Wing Mate

Newsletter 408-437 Wing

Royal Canadian Air Force Association of Canada

Gloster Meteor

October 2023

AIR FORCE ASSOCIATION of CANADA MISSION STATEMENT

The Air Force Association of Canada is a national aerospace and community service organization whose aim is to commemorate the noble achievements of the men and women who have served as members of Canada's Air Force since its inception, advocate for a proficient and well equipped Air Force and, support the Royal Canadian Air Cadets.

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Air Cadets

818 Squadron.....Jackie Johnston
110 Squadron..... Cécile Thompson

Sick and Visiting

Be sure to advise Barbara Newman, Fellowship Chair, if you are aware of a Wing member who is ill or in distressed circumstances.

Barbara can be reached at 416-223-7840.

General Meetings

Sheppard Ave. Legion Building
East of Allen Road, North Side

Please note . . .

There will be no October Meeting

(Holiday Monday)

Just for a chuckle . . .

President's Report

Dear Members,

I'm just returned from CFB Borden from a three-month stint supervising a Mess. About 28 people give or take. I can now say I've pretty-well done everything. I will say it was a truly interesting experience. The work was not hard or complicated just tedious. The Mess had to be cleaned and sanitized completely between meals. I had a seven-page check list that covered everything, even some of the outside areas of the building, and then sign off on it. Also ensure that the menu of the day was provided, in quantity and on time. Here again I had an extensive quality and quantity list (met or not met). Nothing in the military moves without lots of paper. Lastly keeping reasonable order in the Mess which was interesting at some moments with one of the Reserve Regiments. But I had the power of the words ***'out now.'*** Getting up at 0430 in the morning were not happy moments. After about a week and a half, give or take, ones body stopped screaming and just quietly whimpered and moaned. After a while there is no need for an alarm clock as your eyes just open automatically at the prescribed time. Problem is they are still doing it at home. I have to retrain them. There is nothing like cold wet grass between ones toes to bring you fully awake trudging to the ablutions building about 100 feet away . . . and sometimes add a little rain. I lived in a soft-shell tent –like structure that mercifully had power.

Most of the people, the cooks, the baker, the salad, and fruit prep person, the pot washers and so on, started out at the usual run-of-the-mill steak and burger places. So, it was fascinating to hear what goes on behind the kitchen doors. Nothing bad but there are no idle moments. So now I'm more inclined to slap down a generous tip even if the meal was predictable. These people were simple (not simpletons) yet smart in a worldly and genuine way. No pretensions but entertaining with their stories. Most of them have actually travelled throughout Canada, dispatched by the company which employs them to work in the kitchens of mining companies, hotels, oil platforms and various camps on set contracts, including a few in the Middle East. Two weeks on and ten days off and flown back to where they live. I was surprised to hear that some came from out west, some from Nova Scotia, Northern Ontario and BC and way northern Ontario from a place called (somewhat insulated) Dubreuilville, a small mining and lumber town where almost everybody is related in some way, with a strange history.

I did enjoy the experience. It was tough at first, but one can get used to most anything. But it is a joy to return to reality. One of the perks of coming home is that the bathroom is mere steps away. It's a good thing I don't sleep walk. When nature calls, I would be trying my neighbour's door at the other end of the hall.

Nick Czernkovich (Major Ret'd)

General Meetings

Sheppard Ave. Legion Building

East of Allen Road, North Side

Monday 13 November

Speaker TBA

Monday 11 December

Christmas/HanukkahDinner

818 Toronto Falcon Squadron
Royal Canadian Air Cadets

With Jackie Johnston

110 Black Hawk Squadron
Royal Canadian Air Cadets

With Cécile Thompson

Jackie's column will return next month.

The doors on the left are more than 40 years old on portable classrooms on the grounds of Stephen Leacock Collegiate Institute in Scarborough, the home of 110 Squadron for all these years. All have been replaced! Thank you to Capt Williams, RCAC for making this refit possible!

A Canadian & The Spitfire's Wing

I always thought that the Spitfire's elliptical wing design was an original British development. I mean, we all have admired the beautiful wing shape of that iconic Second World War fighter, often called the most beautiful plane ever designed.

Imagine my surprise when I learned that the design was actually a German one! Before I turn to the design, let me begin the story with a Canadian, in fact a Torontonian named Beverley Strahan Shenstone.

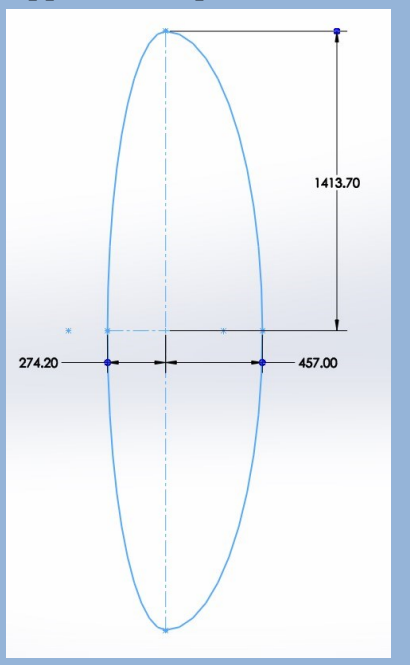
Shenstone, 1906 — 1979, was an aerodynamicist often credited with the Spitfire's elliptical wing. As a boy he designed and raced model yachts, later graduating with an engineering degree from the University of Toronto. He gained a master's degree from research in flying boat stability.

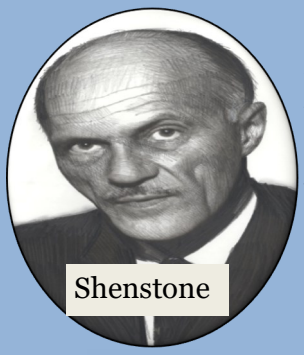
Junkers A50 Junior

Shenstone learned to fly in 1929 as an RCAF cadet, going solo in less than 10 hours and earning an RCAF commission. Shenstone realized that metal monoplanes were the future and that the Germans were leading that field. He applied for a job with Dornier in Friedrichshafen but was unsuccessful. With determination as well as valuable contacts like Parkin and Captain M.C. Christie, the British Air Attache in Berlin, he got a position with Junkers in November 1929 at Dessau.

Shenstone worked for a year at Junkers, learning metal-working techniques and working in technical departments such as the engine workshop. He also studied the wing theories of Hugo Junkers, working with Yoshihara Seiji on preparing the latter's Junkers Junior for its flight from Dessau to Tokyo in August 1930.

Shenstone learned to glide at the Wasserkuppe, the premier gliding centre in Europe where he met Geoffrey Hill and Alexander Lippisch, both pioneers of all-wing aircraft. Shenstone spent the winter of 1930/1931 working with Lippisch and his team developing tailless gliders. While in Germany, Shenstone travelled to Heidelberg and met Ludwig Prandtl, who was a pioneer in the application of systematic mathematical analyses to aerodynamics. He also met Air Commodore John Adrian Chamier and acted as his translator. Chamier suggested that Shenstone should come to work for the British at Vickers-Armstrongs of which Chamier was a director.





Shenstone

In May 1931 Geoffrey Hill tried to get Shenstone a job at Westland but with nothing suitable, he was interviewed by Sidney Camm but due to a misunderstanding walked out of the interview. Through Chamier he got an interview in 1932 with Reginald Mitchell at Supermarine, a part of Vickers-Armstrong. Mitchell was impressed by Shenstone's expertise in aerodynamic theory and gave him a full-time position.

Shenstone travelled with Ernest Hives of Rolls-Royce to Germany in early 1934 and later that year to the U.S. where he visited a number of aircraft manufacturers. As a result, he reported back to Mitchell on the latest wing profiles. Assisted by Shenstone's expertise in theoretical aerodynamics, Mitchell began to investigate using an elliptical wing.

Both men were aware of the potential of an elliptical wing, as Mitchell had proposed it for his Type 179 flying boat and the Short Crusader seaplane with a similar lobe-form wing, an entry for the 1927 Schneider Trophy.

Shenstone was aware that Frederick Lanchester had suggested in 1907 that it was better to spread the vortex flow along the wing instead of concentrating it at the tip, while Max Munk had also discovered that when a wing has an elliptically-distributed lift then induced drag will be reduced.

Eventually Supermarine designers made a distorted elliptical wing with the wing tip pushed forward to produce more lift. With its main spar at right angles the result was a rigid stable wing that provided the stability needed for an aircraft with wing mounted guns. The new wing design was incorporated in the Type 300 proposal that became the Spitfire.

Shenstone soon became chief aerodynamicist on the Supermarine B.12/36 proposal for a four-engined heavy bomber using the Supermarine proposal of a wing with a highly swept leading edge, storing the bomb load in both the wing and fuselage. Supermarine was given a development contract for two prototypes. The first was destroyed in a bombing raid in September 1940 but this specification was fulfilled by the Short Stirling which had been the Air Ministry's backup due to their doubts about Supermarine.

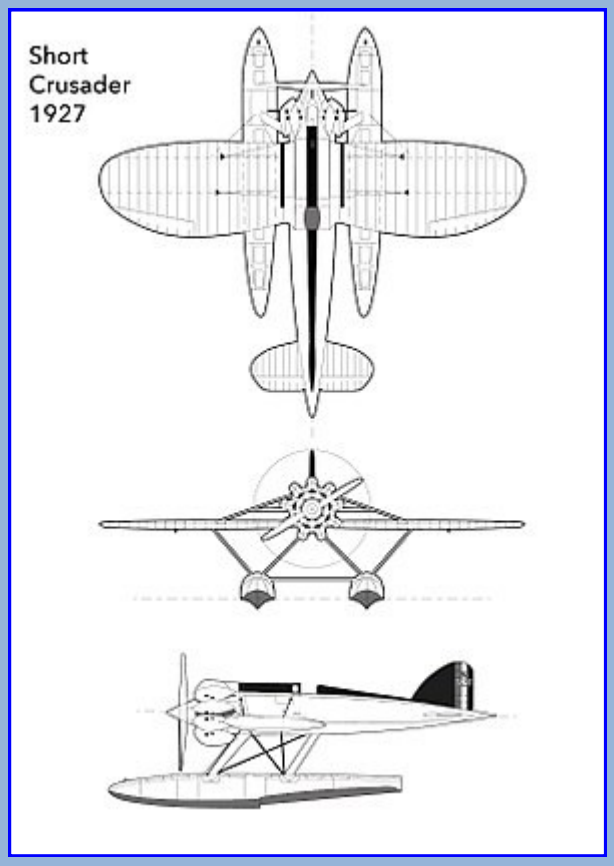

Short Stirling

In 1938, Shenstone left Supermarine to work for the Air Ministry as a senior scientific officer for the director of civil aviation encouraging cooperation and efficiency within the industry. In October 1940, he was sent to the U.S. as part of the British Air Commission-working to ensure that American lend-lease aircraft met the requirements of the RAF. Shenstone took an interest in the development of the P-51 Mustang.

Shenstone moved back to Canada in 1946 as technical administrator for Trans-Canada Airlines. He then moved to Avro Canada in Toronto, where he was involved in technical management aspects of the new Avro Jetliner and CF-100 jet fighter, but was disappointed by the lack of development work that would fully use his expertise. As a result, he left Avro and was given the post of chief engineer BEA in 1948.

There he began a system of statistical maintenance control, using past component failures to direct future maintenance and subsequently made important contributions to the specifications of British civil aircraft. He was instrumental in increasing the passenger capacity of the Vickers Viscount. Shenstone also introduced BEA's first jet services, starting with the de Havilland Comet in 1960. He was appointed to the board of directors of BEA and became president of the RAeS from May 1962 to May 1963.

In 1965 Shenstone moved from BEA to become technical director for B.O.A.C. He retired from there in 1966 after association with projects that included the airline's future involvement with t supersonic Concorde.



He received many honours recognizing his achievements. In 1982 the U of T posthumously named him to the Faculty of Applied Science and Engineering Hall of Distinction, recognizing his contributions to the design of the Spitfire and the North Star. He was named an Honorary Fellow of the Canadian Aeronautics and Space Institute (CASI) and also as a Fellow of the American Institute of Aeronautics and Astronautics. He retired to Cyprus in 1966 where he remained until his death in 1979. "Bev' Strahan Shenstone was inducted as a Member of Canada's Aviation Hall of Fame in Ottawa in 2016.

A Note from Sam Newman

427 Wing London, ON

Recently I have been working hard to bring my basement workshop back to a level where I can not only find things, especially tools that my family borrows and never seem to return, but also when my very well stocked library is located, along with my collection of Air Force Magazines, since they were first published. Nick . . . your recent Wing Mate Newsletter, for May 2023, and your President's Report, amused me greatly. I love the way you spend time to research your product, Sir, and often include a lesson of historical interest for your readers' enjoyment and education!

Having said this, WAY BACK WHEN, I was courting my wife Cathy, of 61 years this August, I was visiting her Mom's Homestead in Yarmouth, NS, and as luck would have it, I was present when Cathy's Mom and Step Dad were removing the old linoleum in the kitchen, and laying down newer material afterwards. Well, since the building was built in the late 1800s, and the old 'stuff' laid down was in the early 1900's, there was (understandably) newspaper for added warmth located between the planking of the floor, and the new 'stuff' to be laid on top of the floor. Well, when one is a visitor, courting one's daughter, and there is work to be done, one would be very smart to roll up ones' shirt sleeves and pitch in. In doing so, this editorial was found in one of the old papers, dated 1910 which read as follows:

FLYING MACHINES DO NOT FLY

Nothing in the recent history of aviation, both in this country and abroad, is so disappointing, notes Paris Cosmos as the failure of the flying machine to fly.

"If a flying machine could fly" to quote our contemporary, there would be some basis for the great expectation of the laymen on the subject of aviation. Of course, no flying machine really flies at all, not withstanding the confused popular impression that the Paulhans, the "Wrights, and the Bleriots actually fly through the air in their flying machines.

"The explanation of the paradox" adds that expert on aviation, H. Massac Buist, is to be found in the point that "the fixed winged planes must give way to the flapping wings before the true flying machine Arrives." That is, in existence today, no such thing as a flying machine, although it seems quite impossible to make the man in the street realize that fact.

The brothers, Wright, Lilienthal and others have proved that under certain very favourable conditions, soaring feats are possible; but 'when it is proposed to employ native power for imparting motion to the wings, we come up against a proposition which NATURE tells us, shall never be solved by man'.

As I see it, at the time this article was written (a year after out very own SILVER DART had flown down in Baddeck, NS) man had already left his cradle and was reaching for the stars . . .

PER ARDUA AD ASTRA

(Through Adversity to the Stars)

Please feel free to use these words from an old hunk of yellowing newsprint, in an upcoming issue of your WING MATE, Terry. Others may be amused by it too!

Sincerely, and with thanks again for the two of you in providing me with such interesting reading!

Sam Newman

Gloster Meteor

The Meteor was the first British jet fighter and the Allies' only jet aircraft to engage in combat during WW II.

The jet's development was dependent on its turbojet engines, pioneered by Frank Whittle and his company, Power Jets Ltd. Work on these engines started in 1936, while development of the aircraft itself began in 1940 The Meteor first flew in 1943 with its first operations on 27 July 1944 with No. 616 Squadron RAF.

The Meteor was not a sophisticated aircraft in its aerodynamics, but proved to be a successful combat fighter. Gloster's 1946 civil Meteor F.4 demonstrator *G-AIDC* was the first civilian-registered jet aircraft in the world.[1] Several major variants of the Meteor incorporated technological advances during the 1940s and 1950s. Thousands of Meteors were built to fly with the RAF and other air forces and remained in use for several decades.

Slower and less heavily armed than its counterpart, the Messerschmitt Me 262, the Meteor saw limited action in WW II.

Meteor Prototype

Meteors of the Royal Australian Air Force fought in the Korean War and several other nations such as Argentina, Egypt and Israel flew Meteors in later conflicts. Specialized variants of the Meteor were developed for use in photographic aerial reconnaissance and as night fighters.

The Meteor, used for research and development, set several aviation records. On 7 November 1945, the first official airspeed record by a jet aircraft was set by a Meteor F.3 at 606 miles per hour. In 1946, this record was broken when a Meteor F.4 reached a speed of 616 mph. On 20 September 1945, a heavily modified Meteor I, powered by two Rolls-Royce Trent turbine engines driving propellers, became the first turboprop aircraft to fly. In the 1950s, the Meteor became obsolete nations developed jet fighters, many of these having swept wings instead of the Meteor's conventional straight wing. In the RAF, the Meteor was replaced by the Hawker Hunter and Gloster Javelin.

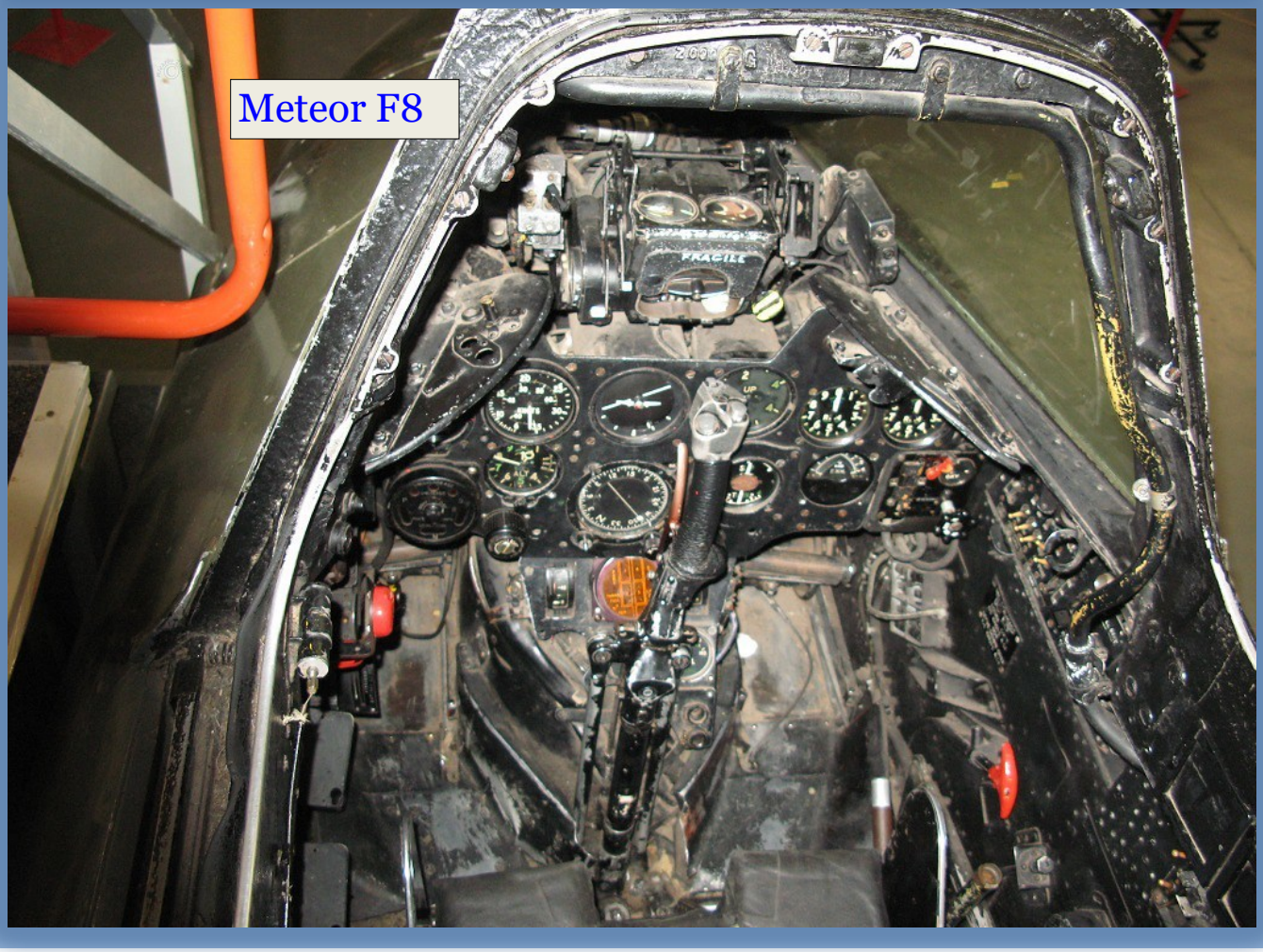
Development

Development of the Meteor was a collaboration between the Gloster Aircraft Company and Frank Whittle's firm, Power Jets Ltd. Whittle formed his company in March 1936 to develop his ideas of jet propulsion, Whittle himself serving as the company's chief engineer. In 1931, Armstrong-Siddeley evaluated and rejected Whittle's proposal, finding it to be technically sound but at the limits of current engineering.

The first Whittle prototype jet engine, began running trials in early 1937 and shortly afterwards, the Aeronautical Research Committee, and the Air Ministry gave the project their support. Power Jets and Gloster quickly formed a mutual understanding around mid-1939. The Air Ministry contracted Gloster in late 1939 to manufacture a prototype aircraft powered by one of Whittle's new turbojet engines. The single-engined proof-of-concept Gloster E28/39, the first British jet-powered aircraft, had its maiden flight on 15 May 1941. Due to the limited thrust available from earlier engines, it was decided that subsequent aircraft would be powered by a pair of turbojet engines.

Gloster E.28/39

On 12 January 1944 the first Meteor F.1 took to the air from Moreton Valence. It was identical to the F9/40 prototypes except for the addition of four nose-mounted 20 mm Hispano Mk V cannon and some changes to the canopy to improve all-round visibility.

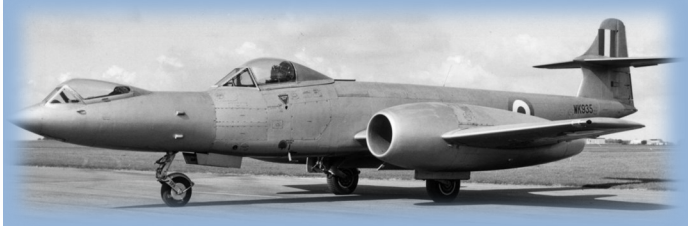

Meteor F8

The Meteor was originally to be named Thunderbolt but that was changed to avoid confusion with the P-47. The Meteor's codename was *Rampage*.

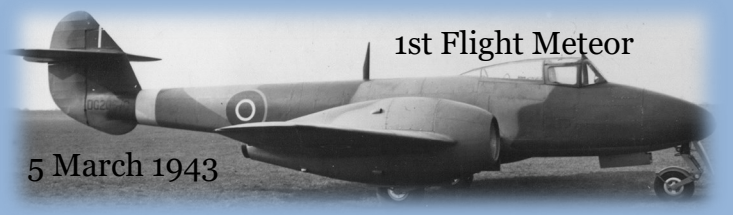
Several prototypes and several engines were tested from 1940 until 5 March 1943, when the fifth prototype, powered by two substituted de Havilland Halford H.1 engines owing to problems with the intended W.2 engines, became the first Meteor to become airborne at RAF Cranwell. On the initial flight, an uncontrollable yawing motion was discovered, and a larger rudder was designed.

Twenty Gloster Meteor F Mk. Is were built, powered by the Rolls-Royce Welland. Although these were nominally production aircraft, they were also used for a wide-ranging series of engine and airframe development trials, which continued on with the latter Gloster Meteor F Mk. III and Gloster Meteor F Mk IV. In total, 3,875 Gloster Meteors were built which was by far more than any other British jet aircraft of the era. Nearly all of these were built in the UK by Gloster Aircraft Company and by Armstrong Whitworth, with a further 330 being built by Fokker in the Netherlands, with 30 of these assembled in Belgium.

The prone pilot Gloster Meteor (WK935) and the Trent Gloster Meteor (EE227 - the world's first aircraft to fly under turboprop power) are striking examples of research developments..



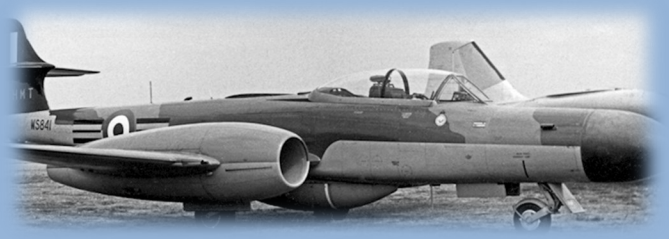
Armed with four 20mm cannon, Meteors were delivered to the RAF for squadron service the following



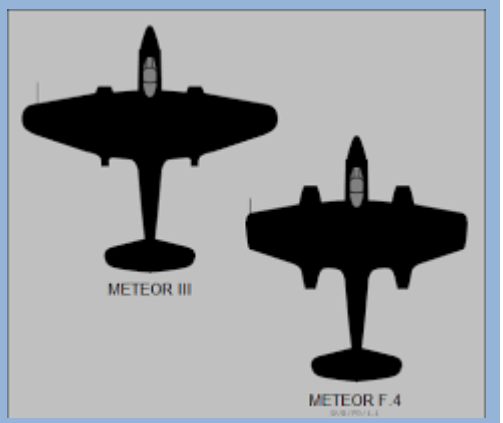
Year, 1944. Early versions saw limited service before the end of the Second World War in 1945.

The Meteor was initially used to counter the V-1 flying bomb threat. 616 Squadron Meteors saw action for the first time on 27 July 1944, when three aircraft were active over Kent. These were the first operational jet combat missions for the Meteor and for the RAF.

RAF Meteors never met in combat with their German counterpart, the Messerschmitt Me 262 jet fighter, but were used to shoot down V1 flying bombs which the Germans were launching against London.



Post-war Meteors soon replaced piston-engined types in frontline RAF fighter squadrons and went on to serve with eleven overseas air forces as their first jet type. Two-seater trainer and night fighter versions were developed, as well as Meteors for a range of specialized tasks.



The Meteor had its shortcomings but was nonetheless a remarkably successful aircraft. It broke the world absolute speed record in 1945 and 1946 and remained in production until 1955.

Bomb Loads: Lancaster vs B-17

Why did the B-17 have a smaller bomb load compared to the Lancaster?

The Fort was designed primarily as a bombing platform for daytime precision bombing requiring it to have a relatively stable flight platform. This was achieved by having a larger fuselage and wing design; however, this limited the aircraft's ability to carry a large bomb load. The Lancaster was designed for night-time bombing, which required a greater emphasis on bomb capacity over stability. Thus, the Lancaster had a much larger bomb load capacity.

The B-17, a 1934 design, was required to carry a "useful bomb load", at a minimum of 10,000feet, for 10 hours, at 200 mph. Boeing decided that such a bombload was 4,800 pounds, none larger than 200 pounds, of which it could only carry two on the lowermost shackles.

With smaller bombs above, a maximum of 7,600 pounds could be carried in the bomb bay, but for a shorter distance.

The photo below shows 7,000 pounds in the Fort's bomb bay: 14 x 500 pound bombs. Another two bombs could be mounted on the central racks for a total of 8,000 pounds internally. Heavier bombs would be of larger diameter and preclude the use of the outer racks. 8,000 pounds is the maximum internal load documented.

Larger bombs would eventually be carried externally on two racks, one each side, but this had caused drag. The B-17A became a very different-looking airplane. The Lancaster morphed from a 1936 design called the Manchester with an 8,000 pound bomb load for a range of 2,000 miles and a cruise speed of 275 mph. The bomb load included 2 x 16" torpedos, meaning the bomb bay had to be long. The Vulture engines failed to deliver the power or reliability expected but

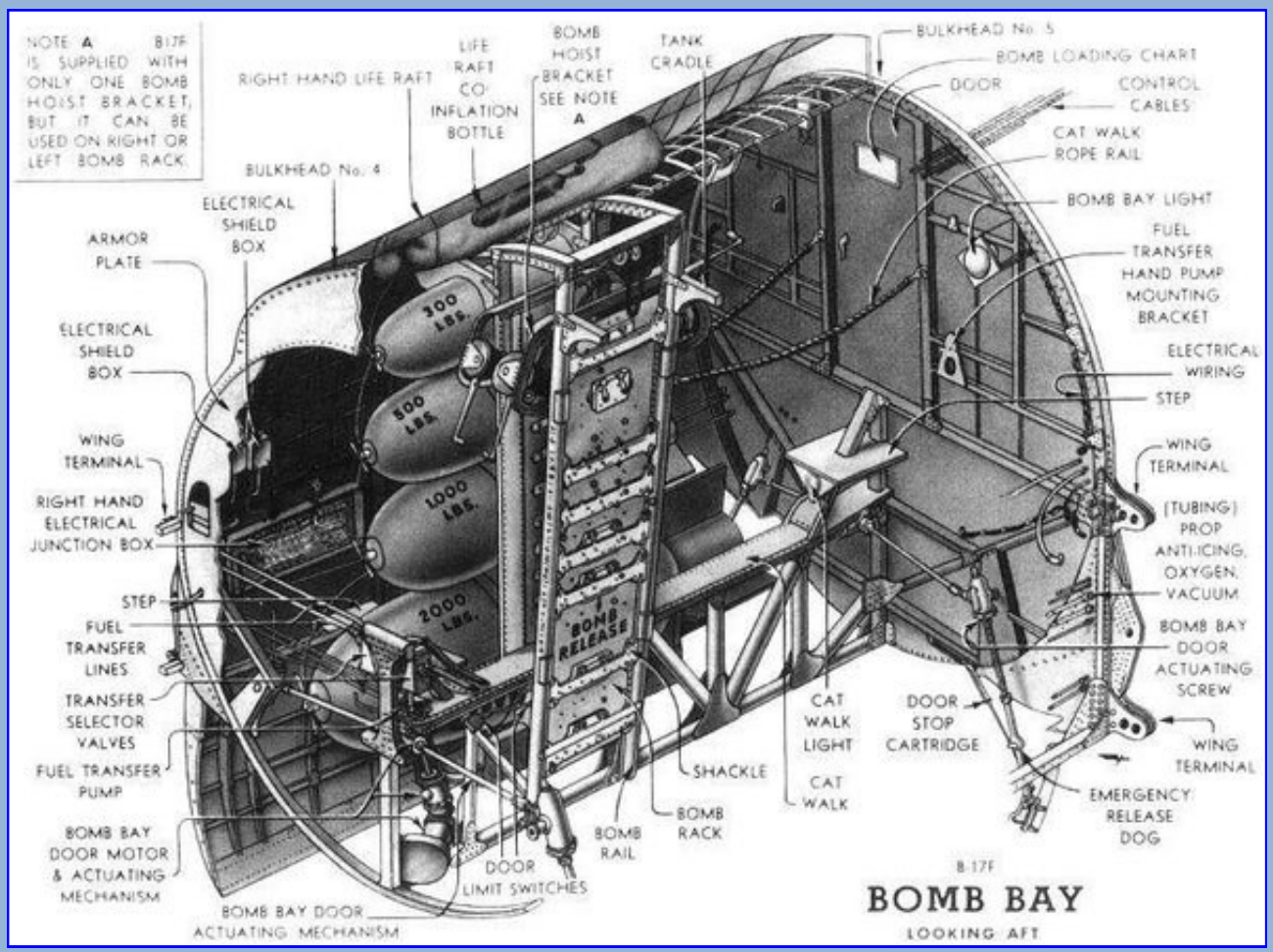
designer Roy Chadwick had already started to redesign the wing to take four Merlins. In 1939 the Air Ministry eventually supported the development, while asking for more lifting capacity to give a similar load capacity to the Halifax, their favourite - meaning more than 13,000 pounds.

So the B-17 was built to a different requirement, laid down in 1934, whereas the Lancaster's design started from a 1936 requirement that had included 17 foot long torpedoes at one stage, and was updated in 1939. How was the B-17 able to have a full-depth bomb bay in a position between the wings; that is, where did the wing spar loads get carried through? The B-17 wing is a two-spar structure, and the spars attach to what look to be thick plate bulkheads supported by additional girders which define the front and rear of the bomb bay. Thus the B-17 carries its bombs between the two wing spars, making it impossible to lengthen the bomb bay without making a whole new airplane.

The B17F's pilot's manual noted that she could be loaded to 14,000 pounds, 6,000 in the bomb bay and 8,000 on external racks, the same as the Lanc, and easily reach Berlin and back with a range of 1,170 miles with said load. According to Martin Caiden's book on the B17, it could be overloaded to almost 21,000 pounds. However in typical combat operations, she was loaded to around 5,000 pounds of bombs. That was mainly because the USAAF wanted her to stay up around 25,000 feet where flak accuracy dropped and some German fighters, like the Fw190, performed poorly. The Lancaster, with its single stage super chargers, simply couldn't fly that high. The 8th Air Force also had to worry about runway length. A bomber overloaded isn't a good idea as it's very stressful on the airframe and can make the aircraft very difficult to fly. It also comes at cost of speed and altitude in any bomber, Lancaster included.

Still it wasn't uncommon for B17s to be loaded up with 7–9,000 lbs.

The B-17's rear bomb bay bulkhead with the rectangular access hatch.



Where the Lancaster really shined was her 33 foot-long uninterrupted bomb bay that allowed it to not only carry large bomb loads but also huge single bombs like the Tallboy and Grand Slam. She could also be overloaded to carry 22,000lbs in the case of the Grand Slam bomb albeit the guns had to be removed and the landing gear had to be strengthened. With the Grand Slam the bomb bay doors had to be removed.

But when the Lanc was on normal duty hitting German cities, she was normally loaded with 7,000 lbs of bombs all of which could be carried internally leaving her airframe cleaner. .

In summary: the B-17 only carried a smaller bomb load because her mission specs dictated it, not because she wasn't capable.

The B-17 was an electric airplane: all moving pieces that were powered (flaps, bomb-bay doors, landing gear, ball-turret motion and retraction) were powered by electricity, with manual back-up. On a B-24 , all those pieces were hydraulically powered. Whether by battle damage or maintenance problems, a failed electrical line is far less hazardous than a failed hydraulic line.

Canadian Pilots of Note

William Gordon Claxton DSO, DFC & Bar
1899-1967

William Claxton was born in 1899 in Gladstone, Manitoba. He enlisted with the Royal Flying Corps in Canada in 1917 as an 18-year-old and trained at Camp Borden. Claxton was assigned to No. 41 Squadron in France, flying S.E.5a aircraft. He claimed 37 air victories in 79 days during the War's final year. This meteoric career was marked by several multiple victory days. His calmness under fire earned him the nickname "Dozy" and led him into situations where his planes experienced battle damage. Claxton opened his tally of 'kills' on May 27, 1918, in the skies above France, downing a German Fokker Dr.I aircraft. The following day he brought down two Pfalz D.III aircraft.

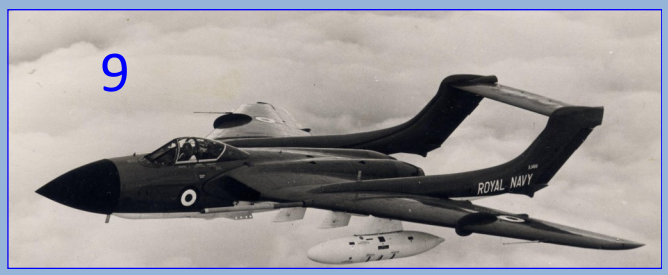
Between June 12 and June 30, Claxton successfully downed 17 German aircraft plus an observation balloon. Thirteen of these planes fell in a four-day stretch, from June 27 through June 30. On June 30, alone he brought down six enemy aircraft. On that incredible day, he flamed a Pfalz D.II, destroyed two Albatros D.Vs, and drove another Pfalz D.III down out of control — all before lunch. In the afternoon, he destroyed yet another Pfalz D.III and shot a DFW C model down in flames. By the end of July, he had increased his total to 27. On August 3, 1918, Claxton was awarded the Distinguished Flying Cross and appointed flight commander. By that time, his victory list had grown to 30.

On August 17, 1918, Claxton was shot down by Leutnant Johannes Gildemeister during an encounter with Jasta 20 in which he and fellow pilot Frederick McCall were outnumbered 20-to-1; by this time he had amassed 37 air successes. In this dogfight, he brought down three enemy planes before being hit. Claxton crash-landed behind enemy lines with a serious head wound and was only saved by prompt attendance of a German doctor, who performed cranial surgery.

Claxton's final score was two observation balloons destroyed, 16 aircraft driven down out of control, and 19 aircraft destroyed. Two of the planes he destroyed were shared victories with 41 Squadron's second ranking ace, Frederick McCall. Claxton remained a prisoner of war until the armistice. Returning to Canada Claxton became a financial journalist. He died in Toronto on September 28, 1967, aged 68.

S.E.5a

Quiz: British Jets



1. English Electric Lightning 2. Saunders Roe SR-A/1
3. Hawker Hunter 4. Gloster Javelin 5. Hawker Harrier
6. de Havilland DH 100 Vampire 7. Blackburn Buccaneer
8. Supermarine Scimitar 9. de Havilland DH 110 Sea Vixen
10. Supermarine Attacker

RCAF News

L3Harris delivers first aircraft of Hornet Extension Project

Mirabel, QueRCAF Newsbec-based L3Harris announced on Aug. 2 that it delivered the inaugural fighter aircraft as part of the Hornet Extension Project (HEP) for the Royal Canadian Air Force. The upgraded CF-188 Hornet aircraft was delivered this past June from L3Harris's Canadian fighter aircraft center of excellence facility in Mirabel.

The company is responsible for much of the design and all of the aircraft's modifications and upgrades associated with the HEP. The project aims to enhance the RCAF's aging Hornet fleet to enable the aircraft to meet operational commitments, including those to the

The Hornet Extension Project aims to enhance the RCAF's aging CF-188 fleet to enable the aircraft to meet operational commitments. Mike

North American Aerospace Defence Command (NORAD) and the North Atlantic Treaty Organization (NATO), until the forthcoming F-35 next-generation fighter aircraft reaches full operational capability in 2032. The Hornet Extension Project includes a two-phased approach. In the initial phase, all 94 Hornets within the fleet will receive a series of upgrades, including the integration of automatic dependent surveillance-broadcast (ADS-B) to replace the existing transponder; the integration of Honeywell GPS/INS systems; the integration of Collins Aerospace AN/ARC-210 RT-2036 (Gen 6) radios and airborne Joint Tactical Radios; upgrades to the sniper targeting pod; enhanced mission computers and data transfer units; and updated software for the Advanced Distributed Combat Training System (ADCTS) for networked flight simulation training.

"These adjustments will allow the CF-188s to continue to utilize civilian airspace in the future and to remain interoperable with Canada's allies," L3Harris said.

In the second phase of the HEP, 36 select aircraft will receive upgraded hardware and software to improve their combat capability. Most noteworthy is the replacement of the current APG-73 radar with the Raytheon APG-79(V)4 Active Electronically Scanned Array (AESA) radar.

Moreover, the select Hornets will receive new and advanced weaponry, including the Sidewinder AIM-9X Block II air-to-air short-range missile, the AIM-120D advanced medium-range air-to-air missile, and the AGM-154 Joint Standoff Weapon (JSOW), which is an air-to-surface glide bomb with a striking unclassified published range of at least 100 kilometers.

"L3Harris is Canada's only fighter aircraft center of excellence," said Ugo Paniconi, L3Harris's general manager. "This contract stands as a testament to our unwavering performance and dedication to our customers' mission. For over three decades, we have faithfully maintained Canada's sole fighter aircraft fleet, and we eagerly anticipate the opportunity to continue this rich legacy of in-service support for Canada's future F-35 fleet."

The ambitious timeline of the HEP includes initial operating capability for six upgraded aircraft by the close of 2023. The fleet is expected to be fully operational by June 2025. In an interview with *Skies* in late 2022, RCAF Commander LGen Eric Kenny noted that the project "gives our aircrew and ground crew training on how to use some of these more advanced systems so that when we step into the future fighter, it should be more seamless."

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