



CLOSE, BUT NO COMBAT

THE JETS THAT COULD HAVE CHANGED THE COURSE OF THE WAR

*It's commonly known that just a handful of jet aircraft were ready to see action in World War Two. However, as **Frank Glass** discusses, there were many more waiting in the wings*

When peace broke out across the world in the summer of 1945 and the dust began to settle, it soon became obvious that the era of the piston-powered military aircraft was almost over.

The Messerschmitt Me 262 had become the world's first operational jet fighter in June 1944 and Gloster's Meteor had followed it into service just a month later. It would be just a matter of weeks before the Luftwaffe's Arado 234 'Blitz' took the title of the first operational jet bomber and as 1945 dawned the USAAF and US Navy joined the ranks of jet operators, albeit the mixed power half jet/half piston Ryan Fireball in the case of the Navy.

Familiar faces

Much has been written about the Me 262's potential against the Allied bomber fleets that ran amok over occupied Europe in 1945 and Hitler's dogmatic insistence that this new jet fighter be used as a fighter bomber, stifling its potential as a high speed interceptor. Likewise, the stories of Meteors in combat with V-1 flying bombs are the stuff of legend.

In the last issue of *Jets* the Heinkel 162 Salamander, which entered service in February 1945, was discussed in some detail

but this 'people's fighter' was a poorly built and ill-proven last ditch attempt at stopping the onslaught by the RAF and USAAF.

Pioneers

It was Germany's Luftwaffe that lays claim to the world's first jet flight when the Heinkel 178 took to the skies in August 1939. Although this was purely a flying test bed, Ernst Heinkel did develop the twin engined He 280 in 1940 as a fighter jet and nine examples of this unusual aeroplane had been completed before Hitler cancelled the project.

It would be May 1941 before Frank Whittle's Power Jets engine would make its maiden flight, this being in the first of two Gloster E.28/39 test beds. This, in turn, would spawn the highly successful Meteor but it is easy to forget those manufacturers and nations that were also trying hard to put jets into the skies.

Italian first

While much is made of the E.28/39's pioneering jet flights in the UK, often overlooked is the fact that it was beaten into the skies by not just the He 178 and He 280 but also an unusual aircraft from Italy.

The Italian pioneer can trace its history back to 1931 when Secondo Campini



The Gloster Meteor may have been the only Allied jet to see operational service and one of the best selling jets of its decade, but there were plenty of other unsung aircraft from the period

submitted a thesis on the potential of jet propulsion to the Regia Aeronautica. A year later he demonstrated a jet-powered boat and in 1934 he finally got permission to develop an aircraft to prove his concept.

By modern standards the aircraft is best described as a 'ducted fan' rather than a pure jet and used a 900hp piston engine to drive a three-stage variable-incidence compressor, which forced air into a combustion chamber where it was mixed with fuel and ignited to create thrust.

The system was blighted by poor fuel economy and low power but Campini approached the Caproni aircraft factory to



Lessons learned from the inadequacies of the P-59 led Lockheed to produce the P-80 Shooting Star

build the two prototypes.

On August 27, 1940, test pilot Mario De Bernardi took the Caproni Campini N.1 into the skies for the first time and claimed it reached 200kts at barely half throttle.

The Italians proudly showed off their new 'jet' to the world and as the secretive Germans had not yet announced the 1939 flight of the He 178, the Fédération Aéronautique Internationale incorrectly awarded Campini with the honour of creating the world's first jet aeroplane.

The aeroplane was certainly innovative but its limitations were many and the type never entered service, although one example was shipped to the UK after the war for study by the Royal Aircraft Establishment.

American debut

Next to enter the jet set were the Americans, whose Bell XP-59A flew for the first time on October 1, 1942.

US Major General 'Hap' Arnold had been given a demonstration of the Gloster E.28/39 during a visit to Britain in April 1941 and he later requested the blueprints for the Power Jets W.1 engine. By September, General Electric had been contracted to produce a version of the engine and Bell Aircraft had been tasked with building a fighter to use it.

The design for the XP-59A was finalised by the following January and by March, long before the aircraft had flown, 13 pre-production aircraft had been ordered.

However, the new type had a number of problems and although Bell eventually completed 50 production Aircomets and six pre-production versions, the type never saw combat and was only assigned to the 412th FG to familiarise pilots with the handling and performance characteristics of jet aircraft. They had all been retired before the end of the decade.

The honour of becoming America's first jet fighter to be used operationally fell to the Lockheed P-80 (later F-80) Shooting Star.

Using the lessons learned from the P-59 project, Lockheed designed, built and flew the P-80 in just 143 days but although it first flew on January 8, 1944 the type was still not ready for operational service in World War Two. It would be the war in Korea that saw the USA's first jet combat but by then the straight-winged F-80 was outclassed by swept-wing aircraft such as the MiG-15.

Bell was awarded a contract to produce a long-range jet escort fighter in late 1944 and using its 'Model 40' interceptor as the basis and retaining the general layout of the P-59, the XP-83 took to the air on February 25, 1945. Powered by a pair of General Electric J33-GE-5 turbojets, one in each wing root, the tubby fuselage was left free for fuel tanks and armament. However, apart from range, the XP-83 was inferior to the P-80 and the project was cancelled in 1947.

The USAAF also explored the possibility of using jet engines to power bombers as far back as 1943. In October 1943 Douglas Aircraft submitted a futuristic bomber proposal to the Air Force dubbed the XB-42. Its piston engines were buried within the fuselage, thus allowing an aerodynamically clean wing. The airframe appeared ideally suited for jet propulsion and Douglas were convinced to modify the aircraft to use a pair of 4,000lb/thrust General Electric J35-GE-3 turbojets. Although the modified XB-43 Jetmaster was ordered in March 1944, it would be post-



The Italian Caproni Campini N.1 was initially declared the world's first jet aeroplane when it flew on August 27, 1940, although the Heinkel He 178 had secretly flown by this point



Although the Bell P-59 was the USA's first jet fighter, its performance was found to be worse than some piston-powered aircraft already in service

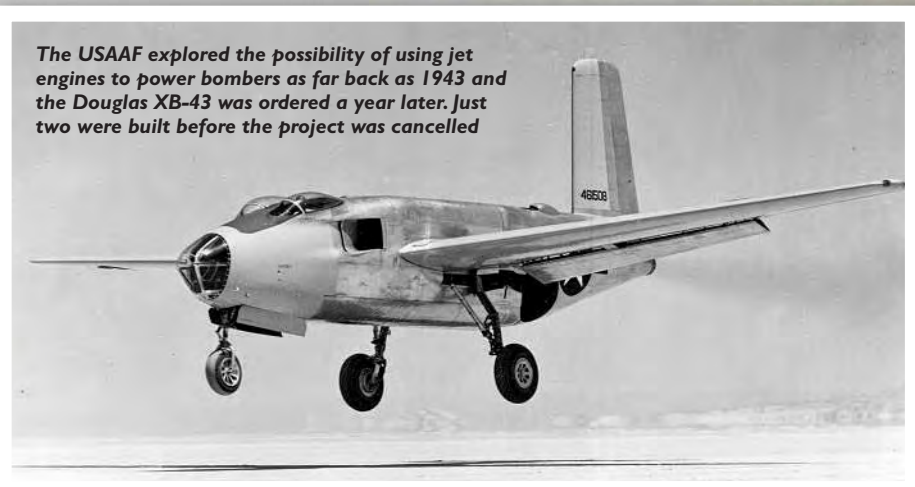
war before the aircraft would fly. Just two were built before the project was cancelled.

Naval aviators

The US Navy also explored jet technology and its first foray into propeller-less flight came in January 1945 with the McDonnell



Bell used the same configuration as the P-59 to create the long-range XP-83 in 1945. The aircraft had good range but the rest of its performance was still lacking compared to the P-80



The USAAF explored the possibility of using jet engines to power bombers as far back as 1943 and the Douglas XB-43 was ordered a year later. Just two were built before the project was cancelled



FD Phantom. McDonnell was invited to cooperate with the Navy in the development of a shipboard jet fighter in early 1943, using a choice of turbojet engines under development by Westinghouse.

Engineers evaluated a number of engine combinations, including one with eight 9.5in diameter engines, before settling on a pair of 19in diameter Westinghouse 19XB-2B powerplants. These were buried in the wing root to keep exhaust ducts short, offering greater aerodynamic efficiency than the underwing nacelles used on aircraft such as the Meteor and Me 262.

When the prototype was ready to fly only one engine was complete, but such was the



Above right: The US Navy ordered 100 McDonnell FD Phantom jets after the prototype had flown in January 1945. This was later slashed to 60 but the aircraft would become the first purely jet-powered aircraft to land on an American aircraft carrier

Right: The Nakajima J9Y Kikka was Japan's only jet-powered aircraft from World War Two. It was damaged on its second flight and before it could be repaired Japan had surrendered



confidence in the aircraft that the maiden flight took place with just the one engine! It would go on to become the first naval aircraft to exceed 435kts (500mph) and the first purely jet-powered aircraft to land on an American aircraft carrier.

The Navy ordered 100 FD-1 aircraft in March 1945 but the end of the war saw the order slashed to just 60, these powered by two of the 1,600lb/thrust Westinghouse J30-WE-20 engines. The later availability of more powerful engines led to the aircraft being radically developed into the F2H Banshee.

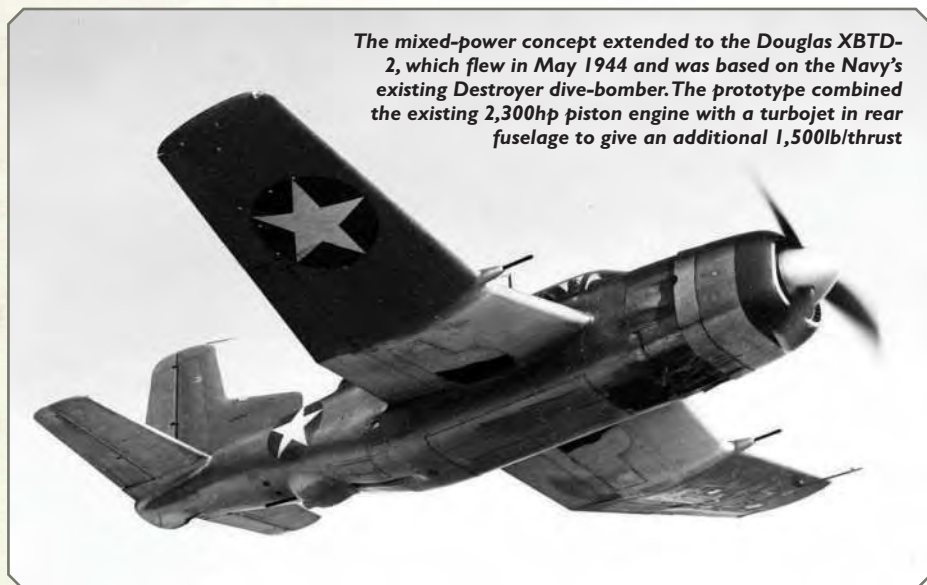
Mixed power

Other early US 'jet' designs focused heavily on the mixed-power concept. The first of

these was the Douglas XBTD-2 Destroyer, which flew in May 1944 and was based on the Navy's existing Destroyer dive bomber. The prototype combined the existing 2,300hp Wright Cyclone engine with a Westinghouse 19B turbojet in rear fuselage to give an additional 1,500lb/thrust but the combination did not provide sufficient improvement to warrant further development and just two were built.

A month later the mixed-power Ryan Fireball took to the air and 71 would eventually serve with the US Navy until a new generation of jets surpassed its performance. [Ed: see *Jets* May/June 2014 for a full article on the Fireball]. Undeterred by the limited potential of the mixed-

The mixed-power concept extended to the Douglas XBTD-2, which flew in May 1944 and was based on the Navy's existing Destroyer dive-bomber. The prototype combined the existing 2,300hp piston engine with a turbojet in rear fuselage to give an additional 1,500lb/thrust



power concept, both the Navy and USAAF explored the options with the Curtiss XF15C and Consolidated Vultee XP-81 [see page 58] but the future for both air arms lay with jets.

Japanese jet

The Japanese military attaché to Germany had witnessed the Messerschmitt Me 262 flying in 1944 and the Imperial Japanese Navy requested Nakajima to develop a similar aircraft as a high-speed bomber. The design needed to be built by unskilled labour and as Japan began to prepare to defend its home islands, there was a need for the aircraft to have removable wings so it could be hidden in caves or tunnels.

The resulting aircraft bore a strong resemblance to the Me 262, but was much smaller and had straight wings rather than swept. Power was to come from the Ne-10 centrifugal turbojet but tests revealed it would not produce sufficient thrust and the project stalled until a new axial flow turbojet could be produced, based on the German BMW 003.

Dubbed the J9Y Kikka, the new fighter bomber began taxi tests on June 30, 1945 and was later transferred to Kisarazu Naval Airfield for its maiden flight. On August 7, Susumu Takaoka took the aircraft aloft for a 20-minute flight that went well apart from very slow acceleration on take-off. For the second test flight, four days later, rocket assisted take-off (RATO) units were fitted to the aircraft but these had been mounted incorrectly and forced the tail to hit the ground. The Kikka eventually overran the runway and into a ditch. Before it could be repaired Japan had surrendered and the war was over.

German innovation

The German Luftwaffe-developed Messerschmitt Me 328 began life in 1941 as 'Project P.1073' – a simple and cheap escort fighter constructed mostly from wood. It was intended to be carried aloft or towed behind a bomber before igniting its engine and breaking free to protect the larger aircraft if needed. Power was to come from Argus pulsejets or a Junkers Jumo 004 turbojet.

The idea was dropped in August 1942 but

with the tide of the war turning the project was reactivated 18 months later as the Me 328. This time the aircraft was deemed suitable as either a suicide weapon or a disposable bomber to be flown by volunteers from 5/KG200, the so-called Leonidas Squadron. In the end just nine examples were built before the project was shelved in favour of the Fieseler Fi 103R Reichenberg.

The Reichenberg was a manned version of the V-1 'Doodlebug' flying bomb and designed to fulfil a similar role to the Japanese Ohka. The original V-1 was modified into the Fi 103R version by virtue of adding a small cockpit atop the fuselage, just ahead of the pulsejet engine. The cockpit had a plywood bucket seat and only basic flight instruments and the pilot sat below a Perspex canopy and behind an armoured front panel. The wings were fitted with hardened edges to cut through barrage balloon cables.

The aircraft was designed to be dropped from below a Heinkel He 111 bomber and officially pilots were instructed to jettison their canopy and bail out just before impacting their target – but the chances of bailing out from immediately in front of a burning pulsejet must have been negligible.

Around 175 examples were constructed/converted but only a handful of flight tests had been completed before Werner Baumbach assumed command of KG 200 in October 1944 and shelved the project. He managed to convince Hitler that suicide missions were not part of the German warrior tradition.



The Fieseler Fi 103R Reichenberg was a manned version of the V-1 'Doodlebug' flying bomb and designed as a suicide bomber. It was never used in anger



By January 1944 the Soviets were aware of successful British and American jet aircraft projects and that the Germans were about to deploy jet and rocket-propelled aircraft of their own. The MiG-13's VRDK booster engine forced air into a stainless steel combustion chamber where fuel was sprayed from seven nozzles and ignited to exhaust out the variable rear nozzle. The aircraft used a conventional 1,650hp Klimov piston engine but after take-off a clutch was engaged to transfer power from the propeller to the compressor in the VRDK. It boosted power output to 2,500hp but could only run for ten minutes. Just twelve were built

Other last-ditch German attempts at self-defence included the Heinkel He-162, which was designed to be cheap to build and capable of being flown by pilots with

were allegedly taken from crashed USAAF Consolidated B-24 Liberators!

Power came from four Junkers Jumo 004 engines, two of which were hung below

“De Bernardi claimed the NI reached 200kts at barely half throttle”

minimal training. For such a simple aircraft it proved to be the fastest of all the jets to see service in World War Two.

Advanced technology

Also from 1944, the Junkers Ju 287 was a much more complex beast. The four-jet bomber was designed to provide the Luftwaffe with an aircraft that could outrun enemy fighters and its most notable feature was its forward-swept wing. It was felt that the concept (suggested by Dr Hans Wocke) would provide extra lift at low airspeeds.

Construction of the first prototype began in early 1944 with the aeroplane 'borrowing' elements from other designs. The fuselage came from a Heinkel He 177 A-5, the undercarriage was from a Junkers Ju 352, the tail was from a Junkers Ju 388 and – astonishingly – the nosewheels

the wing in a conventional style and two were mounted in nacelles on the side of the forward fuselage.

Subsequent aircraft were planned to be powered by Heinkel-Hirth HeS 011 engines but development problems led to them being replaced by six BMW 003 engines clustered three below each wing.

The programme was halted in July 1944 to concentrate on other more conventional bombers, however; Junkers was given permission to test fly the already completed prototype. Siegfried Holzbaur took it into the skies on August 16, 1944 and reported

Below: The Sud-Ouest SO.6000 Triton was the first French jet aircraft to be manufactured and design actually began as a clandestine project under German occupation in 1943. Post-war five examples were built, the first of which flew on November 11, 1946





Above left: The Junkers Ju 287 was a high-speed four-jet bomber that was most notable for its forward-swept wing

Above: The unorthodox Henschel Hs 132 was a German dive-bomber powered by a BMW 003 jet engine. The pilot was to fly in the prone position to reduce the effect of G forces but the Soviet Army overran the factory as the prototype was nearing completion

Left: Nine examples of Ernst Heinkel's twin engine He 280 were completed before Hitler cancelled the project in favour of the Me 262

mostly good handling characteristics, but noted in-flight flexing of the main-spar.

The programme restarted in March 1945 with the Luftwaffe issuing an order for 100 examples per month as soon as possible. A second prototype was almost ready to join the flight test programme by the time

Flying wings

The P.1011 was not the only German aircraft destined to play an important role in post war America. The Horten Ho 229 was a jet-powered flying wing designed by Reimar and Walter Horten in response to Hermann Göring's call in 1943 for a bomber capable of



The Horten Ho 229 was designed in response to Hermann Göring's call in 1943 for a bomber capable of meeting the "3x1000" requirement. It was to become the first pure flying wing powered by jet engines

"Chances of bailing out from a burning pulsejet were negligible"

the Junkers factory was overrun by the Red Army in late April 1945. It and a third prototype were later test flown in the USSR.

Intended to pioneer the use of variable geometry wings, the single-seat Messerschmitt P.1101 was developed in response to the Luftwaffe's July 15, 1944 Emergency Fighter Programme, which sought the second generation of jet fighters for the Third Reich.

The aircraft had a swept wing which could be adjusted on the ground between 30, 40, and 45 degrees. The P.1011 was to be powered by a single HeS 011 jet engine and Messerschmitt proffered it could break the sound barrier in a slight dive. However, the worsening war situation led to a lack of funding and the prototype was constructed using the wings from a Me 262 and landing gear from the Bf109 along with other scavenged parts.

By the time American forces discovered the prototype on April 29, 1945 it was approximately 80% complete. It was shipped to the USA where Bell Aircraft studied it prior to building its X-5 test bed – which would be the first aircraft capable of varying its wing geometry while in flight.

meeting the "3x1000" requirement; namely to carry 1,000kg (2,200lb) of bombs over a distance of 1,000km (620 miles) at a speed of 1,000km/h (540kts). It was to become the first pure flying wing powered by jet engines.

Based on their experience with flying wing gliders, the Horten brothers were

able to complete an unpowered version of the Ho 229 by March 1944 and a jet-powered version followed it into the skies in December. A second example flew on February 5, 1945 and the aircraft was found to have unexpected 'stealth' capabilities [see *Jets* Nov/Dec 2013].



The Messerschmitt P.1101 was designed to have a ground-adjustable swept wing. It would be pivotal in the development of the Bell X-5 – which would be the first aircraft capable of varying its wing geometry while in flight



Jack Northrop's XP-79B only flew once and was to crash while performing aerobatics. The test pilot bailed out but fell to his death after he was struck by the aircraft

Towards the end of the war, the US launched Operation Paperclip in an attempt to capture advanced German weapons research and keep it out of the hands of the Soviet Union. Included in the stash of captured aircraft was a Ho 229, which was sent to the USA for evaluation.

However, the Germans were not the only ones exploring the flying wing concept during World War Two and Jack Northrop had been experimenting with his piston powered N-1M since 1940. He would later use much of the Horten technology to forward the progress of large flying wing bombers but he had already been developing the XP-79 high-speed rocket powered interceptor since 1942 – well before the Ho 229 was commissioned.

In January 1943 the USAAF issued a contract for two prototype XP-79s and a glider variant (dubbed the MX-324) took to the air on July 5, 1944 to prove the concept.

It soon became obvious that the monoethyl aniline and red fuming nitric acid powered rocket motor would be overly corrosive so Northrop redesigned the XP-79 around a pair of Westinghouse J30 turbojets – and the XP-79B was born.

As with so many promising designs the war was over by the time the XP-79B took flight on September 12, 1945. Sadly, test pilot Harry Crosby was killed during the maiden flight when the aircraft entered a spin. He bailed out but was hit by the aircraft and fell to his death. The project was cancelled.

Britain also explored the flying wing concept during the war years, with Armstrong Whitworth Aircraft proposing a six-jet-powered flying wing that could be used as a bomber or airliner. Testing of an unpowered version (the AW.52G) began on March 2, 1945 with the glider towed aloft behind an Armstrong Whitworth Whitley.



The Arado 234 Blitz would become the world's first jet-powered bomber and would be one of the most prolific jets of World War Two

The aircraft proved its worth and the company received a contract to produce a pair of jet-powered AW.52 prototypes.

The first prototype flew on November 13, 1947, powered by two Rolls-Royce Nene engines and this was followed by the second on September 1, 1948.

On May 30, 1949 the first prototype crashed after elevon flutter caused large pitch oscillations. The pilot, J O Lancaster, ejected and became the first British pilot to do so in anger.

The World War Two jet era spawned countless unsung heroes and examples of missed potential, but it also marked a changing point in aviation history, which has never looked back since. ●



The Armstrong Whitworth AW.52 traces its history back to the war years but was not to fly until late 1947

JETS OF WORLD WAR TWO

TYPE	NATION	FIRST FLIGHT	OPERATIONAL	NO BUILT
Heinkel He 178	Germany	August 27, 1939	n/a	2
Caproni Campini N.1	Italy	August 27, 1940	n/a	2
Heinkel He 280	Germany	September, 22 1940	n/a	9
Gloster E.28/39	UK	May 15, 1941	n/a	2
Messerschmitt Me 262	Germany	July 18, 1942	April 1944	1,433
Bell XP-59A Airacomet	USA	October 1, 1942	n/a	66
Gloster Meteor F.1 / F.3	UK	March 5, 1943	July 1944	238
Arado 234 Blitz	Germany	June 15, 1943	August 1944	210
de Havilland Vampire F.1	UK	September 20, 1943	March 1945	244
Lockheed P-80 Shooting Star	USA	January 1944	January 1945	539
Messerschmitt Me 328	Germany	February 1, 1944	n/a	9
Horten Ho 229	Germany	March 1, 1944	n/a	3
Douglas XBTD-2 Destroyer*	USA	May 1944	n/a	2
Ryan Fireball*	USA	June 25, 1944	March 1945	7
Junker Ju 287	Germany	August 16, 1944	n/a	3
Heinkel He 162	Germany	December 6, 1944	February 1945	320
Fieseler Fi-103R Reichenberg	Germany	September 1944	n/a	175
McDonnell FD-1 Phantom	USA	January 26, 1945	August 1947	62
Consolidated Vultee XP-81*	USA	February 11, 1945	n/a	2
Bell XP-83	USA	February 23, 1945	n/a	2
Curtiss XF15C	USA	February 27, 1945	n/a	3
Mikoyan-Gurevich MiG-13*	USSR	March 3, 1945	n/a	12
Sukhoi Su-5*	USSR	April 6, 1945	n/a	1
Nakajima Kikka	Japan	August 7, 1945	n/a	1
Douglas XB-43 Jetmaster	USA	May 17, 1946	n/a	2
Northrop XP-79B	USA	September 12, 1945	n/a	1
Sud Ouest Triton	France	November 11, 1946	n/a	5
Armstrong Whitworth AW.52	UK	November 13, 1947	n/a	2
Henschel Hs 132	Germany	n/a	n/a	4
Messerschmitt P.1101	Germany	n/a	n/a	2

* = Mixed power aircraft