same period as the He 115, although this was very much in the 'junior league'. This was the Yugoslav Rogožarski SIM-XIV-H, designed by the engineer Simo Milutinovic and built for coastal reconnaissance duties for the *Kraljevska mornarica* (Royal Yugoslav Navy). Powered by two 8 cylinder 270 hp Argus As 10 engines, the design of the wooden SIM-XIV-H prototype started in 1936 and was concluded in January 1938. Flight tests on 8 February 1938 proved that it was too slow because of its heavy nose turret. In any case, the wooden structure was thought to be difficult to maintain, so it was replaced with a new mixed construction fuselage in the second prototype, with a plywood skinned steel tube structure, although the plywood covered wooden wing was retained as were the fabric covered wooden control surfaces and the light alloy EDO floats. Final flight tests were concluded in the summer with satisfactory results. Armament consisted of two 7.92 mm Browning machine guns and up to 200 kg of bombs. Six pre-series aircraft were ordered, soon to be followed by eighteen series aircraft. The series aircraft differed from the prototype with a modified tail area, an improved cockpit canopy and omission of the machine gun cupola in the nose, and all were delivered in 1939. The twelve aircraft of the second series, intended to be fitted with more powerful 450 hp Argus As 410 engines, were still under construction at the time of the German invasion. They saw little action during the brief campaign and, on the approach of the Axis forces, four aircraft tried to reach Greece with varying success, eight fell into Italian hands and were intensively used in training duties. The last surviving aircraft of these was captured by the Germans after the Italian armistice.

In summary, neither the Fokker T.VIII W/G nor the Z.506B floatplanes were ever actually used as a torpedo bomber during the Second World War. That distinction belongs uniquely to the He 115 alone, the last of Heinkel's solid, very competent seaplane designs with floats. By the time it entered service though, the He 115 was already evident as a holdover of outdated thinking, delivered into a world that no longer had any use for it. That on 1 September 1939 the Germans had no torpedoes suitable from dropping from the He 115, and that the eighty-three production machines already delivered were not even equipped with the racks necessary to carry air-laid mines or torpedoes only adds to the irony and highlights the controversies attending the development and deployment of this floatplane anachronism.
Thus the Heinkel He 115 was the very last of all the designs of attack seaplanes fitted with floats to have ever dropped aerial torpedoes in earnest. The design of the He 115 marked the close of an era, the conclusion where the high hopes of those that had specified its floatplane configuration, met harsh reality and disappointment.
As a round-out, a brief comparison between the Heinkel He 115, the Ha 140 and other contemporary operational twin/three-engine floatplanes of the decade is set out in the data table below to provide an impression of their different characteristics.

	Type									
Dimensions	**SIM-XIV-H**	**T VIIIw/G**	**R-XXA**	**LN 10**	**MB.480**	**NC.-410**	**RS.14**	**Z.506B**	**Ha 140**	**He 115 A**
Length	11.20 m	13.00 m	16.64 m	17.10 m	19.10 m	17.70 m	14.10 m	19.25 m	17.60 m	17.30 m
Wingspan	15.20 m	18.00 m	23.65 m	27.01 m	23.50 m	26.80 m	19.54 m	26.50 m	21.00 m	22.20 m
Height	4.48 m	5.00 m	5.00 m	6.70 m	4.60 m	6.80 m	5.63 m	7.40 m	5.50 m	6.70 m
Wing area	33.55 m²	44.00 m²	76.50 m²	90.00 m²	82.20 m²	89.00 m²	50.00 m²	87.00 m²	92.00 m²	87.50 m²
Empty weight	2,230 kg	3,100 kg	4,500 kg	8,518 kg	7,020 kg	8,170 kg	5,470 kg	8,300 kg	6,300 kg	6,465 kg
Gross weight	3,350 kg	5,000 kg	6,800 kg	13,974 kg	10,002 kg	11,980 kg	8,470 kg	12,300 kg	8,500 kg	9,295 kg
Performance										
Top speed	245 km/h	285 km/h	261 km/h	430 km/h	330 km/h	326 km/h	390 km/h	365 km/h	320 km/h	310 km/h
Cruise speed	-----	220 km/h /h	227 km/h	280 km/h	280 km/h	-----	-----	325 km/h	295 km/h	300 km/h
Max. range	840 km	2,750 km	950 km	2,000 km	3,300 km	2,000 km	2,500 km	2,745 km	1,150 km	2,220 km
Service ceiling	4,500 m	6,800 m	5,500 mm	7,000 m	7,100 m	5,800 m	6,300 m	8,000 m	5,000 m	5,600 m