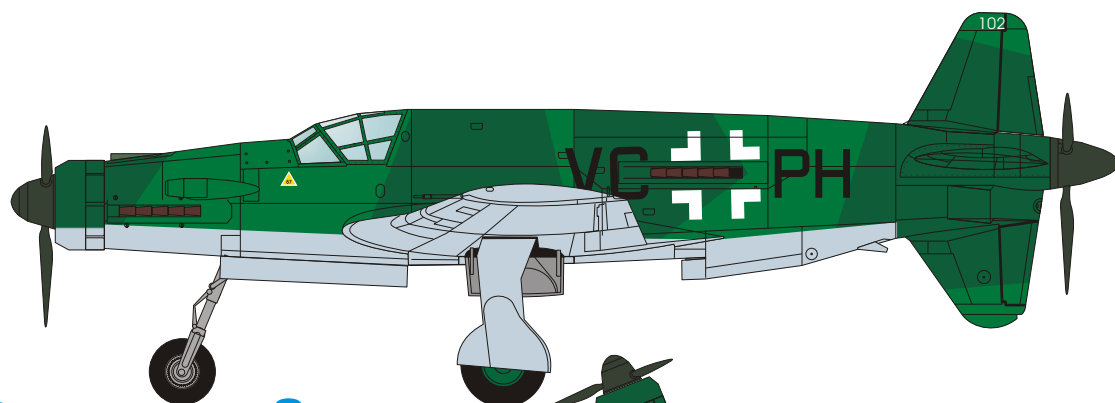


# CARDBOARD MODEL

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MODELS BY MAREK



## Dornier Do-335A



**5**



# Dornier Do 335A-1 Pfeil „Arrow“

No-one can accuse the World War II German aircraft designers of conservatism and, while the majority of combat aircraft were of conventional design, there were many others which pushed the forefront of aeronautics. Unhampered by tradition, German designers sought fresh means to solve old problems, and in so doing provided the Allies in both East and West with a wealth of advanced research material following the end of hostilities. One of the most famous of the bizarre shapes which took to the air over Germany was the Dornier Do 335 Pfeil, a brave attempt to provide the Luftwaffe with a potent fighter-bomber, night-fighter and reconnaissance platform.

Prof Dr Claudius Dornier was the genius behind the famous company of Dornier-Werke GmbH, and he had established a long line of successful aircraft, notably in the field of flying-boats. For most of the late 1930s and World War II, Dornier was primarily concerned with the production of bombers for the Luftwaffe. Since the end of World War I, Claudius Dornier had been interested in the field of centreline thrust, whereby two engines shared the same thrust line (one pulling and one pushing). Benefits of this system were obvious over a conventional twin layout, with only the same frontal area as a single-engined aircraft, the wing left clean of engine nacelles and attendant structures, and no asymmetric pull if one engine cut out. However, problems did exist in the area of the drive shaft which drove the rear propeller. The unconventional tandem engine layout was patented by Claudius Dornier in 1937.

Dornier's extensive flying-boat experience gave him a wealth of knowledge in simple centreline thrust arrangements, where two engines were mounted back-to-back over the centreline of many of his designs. By the mid-1930s, he saw the possibility of using this concept to power a high-speed fighter, but first the rear engine extension shaft arrangement had to be proved. To that end Ulrich Hutter was commissioned to design a small testbed for the arrangement. Designated the Goppingen Go 9, and built by Schempp-Hirth, the testbed featured a pencil-slim fuselage contained a 80 hp (59.6 kW) Hirth HM 60R engine mounted at the centre of gravity beneath the shoulder-set wing. Stalky main undercarriage units retracted into the wing, while a nosewheel unit retracted forward into the extreme nose. Behind the wing a long and slender tail boom hid the drive shaft, which extended past a cruciform tail to a four-bladed wooden propeller.

Flying for the first time in 1940, the Go 9 proved that the rear pusher principle was both efficient and safe, which gave Dornier new impetus to his fighter designs taking shape on the drawing boards. However, the Technische Amt of the RLM decreed that Dornier abandon his work with fighters and return to the main job in hand of producing bombers and flying-boats, despite some initial interest in his radical designs. Nevertheless, in 1942 the Technische Amt issued a requirement for a high speed unarmed intruder aircraft, and Dornier submitted his Projekt 231 design, incorporating the tractor-pusher engine arrangement. After evaluation Dornier was awarded a development contract in the face of opposition from Arado and Junkers, and the designation Do 335 was assigned to Projekt 231.

As design got underway, the RLM issued a new directive to redesign the Do 335 as a multi-purpose day fighter, night-fighter, fighter-bomber, Zerstoror and reconnaissance platform, which caused a delay in production of the prototype. By the autumn of 1943 the Do 335 was ready for flight.

Dornier's concept had emerged as a fearsome looking aircraft, appearing as purposeful as a fighter could. In the forward fuselage a Daimler-Benz DB 603 featured an annular-ring cowl, while exhaust stubs just aft of the trailing edge belied the position of the rear engine. Underneath the rear fuselage a large air scoop aspirated the second unit, which powered a three-bladed propeller mounted behind a cruciform tail. Under the centre-section of the wing were doors for a small weapons bay, capable of carrying a single 1,100 lbs (500 kg) or two 550 lbs (250 kg) bombs. The undercarriage was a tricycle arrangement, with the wide-track main units retracting inwards into the wing and the nosewheel retracting backwards (following a 90 degree rotation) into the area beneath the cockpit.

The broad wing was set well back, and although the name Pfeil was used semi-officially, the service pilots who became acquainted with this extraordinary machine soon dubbed it 'Ameisenbär' (ant-eater), thanks to its long nose. A Dornier pilot was at the controls for the first flight from Oberpfaffenhofen, this taking place on 26 October 1943 with the Do 335 V1 first prototype (CP+UA). After initial Dornier trials, it moved to Rechlin to begin extensive official trials. Reports from Oberpfaffenhofen and Rechlin were favorable, with only slight longitudinal stability problems encountered. Most pilots were surprised at the speed, acceleration, turning circle and general handling of the type, and development continued smoothly. Further prototypes joined Dornier and Rechlin trials, introducing new improvements such as redesigned undercarriage doors and blisters in the canopy accommodating mirrors for improved rearward vision.

By the fifth prototype armament had been installed, this comprising two 15 mm MG 151 cannon in the upper fuselage decking and a single 30 mm MK 103 cannon firing through the forward propeller hub. Subsequent prototypes were used for further flight trials and engine tests, culminating in the Do 335 V9 built to pre-production standards. The first Do 335A-O pre-production aircraft (VG+PG) followed shortly in mid-1944, with full armament and ready to start operational evaluation. The Erprobungskommando 335 was established in September 1944 to conduct tactical development using many of the 10 Do 335A-Os built. Service trials began with the V9 with the Versuchsverband des Oberfeldshabers des Luftwaffe.

By late autumn in 1944, the Do 335A-1 full production model appeared at Oberpfaffenhofen, this introducing the definitive 1,800 hp (1342 kW) 12-cylinder DB 603E-1 engine and two underwing hardpoints capable of carrying fuel or 550 lbs (250 kg) bombs. Similar in airframe details to the Do 335A-1 was the Do 335A-4 (T9+ZH) unarmed reconnaissance version. Only one was completed, adapted from a Do 335A-0 with two Rb 50/18 cameras in the weapons bay and increased external fuel. Daimler-Benz DB 1,900 hp (1417 kW) DB 603G engines were to have been fitted with higher compression ratio and more powerful superchargers. The sole example was later tested at 1./Versuchsverband OKL.

Next in line of the Pfeil variants was the Do 335A-6 (prototype Do 335 V10), which was the night fighter variant. Armament remained unchanged from the fighter bomber, but FuG 220 Lichtenstein SN-2 or FuG 217J Neptune/FuG 218 Neptun V airborne intercept radar was to have been incorporated, the aeriels being located forward of the wing (lateral beam port and vertical beam starboard). To operate the radar a second crewman was needed, and to accommodate him a cockpit was incorporated above and behind the pilot. Giving the Pfeil an even stranger appearance than before, the second cockpit also meant a considerable restructuring of the fuel system since fuel capacity was reduced to 600 litres. To augment this the weapons bay area was converted over to fuel storage. The negative effect on performance of the extra cockpit, aeriels, weight and other modifications such as flame damping tubes over the exhaust ports was in the region of 10 percent, but production aircraft would have offset this partially by being fitted with DB 603E engines with MW-50 (water/methanol) boost instead of the DB 603A retained by the sole example. Production was scheduled to have been undertaken by Heinkel in Vienna, but this plan was overtaken by events and the tooling was never assembled. There was only one operational Do 335A-6, flown by Werner Baake in I./NJG 3 flying Do 335 V-10 (CP+UK) with FuG 220 Lichtenstein SN-2 radar.

The final pair of Do 335A variants comprised the Do 335A-10 and Do 335A-12, both featuring the second cockpit for use as conversion trainers. The former was powered by the DB 603A engine (prototype Do 335 V11) and the latter by the DB 603E (prototype Do 335 V12). With full controls in the raised cockpit for the instructor, the two prototypes were both delivered without armament, but this was rectified in the pair of Do 335A-12 production aircraft.

After development of fighter-bomber, reconnaissance, trainer and night-fighter variants, the role of heavy Zerstoror was next to be

developed, as a direct result of the worsening war situation. During the winter of 1944/45, the Do 335 V13 (RP+UP) emerged from the Oberpfaffenhofen factory as the Do 335B-1. This aircraft featured the replacement of the weapons bay by a fuel tank, and the replacement of the 15 mm cannon by 20 mm MG 151 cannon. More heavily armed was the Do 335 V14 (RP+UQ) which, intended for service as the Do 335B-2, featured the same armament and an added MK 103 30-mm cannon mounted in the wings.

In the event, these were the only B-series aircraft to be completed, although others (V15 to V20) were on the construction line at the termination of the project. These included more B-1 and B-2 prototypes, and a pair of Do 335B-6 prototypes, these being night-fighters similar to the Do 335A-6 but with the heavy armament of the Do 335E-1. Other prototypes would have featured DE 603LA engines with a two-stage supercharger. The Do 335B-3 was to be powered by two 2,100 hp (1566 kW) Daimler-Benz DB 603LA engines. One other development deserves mention, the B-4, B-5 and B-8 models which featured a 14 ft 10 in (4.3 m) increase in wing span for greater altitude performance. The development of these new outer wing panels had been undertaken by Heinkel, but they remained on the drawing board. The last flight took place on 20 April 1945, when Hans-Werner Lerche took Do 335A-02 from Rechlin to Oberpfaffenhofen.

As far as is known, the Pfeil never entered into combat, although US pilots reported seeing the strange aircraft in the sky during sorties over Germany, and the Erprobungskommando was forced to send aircraft into a sky which could not be guaranteed as being free of hostile aircraft. In its single-seat version it was one of the fastest piston-engined fighters ever built, with a claimed top speed of around 475 mph (765 km/h). Despite this high performance, it was the much slower two-seat night-fighter version which would probably have proved the most effective if the war had continued. Equipped with excellent radar and powerful weapons, and blessed with good visibility, combat persistence and performance, the night-fighter would have wreaked havoc against the RAF bomber streams.

Flying the Pfeil was an experience, thanks to its high performance and unusual configuration. While the performance provided an exhilarating ride for the pilot, the configuration prompted some doubts.

His main concern was the ejection seat, the Do 335 being only the second production type to feature this (after the Saab J21). Before firing the seat, explosive bolts which held the upper vertical tail surface and rear propeller were fired to clear a way for the egressing pilot. Despite the ejection seat, he had to jettison the canopy manually. As another safety feature, the lower vertical tail surface was jettisonable in case a wheels-up landing was attempted.

To conclude, the Pfeil proved to be a sound design with no major faults. If development had been allowed to continue at a steady pace, and had sufficient resources been made available, the teething problems which remained with the type could have been ironed out, and the Pfeil could have emerged as a warplane of major importance to the Luftwaffe. However, as the military situation facing Germany darkened during 1944/45, resources continued to be split between dozens of projects, and development of the Do 335 was rushed, to compensate for the dislocation wrought by allied bombing and the advance of the Allied armies. Development and production was also delayed by the state of German industry, which could not provide the necessary sub-contracted components such as propellers, engines and radios. The development effort was further diluted by unnecessary effort on unattainable advanced derivatives while the basic fighter-bomber was starved of both manpower and money.

Today, the sole remaining example of this unique type is on display at the National Air and Space Museum in Washington DC. Do335A-0 VP+GH (Wk Nr. 240102) was one of the two examples evaluated at the US Navy's Patuxent River Test Center in 1945. Thereafter, it stayed in open storage for 27 years in the grounds of the NASM storage facility at Silver Hill. In October 1974 the decaying airframe was flown back to Munich, for a complete restoration by Dornier Aircraft at Oberpfaffenhofen (then building Alphajets). The magnificently restored aircraft was first displayed at the Hannover Airshow in May 1976, and then loaned to the Deutsches Museum, Munich, for a several years before returning to the NASM.

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Type: Single Seat Fighter Bomber

Manufacturer: Dornier-Werke GmbH (Schempp-Hirth built the Goppingen Go 9 on which the Dornier Do 335 was based).

Powerplant: Two 1,750 hp (1305 kw) Daimler-Benz DB 603A-2 12-cylinder inverted Vee piston engines.

Performance: Maximum speed 478 mph (7700 km/h) at 21,000 ft (6400 m); cruising speed 426 mph (685 km/h) at 23,295 ft (7100 m); service ceiling 37,400 ft (11400 m).

Range: 857 miles (1380 km) on internal fuel.

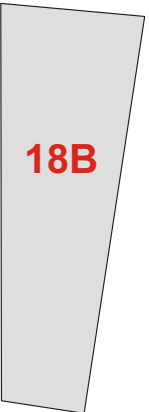
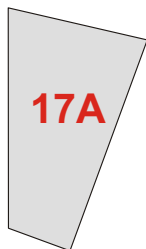
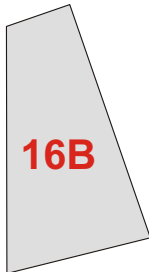
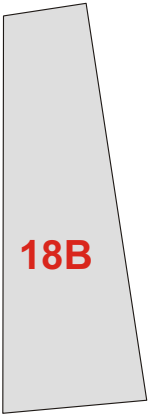
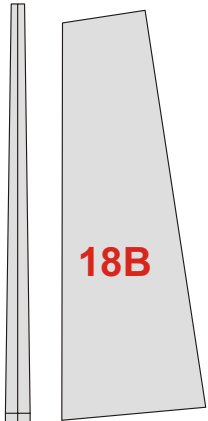
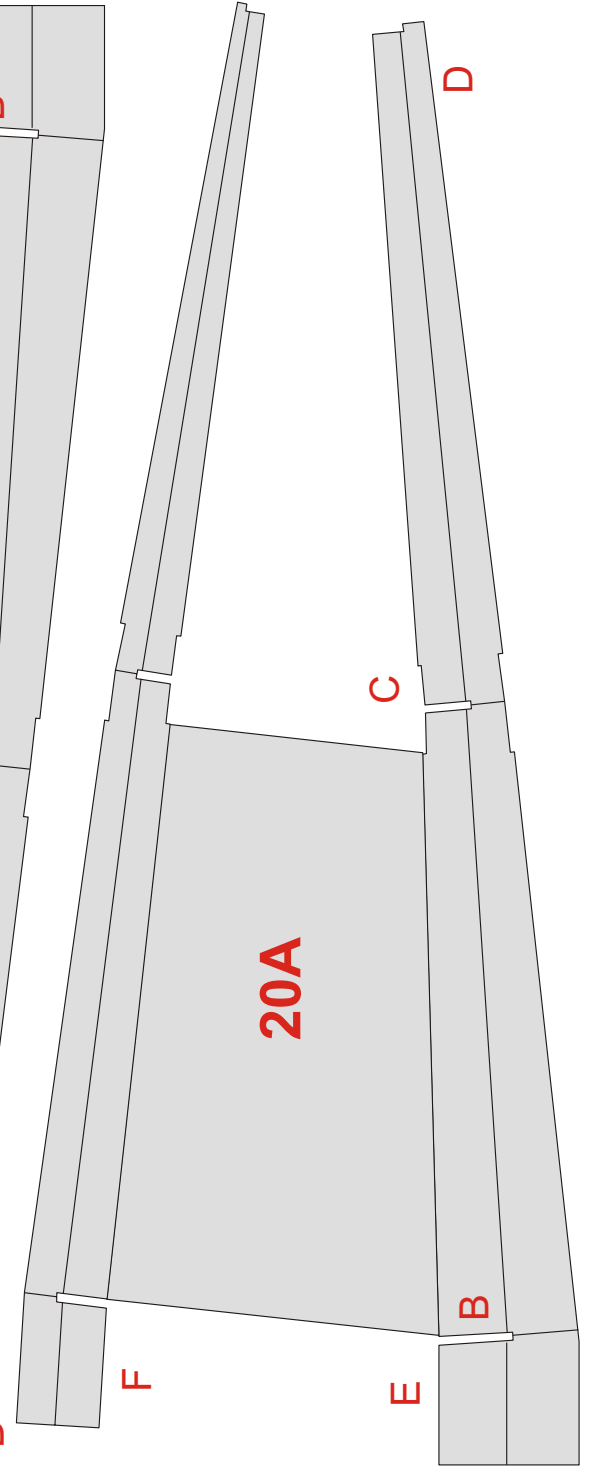
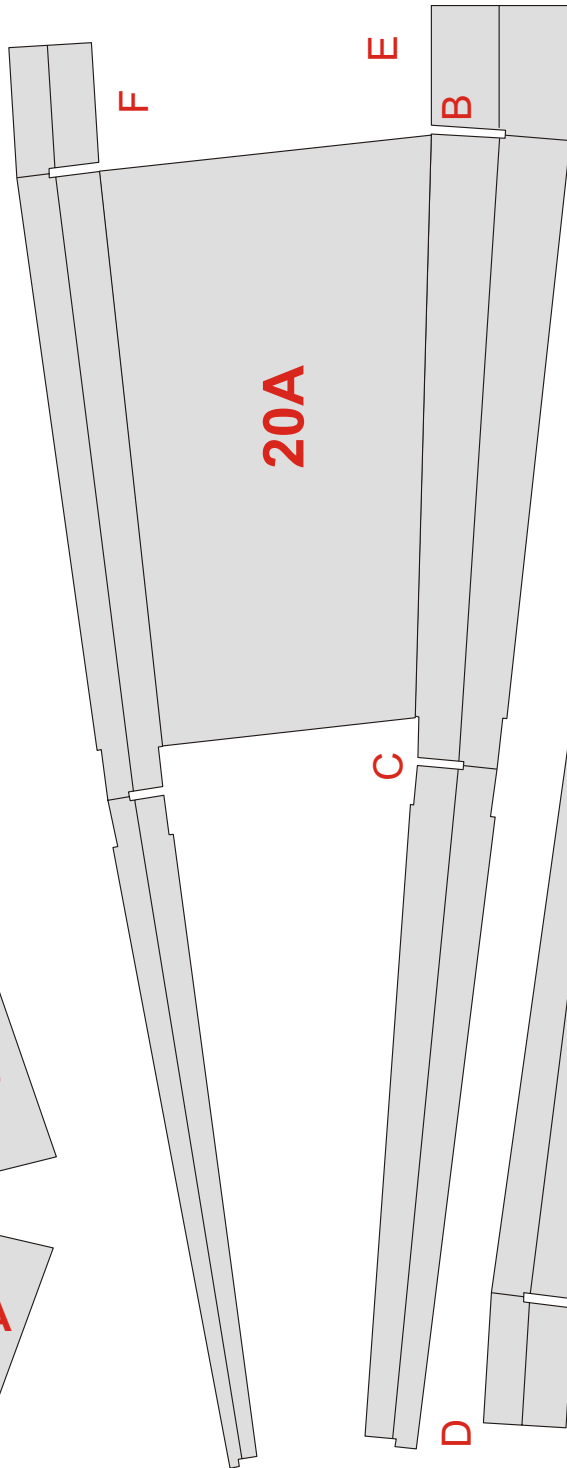
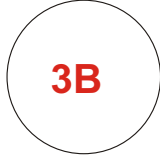
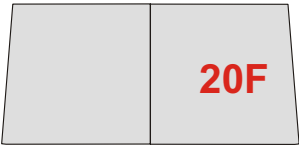
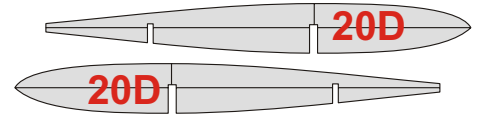
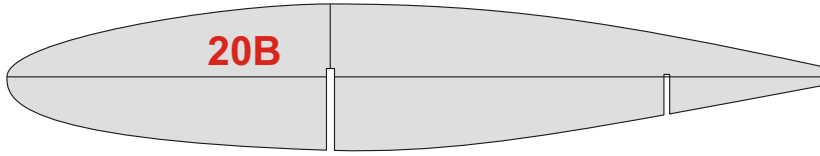
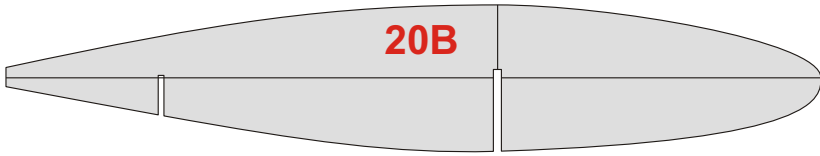
Weight: Empty 16,314 lbs (7400 kg) with a maximum take-off weight of 21,164 lbs (9600 kg).

Dimensions: Span 45 ft 3 1/4 in (13.80 m); length 45 ft 5 1/4 in (13.85 m); height 16 ft 4 3/4 in (5.00 m); wing area 414.42 sq ft (38.50 sq m).

Armament: (A-0/A-1) One 30 mm MK 103 cannon firing through the propeller shaft and two cowling mounted 15 mm MG 151/15 cannons. (B-2) One 30 mm MK 103 cannon firing through the propeller shaft and two cowling mounted 15 mm MG 151/15 cannons plus two 30 mm MK 103 in the wings. (Bomber versions) One 1,102 lbs (500 kg) bomb or two 551 lbs (250 kg) bombs internally and two 551 lbs (250 kg) bombs externally.

History: First flight (Do 335V-1) autumn 1943; (production A-1) late November 1944.

Operators: Germany (Luftwaffe).



18B

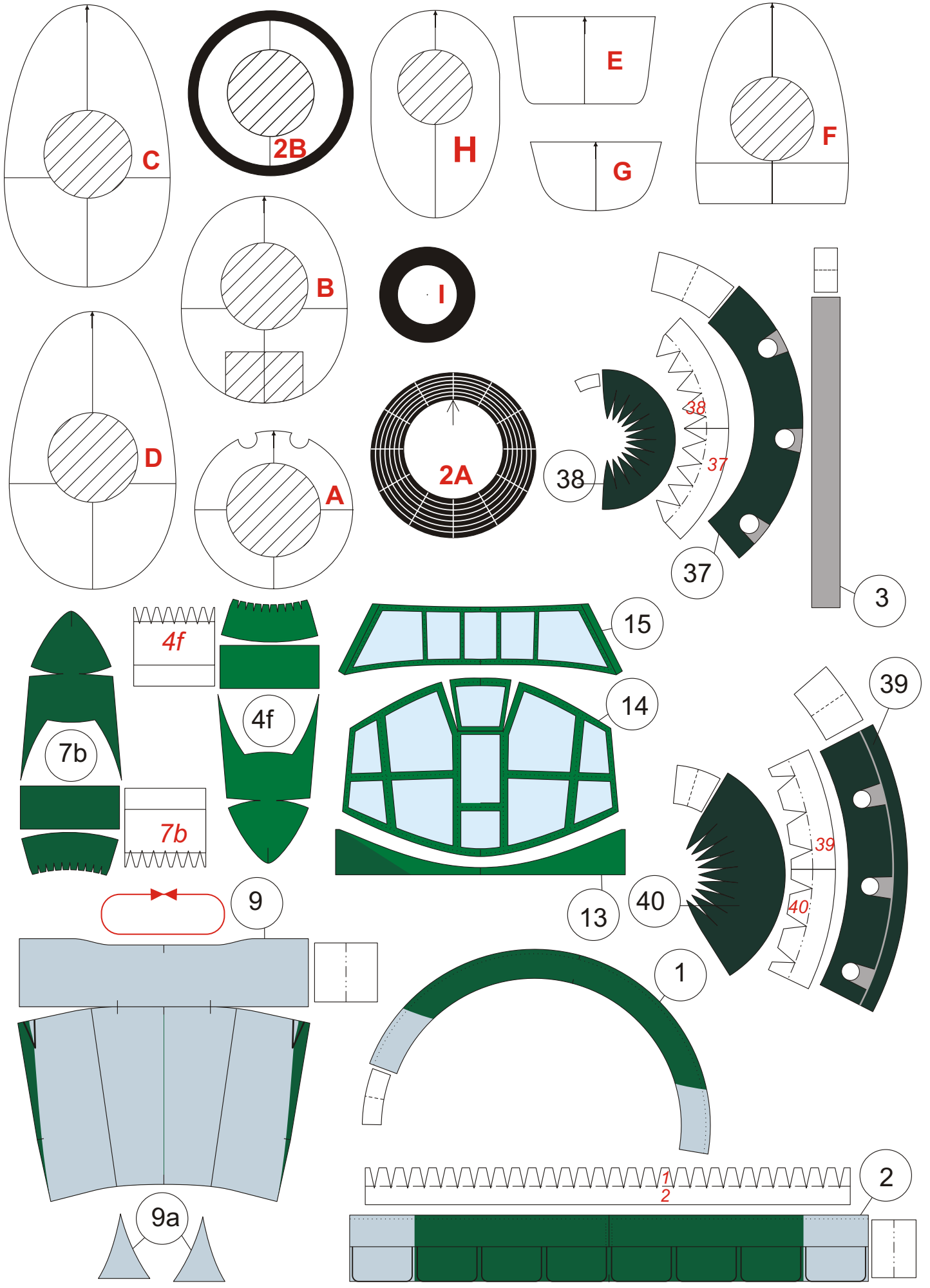
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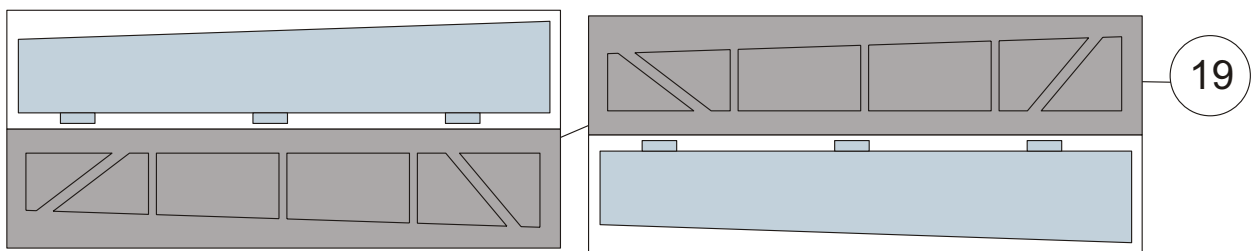
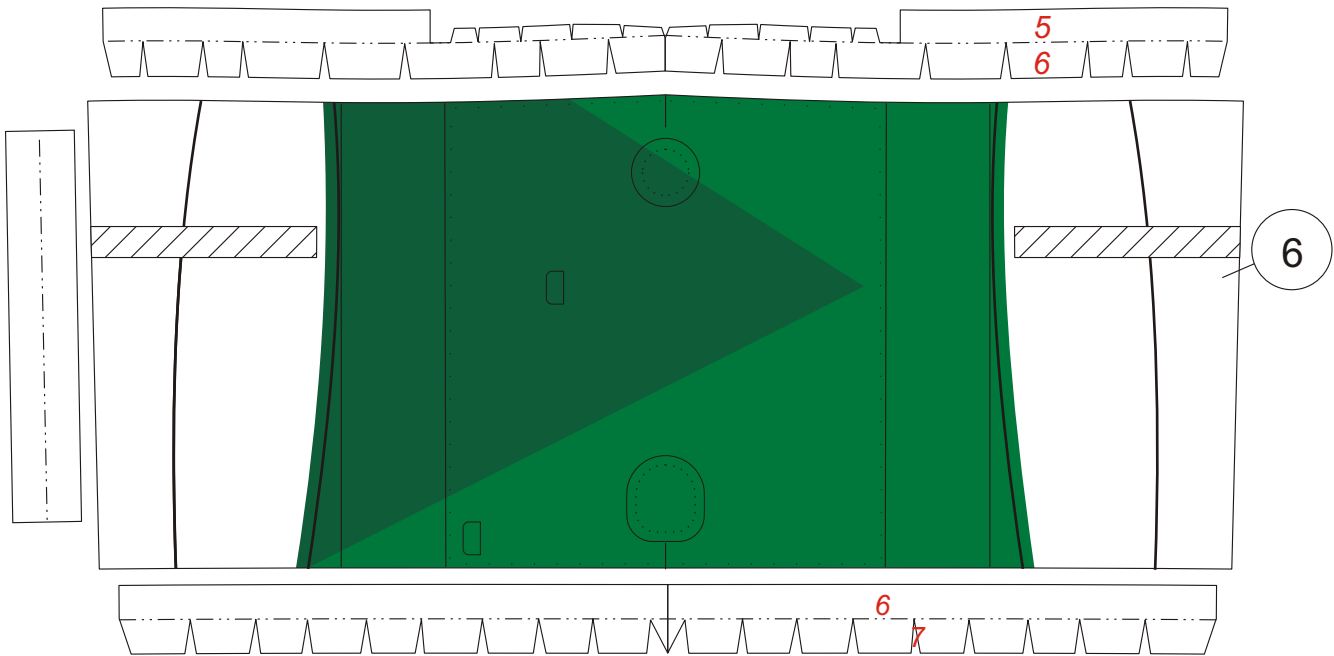
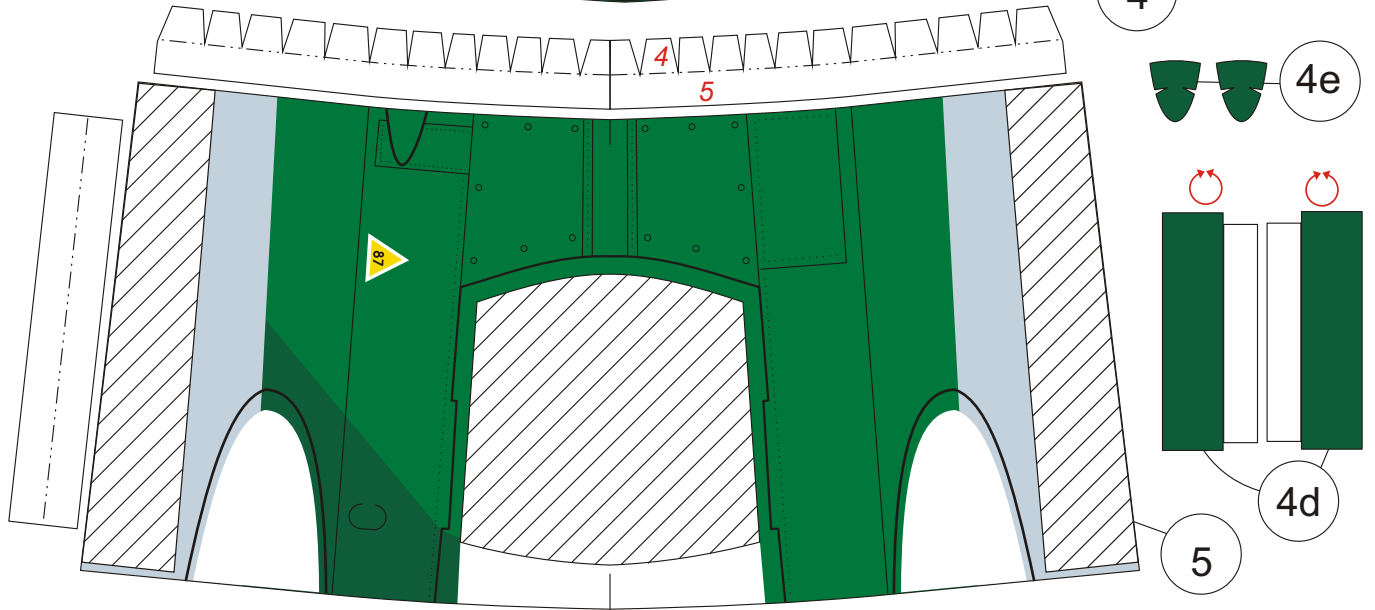
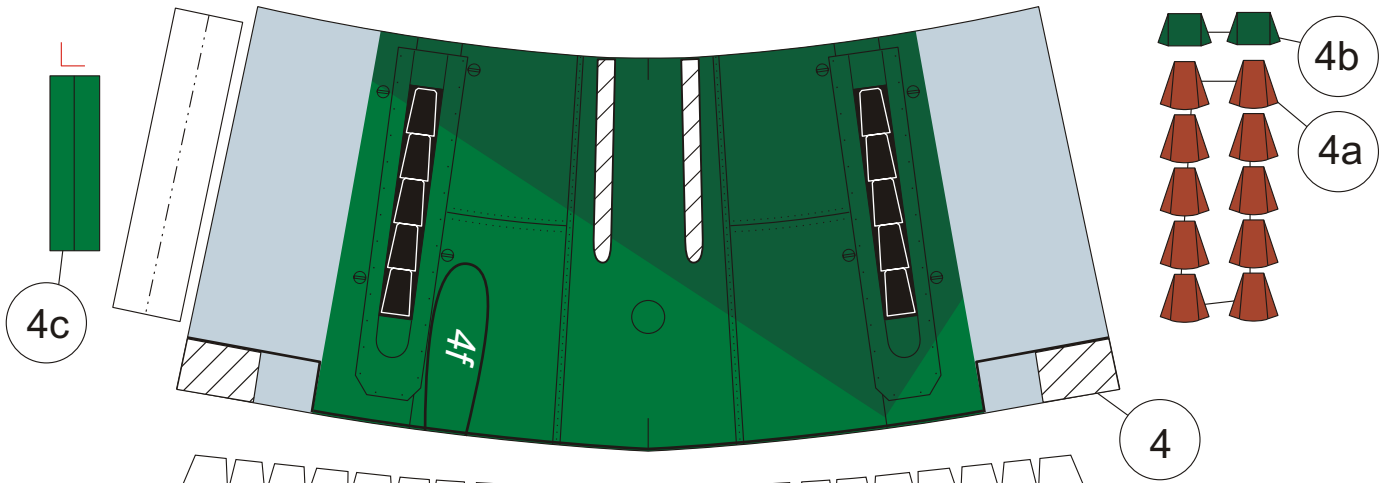
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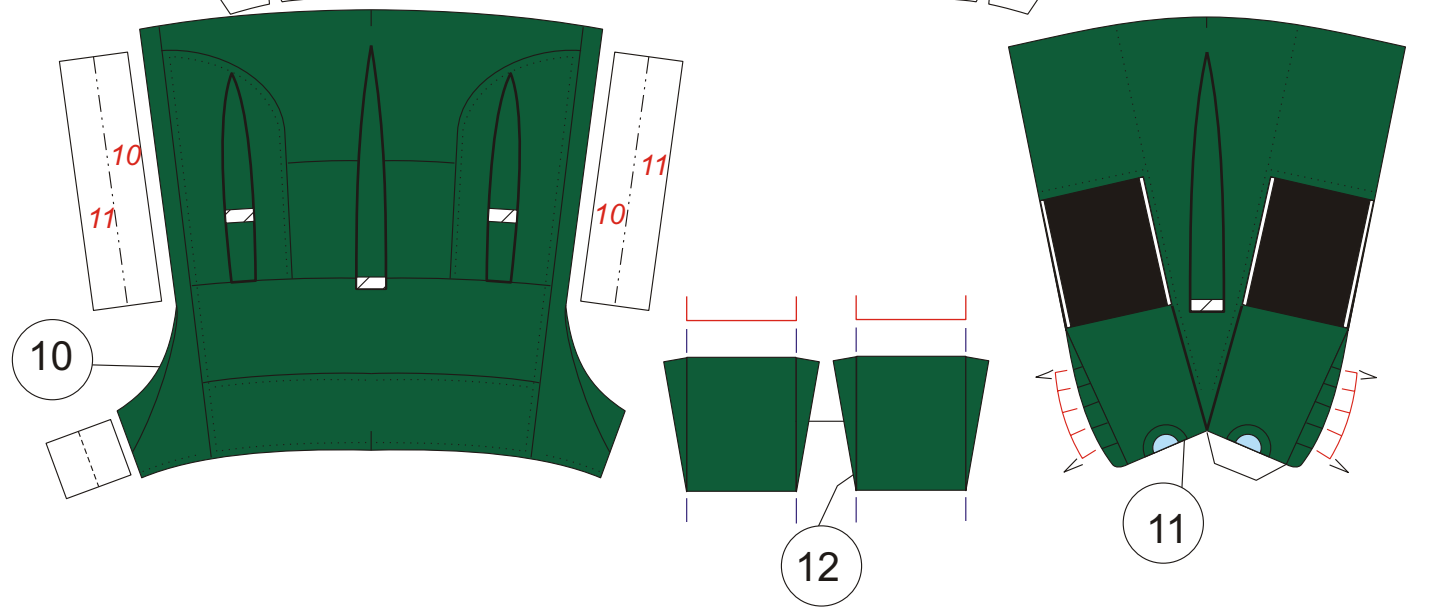
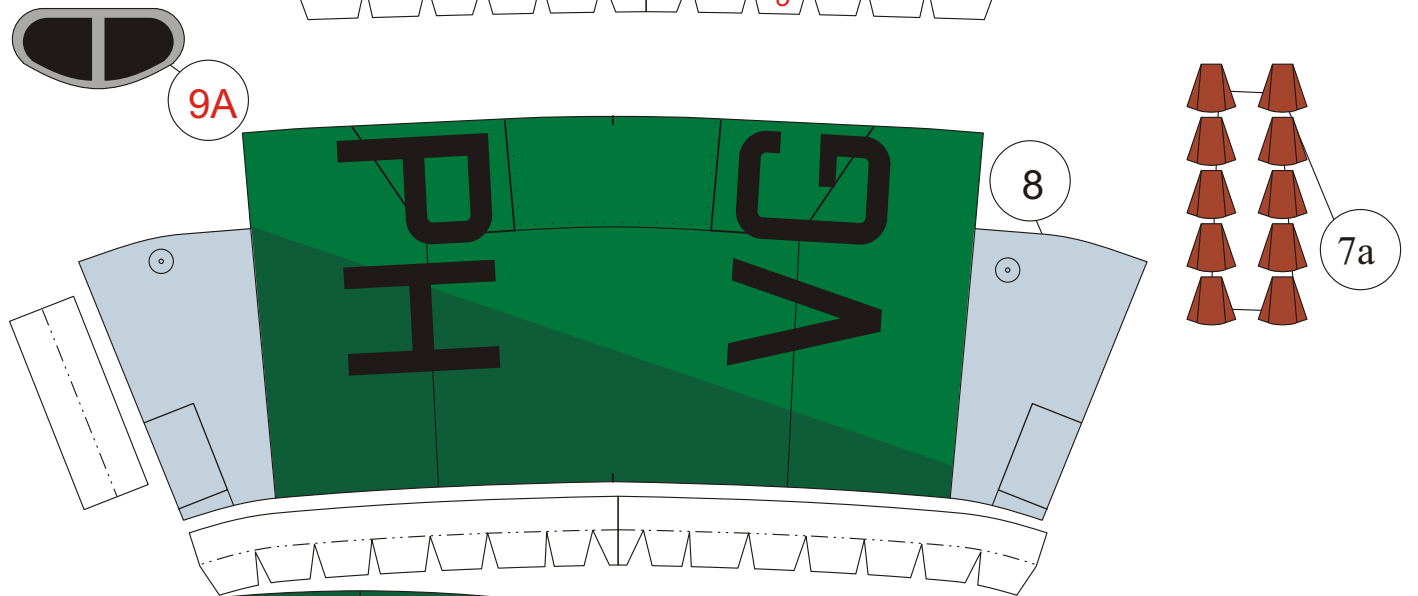
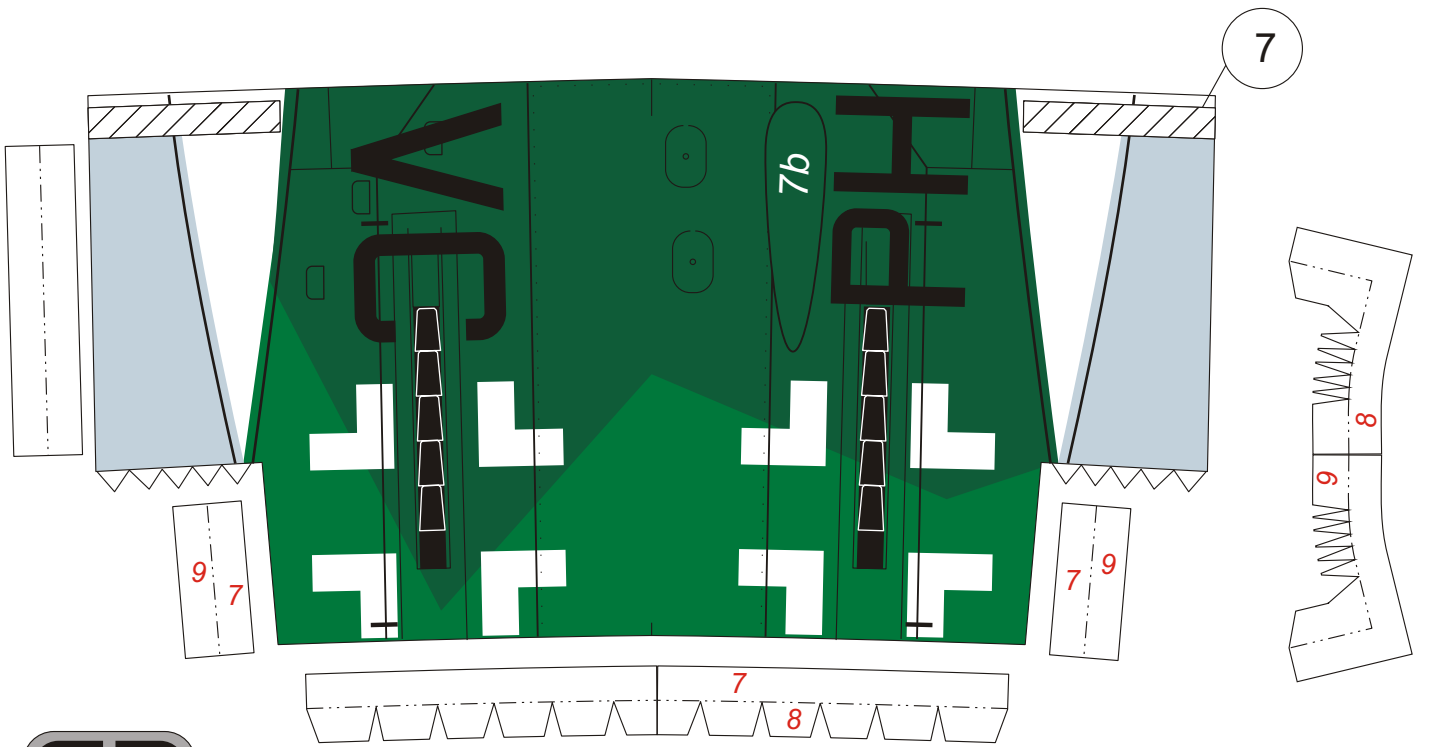
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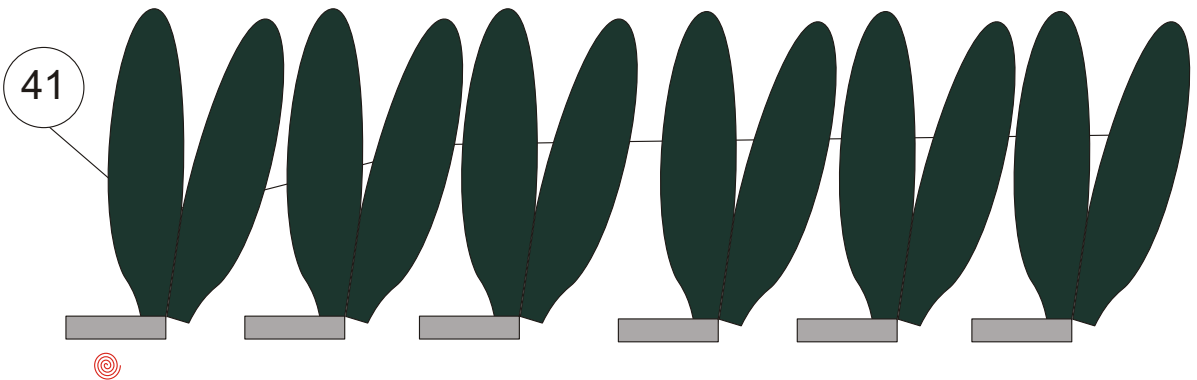
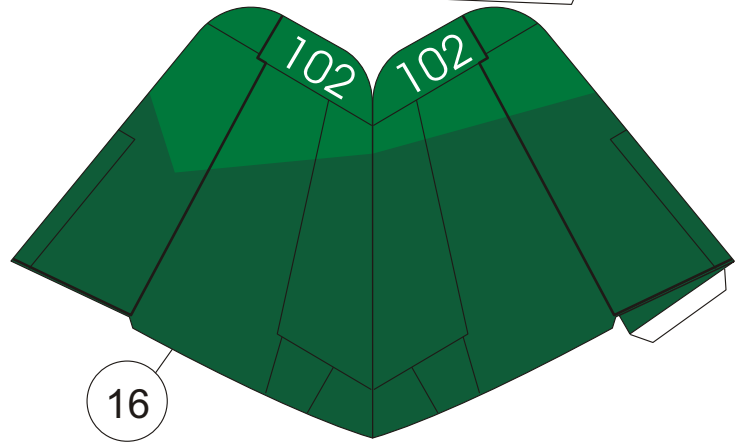
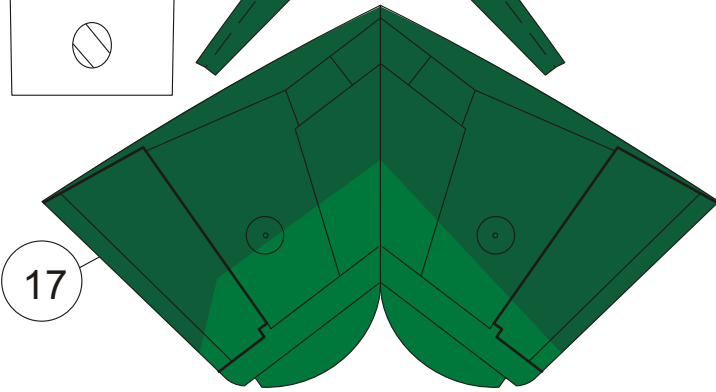
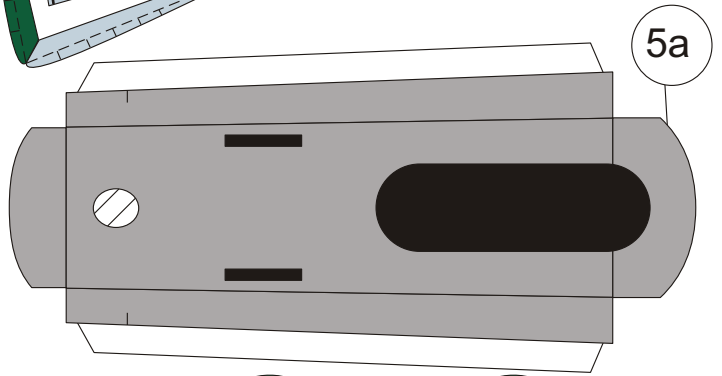
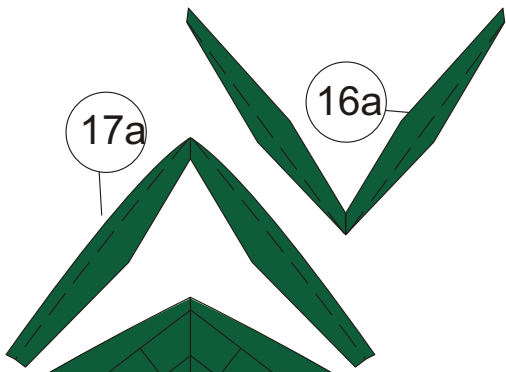
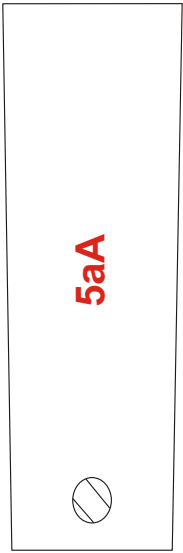
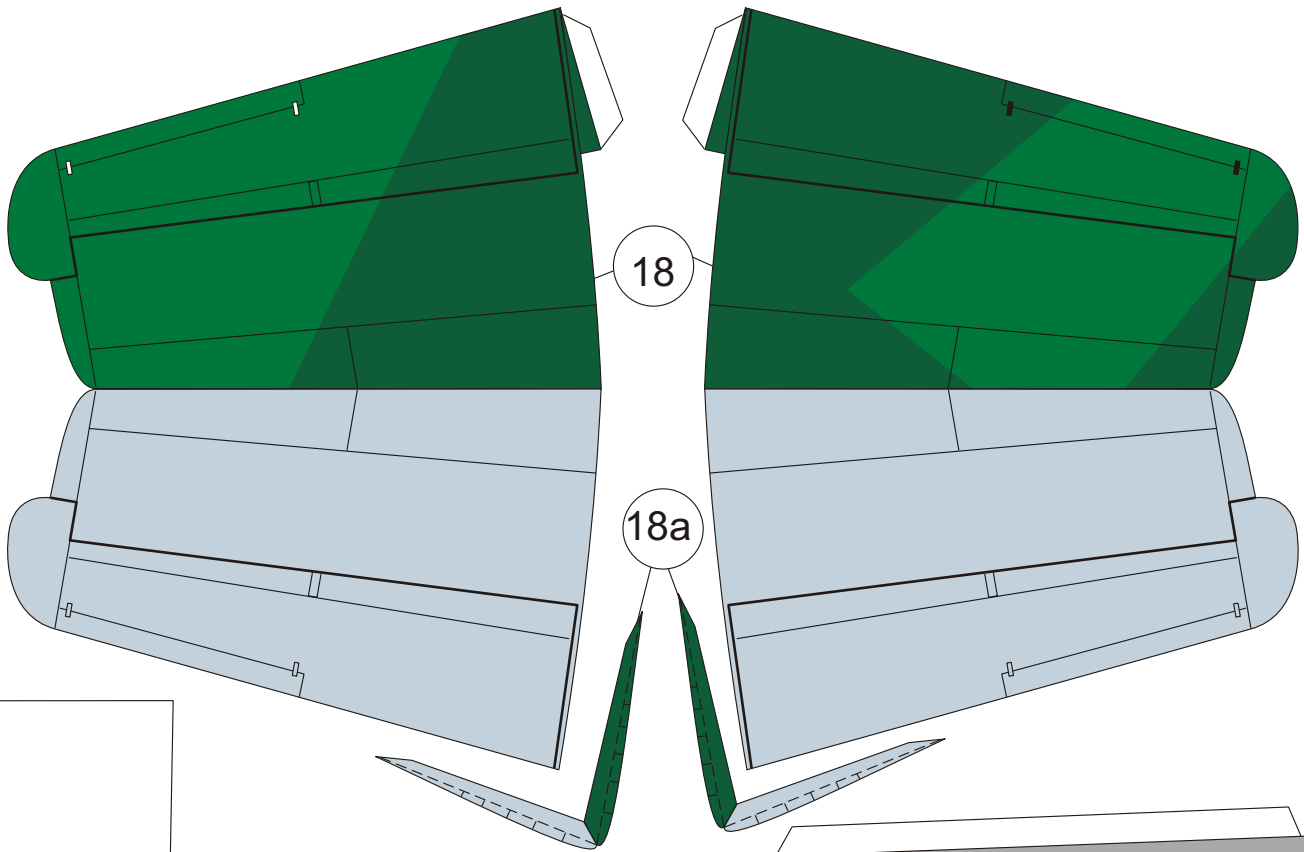
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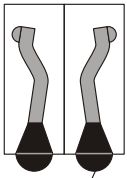
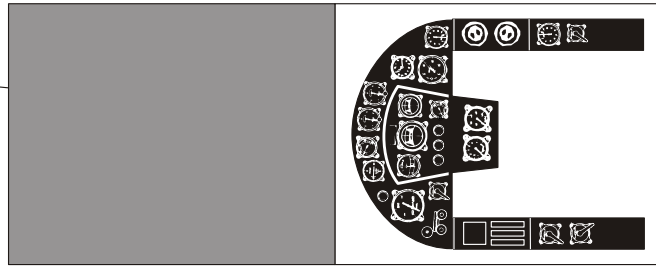
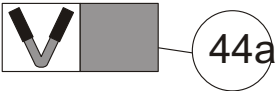
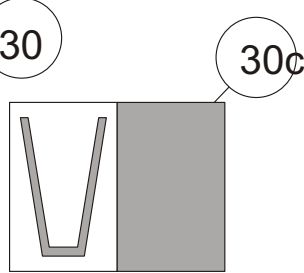
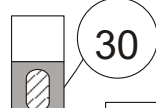
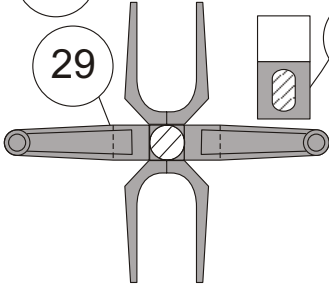
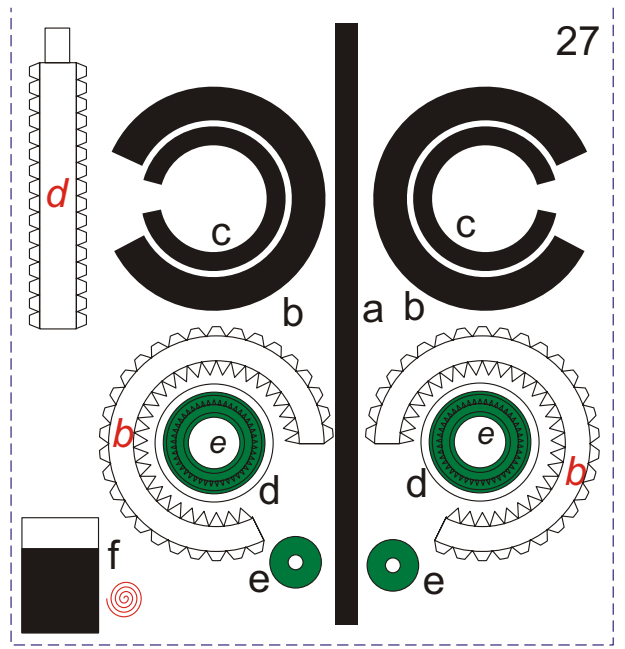
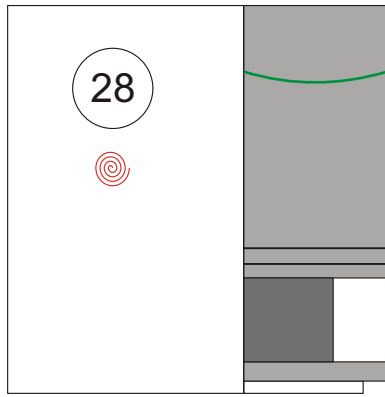
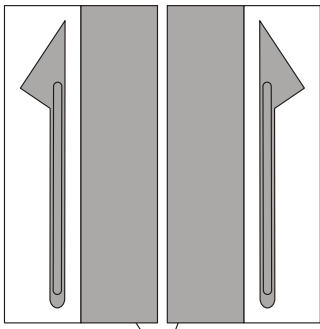




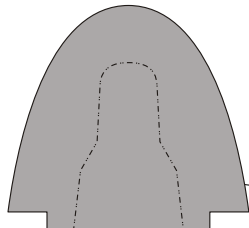




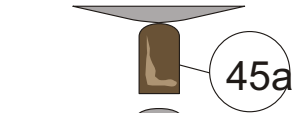
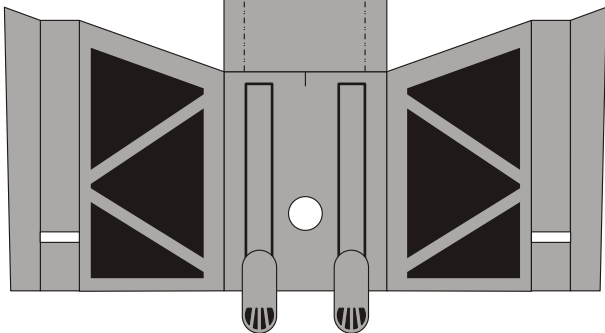




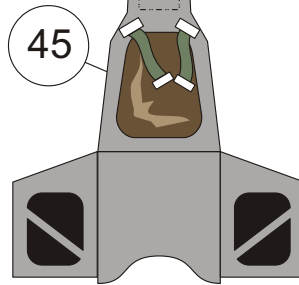
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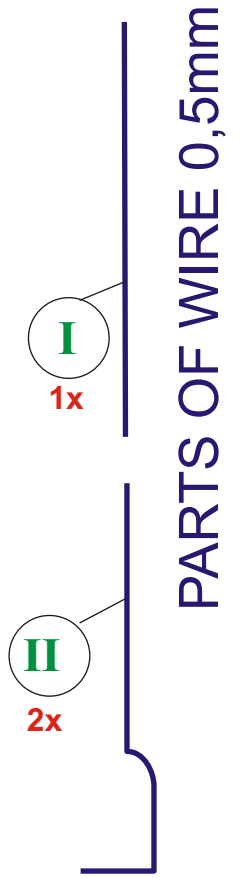
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45a



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I

1x

II

2x

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