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The *ROYAL CANADIAN AIR FORCE JOURNAL* is an official publication of the Commander Royal Canadian Air Force (RCAF) and is published quarterly. It is a forum for discussing concepts, issues and ideas that are both crucial and central to air and space power. The *Journal* is dedicated to disseminating the ideas and opinions of not only RCAF personnel, but also those civilians who have an interest in issues of air and space power. Articles may cover the scope of air-force doctrine, training, leadership, lessons learned and air-force operations: past, present or future. Submissions on related subjects such as ethics, technology and air-force history are also invited. This journal is therefore dedicated to the expression of mature professional thought on the art and science of air warfare and is central to the intellectual health of the RCAF. It serves as a vehicle for the continuing education and professional development of all ranks and personnel in the RCAF as well as members from other environments, employees of government agencies and academia concerned with air-force affairs.

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GRAPHIC DESIGN Baz Kanda

ONLINE EDITION Christine Rodych

PRODUCTION MANAGER Denis Langlois

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ROYAL CANADIAN AIR FORCE JOURNAL



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Canadian Forces Aerospace Warfare Centre
8 Wing / CFB Trenton
Box 1000 Stn Forces
Astra, Ontario K0K 3W0

Attn: LCol Doug Moulton RAWCRCAJJournal@forces.gc.ca

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COMMANDER'S MESSAGE

On formal occasions, Royal Canadian Air Force (RCAF) squadrons parade with their standards. Emblazoned on these blue-coloured, silk rectangles are the unit's battle honours that recognize the courage and sacrifice of all the personnel—aircrew, ground crew, and support trades—that served during a battle or campaign. Thirty-nine RCAF squadrons proudly display the battle honour *Normandy* on their standards.

From an air power perspective, the Battle of Normandy began long before the first paratrooper landed or amphibious assault begun. The months preceding the D-Day invasion on June 6, 1944, saw Allied air forces attriting the Luftwaffe, destroying industrial and transportation hubs, mining and interdicting sea lanes. In addition, for every sortie flown over the assault area, an equal or greater number were conducted throughout occupied Europe to keep the enemy guessing as to the exact invasion point. Thousands of airmen perished during this period, many of them Canadian, but their sacrifice paid dividends when the Allied armies landed in Normandy.

The RCAF contribution was significant. Over 56,000 Canadian airmen and airwomen were serving overseas by June 1944 and the vast majority of them were in the European theatre of operations. Canadian squadrons were to be found in almost every Royal Air Force (RAF) Command, but there were also thousands of Canadians who served in RAF units and formations. On D-Day itself, the RCAF contributed 37 squadrons to the Allied aerial effort. This was a stunning achievement considering that when war had been declared in September 1939, the RCAF mustered fewer than 5,000 personnel and only a handful of combat-ready aircraft.

Sixteen RCAF squadrons flew as part of 2 Tactical Air Force (2 TAF) providing air cover and direct support to Allied ground forces. Most of them were found in No. 83 Group which had a distinctive Canadian flair. A further 14 squadrons were assigned to RAF Bomber Command, all but one with No. 6 (RCAF) Group, whose primary target on D-Day would be coastal gun batteries. Four more RCAF squadrons operated as part of Coastal Command making sure that German surface and sub-surface vessels did not interfere with the invasion. The last three squadrons were part of the Air Defence of Great Britain (formally Fighter Command) and were seconded to 2 TAF for operations that day.

Twenty-three Canadian airmen would make the ultimate sacrifice on D-Day, most while serving with RAF units. Nine would be killed during Bomber Command operations while in 2 TAF squadrons, four more would never return. During the initial airborne assault nine RCAF aircrew would be killed while flying in Dakota and Stirling aircraft belonging to RAF Air Transport Command. Included in this number was Flying Officer Harvey Edgar Jones, 26, from Welland, Ontario. A Dakota pilot, his bravery that day resulted in a posthumous recommendation for a Victoria Cross. Although endorsed by his squadron and group commanders, as well as the Officer Commanding Air Transport Command, it was "knocked back" by the War Office resulting in Jones being awarded a Mentioned-in-Dispatches.

The final Canadian airman killed on D-Day was not aircrew. Corporal Francis Edward Day, 25, from Winona, Ontario, had joined the RAF as a communication technician. He was one of approximately 1,800 British and Canadian ground personnel who landed on the invasion beaches to set up mobile radar, provide ground-to-air communications, and prepare forward landing fields as the troops moved forward. Day's unit was assigned to support the Americans and he was killed by German artillery fire on Omaha Beach.

Ever-present operational requirements meant that mourning the fallen had to wait, at least in theatre. Back in Canada, each death impacted families in the most tragic way possible. Commemorating our contributions to D-Day should include the understanding that courage and sacrifice are not the exclusive purview of men and women in uniform. All Canadians gave up a part of their future to the war effort.

When next passing a squadron standard, spare a moment to contemplate the word *Normandy* stitched into the blue silk. Think of the mature and combat-tested RCAF taking its place within the ranks of the Allied air power coalition fighting with the best against the best. Consider the dedication and professionalism of your predecessors deploying far from their home and native land to serve Canadians in time of need. Remember those that went, those that stayed behind, and those that never returned and take pride in the legacy that has been handed down to you.

Enjoy the read.

Sic Itur Ad Astra



Lieutenant-General A. J. Meinzinger
Commander Royal Canadian Air Force

BURNING OFF THE AUTUMN MIST:

THE RCAF IN THE ARDENNES AIR CAMPAIGN
DECEMBER 1944 - JANUARY 1945

By Jody Perrun, PhD



The Battle of the Bulge is usually remembered principally as an American campaign and an American victory. This is understandable, since the main weight of Hitler's last, desperate attack on the western front at the end of 1944 fell primarily on the First United States (US) Army, and the Americans supplied the lion's share of the effort to stop the German offensive. Winston Churchill called it "the greatest American battle of the war ... United States troops have done almost all the fighting and have suffered almost all the losses."¹ One of the foremost recent historians of the Ardennes campaign, Peter Caddick-Adams, concurs: "In terms of participation, losses and sheer professionalism, the Bulge was without doubt the greatest battle in American military history."² While the ground presence of their allies may have been slim by comparison, the Americans did not fight alone in the Ardennes. Air and ground crews of the Royal Air Force (RAF), drawn from across the British Empire and from many of the countries Hitler had conquered, made substantial contributions to the victory. The RAF's 2nd Tactical Air Force (2nd TAF), along with Bomber Command, helped write off much of the Luftwaffe's strength in pilots and aircraft, thus achieving Allied air superiority; they waged an interdiction campaign that strangled German efforts both on the ground and in the air; and, they provided important tactical support to the ground troops who stopped the German panzers well short of their objectives. Supplying a significant proportion of the personnel flying with the RAF or serving on the ground, the Royal Canadian Air Force (RCAF) participated in all these aspects of the Ardennes air campaign.



Panzer VI (Tiger I) Bundesarchiv, Bild 101I-299-1805-16 /
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The German offensive, conceived by Hitler and code-named *Herbstnebel* (Autumn Mist), was launched in an effort to split the Anglo-American armies as they sat poised to invade Germany from the west while the Red Army closed in from the east.³ Attacking through the dense woods of the Ardennes into Belgium and Luxembourg, the Germans would cross the Meuse River and aim for Antwerp. If Hitler's tanks could reach the port city they might separate Field Marshal Bernard Montgomery's 21st Army Group from Lieutenant-General (LGen) Omar Bradley's 12th US Army Group, and perhaps even force Britain out of the war. Then, victorious, they could turn to confront the Soviets and the looming conquest of Nazi Germany might yet

be averted. In choosing Antwerp and the Ardennes, Hitler's plan held possibilities. The loss of Europe's largest port would certainly throw Allied logistics into disarray, and by striking through the Ardennes, the Germans would hit the most thinly held sector of the Allied front, with only 5 American divisions from LGen Courtney Hodges' First US Army covering a 65-mile (105-kilometre [km]) front.

Given the hilly, thickly forested terrain and the scarcity of good main roads, the American command saw the Ardennes as a "safe" sector. The road network was considered unsuitable for mobile operations by large armoured forces despite German success there in 1940. Bradley, therefore, concentrated his troops for the continuing advance into Germany to the north and south, thinning out his front facing the Ardennes. In retrospect, it is clear that the Allies greatly

underestimated German capacity to launch a significant offensive at this stage of the war. American and British intelligence officers ignored indications of a German attack, such as the movement of numerous trains towards the area and the creation of large supply dumps, because they simply did not believe the Germans capable of marshalling the necessary manpower or materiel.⁴

“In terms of participation, losses and sheer professionalism, the Bulge was without doubt the greatest battle in American military history.”

Hitler’s plan also went against most military logic and the professional advice of the German General Staff. They saw *Herbstnebel* as overly ambitious given German weaknesses, particularly the disparity in resources compared to their opponents, and the massive logistical handicaps they faced as a result of Allied interdiction bombing, which was crippling movement by rail and choking off fuel supplies.⁵ No matter, the panzer spear-

heads would simply refuel from Allied stores captured along the way. Although the offensive would be overseen by Field Marshal Walter Model’s Army Group B, Hitler had created a new panzer army, the Sixth, to lead the way. It comprised the strongest of Germany’s remaining armoured forces, including the elite 1st SS (*Schutzstaffel*) and 2nd SS Panzer Corps, and was commanded by one of Hitler’s favourite SS generals, Josef “Sepp” Dietrich. Dietrich’s army would strike the main blow on the northern part of the front, supported by General Hasso von Manteuffel’s Fifth Panzer Army in the middle and General Erich Brandenberger’s Seventh Army—mostly infantry—in the south. Model had gathered about 200,000 men and 600 tanks for the initial attack, but logistical problems made themselves felt even before Zero Day. The infantry intended for the attack were concentrated in Germany’s Eifel region between the Rhine and the Belgian frontier, while the panzers gathered around Cologne. Allied bombing of the transportation network delayed their assembly, forcing the operation to be delayed several times. They also waited on bad weather to ground Allied air forces and thus reduce the advantages offered by the Allies’ overwhelming air superiority.

The offensive finally opened on the morning of December 16 with a massive artillery bombardment on a 65-mile (105-km) front between Monschau (southeast of Aachen) and Echternach (northeast of Luxembourg). Altogether, the Americans had about 85,000 men and 400 armoured fighting vehicles in the path of the German assault. The armoured divisions of the two panzer armies were to seize crossings over the Our, Ourthe, and Meuse rivers on their way to Brussels and Antwerp, while the German Seventh Army guarded the southern flank by means of a limited advance. The offensive bogged down immediately due to desperate American resistance at Elsenborn Ridge in the north and German inability to quickly bridge the Our in the south. The situation was transformed over the next two days, however, as the two American formations in the centre of the attack eventually buckled and Manteuffel’s tanks surged forward, coming within reach of Bastogne by the morning of December 19. Only timely reinforcement by the 101st Airborne Division kept Bastogne in American hands, though surrounded. Two days later, the 116th Panzer Division was checked at the Ourthe River, unable to cross when a force that included troops from No. 1 Canadian Forestry Group, which had been operating sawmills in the area, blew the bridges. The high-water mark of the offensive was reached at Celles, where the 2nd Panzer Division had come within a mere 4 miles (6 km) of the Meuse before it was stopped by ground troops, air attack, and fuel shortages on Christmas Eve.⁶ By Christmas Day, the Germans were already going over to the defensive, having advanced about 50 miles (81 km) at their deepest penetration.

What stopped them? Apart from the desperate fighting by American divisions that bought time for help to arrive, it essentially came down to two factors: the logistical superiority that permitted rapid Allied reinforcement of the salient and the air superiority that protected Allied troops, degraded German logistics, and harassed enemy ground forces. The Allied command had been caught completely off guard, but Eisenhower immediately ordered three airborne divisions into the Ardennes. A portion of one of them, the 17th US Airborne, was conveyed to the Continent from England by C-47 Dakotas flown by the RCAF's 437 Squadron (Sqn), part of RAF Transport Command. Additional divisions were released from LGen George Patton's Third Army and LGen William Simpson's Ninth Army to shore up the northern and southern shoulders of the Bulge. Patton's tanks then swung north and headed for Bastogne, slamming into the German left flank.

By the opening of the Ardennes offensive, "126 Wing had become 2nd TAF's top-scoring unit, and 412 [Sqn] its top-scoring sqn."

Allied reinforcements poured into the Ardennes while C-47s, some from 437 Sqn, air-dropped fuel, ammunition, food, and other supplies to the surrounded defenders of Bastogne. The Americans were able to double their infantry and triple their armour within four days, and command responsibilities were shifted to better control the evolving battle. Montgomery's 21st Army Group took over the northern half of the Bulge with First and Ninth US Armies under command, while Bradley remained in charge of the southern half.⁷

The arrangements for air support were also adjusted. Air Marshal Sir Arthur Coningham's 2nd TAF thinned out its forces on the Anglo-Canadian front to assist Ninth Air Force over the Ardennes. Along with the strategic bomber forces, their priorities were to establish air superiority to prevent the Luftwaffe from rendering ground support to Model's troops, to carry out interdiction raids to prevent German movement to and within the battle area, and to provide close support for Allied troops. RCAF sqns played an important part in the execution of this strategy. There were twelve Canadian day-fighter sqns plus two of night-fighters, three of fighter-bombers, and one intruder sqn in 2nd TAF.⁸ Most were gathered in No. 83 Group. Supermarine Spitfires filled out two RCAF fighter wings (Nos. 126 and 127), while one RCAF fighter-bomber wing (No. 143) flew Hawker Typhoons. Together, they accounted for about a quarter of 2nd TAF's fighters, and they were a proficient group. By the opening of the Ardennes offensive, "126 Wing had become 2nd TAF's top-scoring unit, and 412 [Sqn] its top-scoring sqn."⁹ The night-fighters flew de Havilland Mosquitos as part of No. 85 Group, as did the lone Canadian intruder sqn (No. 418) belonging to No. 2 Group.



C-47 Dakota transports configured for casualty evacuation wait to fly into the invasion area.



3 November 1944. Flying Officer Martin Pederson, Hawarden, Saskatchewan, a Canadian with the Royal Air Force rocket firing Typhoon wing at an advanced Dutch airfield, chats with his armourers before climbing into the cockpit. Kneeling beneath the rockets is Leading Aircraftman John Taylor, Flakirk, Scotland, and Leading Aircraftman Alec Lay, Cardiff, Wales, is resting his hand on one of the rails which project the missiles.



Their first requirement was maintaining air superiority. The Luftwaffe had been gradually written down since the previous winter, but it had gathered over 2,460 aircraft for *Herbstnebel*. These included, among other types, 1,770 single-engine fighters, principally the Messerschmitt (Me) Bf 109 and Focke-Wulf Fw 190, along with a few dozen Me 262 and Arado Ar 234B jets. A large force in numbers, it laboured under massive disadvantages compared to its opponents, chief of which was sheer numerical inferiority. The combined Allied air strength available in northwest Europe as of September 1944 amounted to 4,581 heavy bombers, 1,404 mediums, 3,735 fighters, and 411 reconnaissance aircraft, for a total of 9,720 all types. Of these, 2nd TAF could call on nearly 300 bombers and 1,000 fighters, while Bomber Command added nearly 1,900 Lancaster and Halifax heavy bombers.¹⁰

More important than the number of aircraft were the men flying them. The Luftwaffe had lost about 500 fighters and 257 pilots killed against Eighth Air Force day raids alone between November 2 and December 5, 1944, despite weather limiting operations to only five days, and pilot losses would increase to unsustainable levels during the Ardennes offensive. German pilots were also noticeably inferior in skill and experience to Allied pilots. By 1943, German pilots joined operational formations with only 112 hours' flying experience on average, along with an additional 30 to 50 hours of training on the aircraft they would have to take into combat. American pilots, by comparison, had over 300 hours with 170 in operational types.¹¹

When Luftwaffe fighters tangled with their Allied counterparts, the Germans hoped that advanced technology might compensate for their disparities in numbers and training. The Spitfire, P-51 Mustang, and P-47 Thunderbolt outclassed all but the latest variants of the Bf 109 and the Fw 190, but these were few in number. The Me 262 jet, however, promised to give the Luftwaffe a significant edge with a top speed more than 100 miles (160 km) per hour faster than any of the Allies' piston-engine fighters. But the Me 262 was fraught with problems aside from the relative inexperience of the pilots, limited by fuel shortages to an average of only ten training hours on type. The jets were less manoeuvrable and accelerated more slowly than the top Allied fighters. The Jumo-004 engines, made from inferior metals because of German shortages of nickel and chromium, were likely to quit or catch fire if throttled up too quickly, and fast acceleration was needed in a fighter engagement. It therefore comes as no surprise that more Me 262 pilots were "lost to accidents with the fickle jet engines than in dogfights."¹² Whatever the promise or demerits of the aircraft, there were never enough to make a real impact. The Germans could muster fewer than fifty Me 262s and only a handful of Ar 234s for *Herbstnebel*.

Of course, launching the offensive in bad weather was intended to mitigate all these disadvantages, and air operations for both sides were hampered by conditions of low cloud, low visibility and rain from December 16 to 18 before almost closing down completely over the next four days, with fog and snow further reducing visibility to near zero. A limited number of sorties were flown by either side during this period, and the weather exacted its consequences for one 402 Sqn Spitfire pilot who undershot the runway at Diest (airfield B 64) and cartwheeled in the mud.¹³ That pilots even attempted to fly is evidence of the desperation of the moment, and those Allied reconnaissance flights that did get up saw enough to worry them—the German panzer spearheads surrounding American units or forcing them to retreat en masse. When the weather cleared on December 23, the Luftwaffe put up 800 planes, but half of them were needed to intercept Allied heavy bombers headed for Germany. They were unable to maintain this scale of effort and the number of daily sorties dwindled while pilot and aircraft losses climbed. From December 16 to 31, the Luftwaffe lost 464 pilots killed or missing plus 150 wounded in addition to hundreds of destroyed aircraft. The Allies' tactical air forces, meanwhile, could afford to put up enough sorties to tackle the German



An RCAF Halifax bomber Mk II (L-QR) from 405 Squadron in flight overseas on 16 July 1942.

fighters even as they strafed and bombed ground targets, sending up over 2,100 of their own sorties in addition to those flown by the strategic bomber forces on December 23. And the disparity only increased, as the Allies put up 2,500 sorties on Christmas Day, followed by 3,500 on Boxing Day.¹⁴

With so many planes in the sky, there were some notable air confrontations over the Bulge. Particularly memorable were Canadian engagements with Me 262 jets. On October 5, five pilots from 401 Sqn had shared the first Me 262 kill, over Nijmegen, but there was still a distinct sense of novelty when Flight Lieutenant (Flt Lt) J. J. (Jack) Boyle encountered one on December 23 during a 411 Sqn sweep east of Eindhoven. Boyle and his mates were attacked by a single Me 262:

He was upon us before the first warning shout came out of my earphones. Luckily, his fire missed everyone and, as he sped past us, he came right into my gun site [sic] and I fired a cannon burst instinctively. I saw a flash on his rudder that looked like an explosive strike, but it could just as easily have been a sun flash. He raced away from us and was gone in seconds. After we landed, my No. 2 confirmed that he had seen an explosion on the rudder. As a result of our Ops Report, I received credit for one “damaged” aircraft. I took quite a razzing from my squadron mates about “seeing things” because none of us had really thought we could hit a jet. That was the first time I had seen a Me 262 and just the sight of it was exciting.¹⁵

Boyle got another chance on Christmas Day, but not before Sqn Leader J. E. Collier of 403 Sqn became the first RCAF pilot to shoot one down single-handedly during a patrol in the Malmedy area. After spotting three of the jets at 1,000-yard (900-metre [m]) range, Collier managed to close on the leader, the other two having dived away.

I [closed to] about 50 [yards (46 m)] range in a steep turn to port and the enemy [aircraft] straightened out in front of me and opened up. At 150 yds [yards (137 km)] I fired a 4–6 second burst and observed numerous strikes on the fuselage and port wing. The port nacelle began to throw considerable white smoke. The enemy a/c [aircraft] was increasing the range fairly rapidly. I continued firing long bursts and obtained more strikes at 5–600 yds [457–550 m].¹⁶

After running out of ammunition, Collier continued to follow and watched as the German pilot took to his parachute before the jet crashed. About an hour later, 411 Sqn was returning to Heesch when Boyle spotted another Me 262 over the airfield. Diving steeply to build up speed and with “his aircraft indicating over 500 mph (miles per hour [804 km/h]), he opened fire and hit the port engine, which began to stream thick smoke. The German pilot sought to dive away, but with only one engine operating he could not outrun the Spitfire. Boyle got in several more bursts and the aircraft crashed at a flat angle, disintegrating and bursting into flames.”¹⁷

Canadian pilots displayed deadly proficiency against the Luftwaffe’s piston-engine fighters as well. A 414 Sqn reconnaissance flight over Cologne saw Flt Lt W. Sawers shoot down three Bf 109s and damage two more on December 24, adding to the two others Flt Lt D. I. Hall had shot down earlier that day.¹⁸ Over the Rheine–Osnabrück area on the 29th, No. 126 Wing shot down eleven enemy aircraft, five of them in one sortie by Flt Lt Richard J. Audet. This was a feat unequalled in either the RCAF or 2nd TAF.¹⁹



DND Archives PL-41716

Richard Joseph “Dick” Audet.

Audet had joined the RCAF in August 1941, and after serving as a pilot instructor he went overseas and joined 411 Sqn in September 1944. These were his first victories, having spent most of his time until then on patrols and interdiction missions. Of his five kills on December 29, four came within a space of two minutes. Having spotted twelve enemy aircraft (Bf 109s and Fw 190s), Audet attacked the last in the formation from 200 yds (183 m) range, striking the fuselage and causing it to burst into flames. “After the first attack I went around in a defensive circle at about 8,500 feet [2,591 m] until I spotted an Fw 190 which I immediately attacked from 250 yards (229 m) ... I saw strikes over the cockpit and to the rear of the fuselage. It burst into flames ... and ... I saw the pilot slumped over in the cockpit.” He immediately dove after another Bf 109, giving it a burst from 300 yds (274 m) and

causing it to “smash into many flaming pieces on the ground.” Next he took out an Fw 190, shot down in flames while on the tail of another Spitfire. The final kill was another Fw 190, which came at Audet head on: “I slowed down to wait for the 190 to fly in range. At about 200 yds (183 m) and 20 degrees I gave a very short burst ... This a/c flicked violently, and continued to do so until he crashed into the ground.”²⁰ By mid-January, Audet had another five enemy aircraft to his credit, all fighters, one an Me 262. He earned a Distinguished Flying Cross (DFC) and Bar before he was killed on March 3, hit by flak while strafing a train.

Losses to enemy flak and fighters, if not to friendly fire, were understood as part of the cost of doing business

As the Ardennes campaign wore on, the Canadians continued to rack up the victories. New Year’s Eve saw No. 442 Sqn shoot down four Bf 109s, while Jack Boyle got one of two kills for 411 and three other sqns (416, 409, and 410) all claimed single-enemy aircraft. On New Year’s Day, 401 and 412 Sqns combined to take out six enemy aircraft. Three days later, 411 and 442 Sqns equalled the feat: Audet got one, Boyle got another, and they shared a third. The two 411 pilots each scored again on January 14, a day of huge losses for the Luftwaffe. American and

British heavy-bomber raids brought out the German fighters, of which at least 176 were shot down either by Allied fighters escorting the bombers or by the tactical air forces. 2nd TAF claimed 22 enemy aircraft, and 126 Wing Spitfire sqns got 11 of them, killing 10 German pilots.²¹

Sometimes, of course, the fight went against the Canadians. German fighters and flak each took their toll; so did friendly fire. Pilots in 2nd TAF had cause to complain about deficiencies in aircraft recognition by American airmen and flak gunners, who showed a tendency to shoot first and ask questions later. Sometimes the consequences were tragic. Two Spitfires from 416 Sqn were shot down, with one pilot killed—Flying Officer J. R. Beasley—and three were damaged by American flak over Malmedy on Christmas Eve. Earlier that day, No. 439 Sqn’s Typhoons were attacked by American P-47s. Flt Lt K. F. Sage was badly hit but was able to make it back to Eindhoven. Flight Sergeant W. A. Wright

was less fortunate and went down in flames. He managed to bail out of his stricken aircraft but his parachute streamed and he was killed. At least three pilots from this squadron had died in this fashion in recent weeks and an investigation was launched into the state of parachutes. Stitches hidden within the folds were found and soon traced to a German sympathiser working in the parachute stores; a cruel twist, with odds already stacked against the ground-attack pilots. The day continued badly for the Squadron, for Ken Sage, on his second operation, now received a direct hit from flak near Mayen, flicked over and crashed to his death. In fact it would prove to be the worst day ever for the Canadian Typhoon Wing as a whole.²²

The next day, 439 Sqn Typhoons and 416 Sqn Spitfires were again attacked by American fighters in separate incidents, the latter sqn losing Flying Officer A. G. Borlaand shot down and killed.

Losses to enemy flak and fighters, if not to friendly fire, were understood as part of the cost of doing business, and for fighter and fighter-bomber sqns that business included ground support as weather permitted. That meant reconnaissance patrols and strafing and bombing attacks on enemy columns, artillery, and targets of opportunity. Trains and motor vehicles were tempting targets outside of the battle zone, but inside the Bulge, German armour was a priority. Although pilots'

tendencies to claim highly inflated numbers of destroyed enemy tanks and other vehicles have been widely noted, the tactical air forces played an important part in blunting the German advance.²³ On December 18, the spearhead of 1st SS Panzer Division was met west of Stavelot by Ninth Air Force fighters whose pilots were flying in 10/10ths cloud cover with a 200-foot (60-m) ceiling and hugging the Amblève River valley at tree-top height. They managed to find the panzers, bombed and strafed their column, and forced them to take cover in the woods. The two-hour delay imposed allowed American engineers time to blow the bridge over the Lienne creek, forcing the 1st SS Panzer Division to retrace its path in search of another crossing. By the 24th, it was surrounded, out of fuel, and compelled to retreat after abandoning its remaining tanks. Fifth Panzer Army's spearhead, 2nd Panzer Division, was also stopped on the 24th near Celles, barely 4 miles (6 km) from the Meuse, tanks and fuel trucks having been shot up repeatedly by American fighters who were joined on Christmas Day by Typhoons from 402 Sqn. The Canadians "bombed and strafed ... until the controller requested they stop firing as infantry was moving in."²⁴ The scene was one of complete devastation and the German division was wrecked, having lost 3,700 men, 81 armoured vehicles, 405 trucks, and 81 guns by the 25th.

The air interdiction programme had been most effective in strangling the flow of troops and supplies to the battlefield, and it is here, rather than in the provision of close support, that the Allied air forces made their most important contribution to victory in the Ardennes, according to British operational researchers.²⁵ Interdiction was a shared task, as heavy bombers attacked German rail yards beyond the Rhine, while mediums attacked key bridges over the Our and Sauer rivers, road junctions, and rail heads from the Rhine to the forward battle area, and fighter-bombers cut rail lines and attacked rolling stock. To the Eighth Air Force's bombing effort, Bomber Command added seventeen daylight and fourteen night operations in December 1944. The heavies repeatedly hit key transportation targets in Germany, attacking Trier, Koblenz, Cologne, Rheydt, Ludwigshafen, Krefeld, and Saarbrücken, among other centres.²⁶ RCAF sqns from No. 6 Group did not participate in all of these raids, but Canadian airmen were also sprinkled throughout most



Avro Lancasters flying in loose formation.

units in the RAF. At any rate, 6 Group was in on Bomber Command's visit to Cologne's Nippes railway yards on December 24, a raid that was judged "extremely accurate" after it inflicted extensive damage to the tracks and blew up an ammunition train. ULTRA intelligence revealed that repairs would require five to six days.²⁷

Damage to these Rhineland towns was extensive. A German prisoner of war captured shortly after passing through Prum described the effects of the bombing there. His interrogation report noted: "As of 29 and 30 Dec [December] 44 [1944] the town was almost completely destroyed. It was difficult to get through the town with infantry carts. Wooden beams from the ruins of houses were laid across the numerous bomb craters on the road . . . in order to allow the carts to pass. A few men using shovels and crowbars were attempting to clear debris."²⁸ Conditions were similar in Koblenz, described by a captured German paratrooper: "the city was still burning as a result of the air raid on December 29th. Most of the streets were completely destroyed and all traffic in the city was stopped. Almost no stores were open and food and water was [sic] unattainable."²⁹

**More than 2,500 heavy bombers
and 5,000 total sorties were
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Bomber Command and Eighth Air Force adjusted their sights on Christmas Eve, joining Ninth Air Force in attacking the German airfields supporting *Herbstnebel* in the largest single bombing raid of the entire war. More than 2,500 heavy bombers and 5,000 total sorties were launched in an attempt to ground the Luftwaffe for good. The enemy's fighters were called back to meet these attacks, leaving the Bulge to Allied tactical forces which pounced on German ground troops. The 2nd TAF claimed 156

armoured vehicles, 786 motor transport, and 85 gun positions destroyed. Even allowing for the usual inflation of claims, it was a field day. Results against the main targets were, however, less than might have been expected: 4 of 13 German airfields targeted were rendered unserviceable for between 10 and 13 days, but the rest either suffered little effect or were back in action within a few days.³⁰ The heavy bombers remained on call as needed for other targets, including those on the battlefield, and Bomber Command hit St. Vith in a crucial Boxing Day attack. Eight roads led into the town, so, as with Bastogne, it was a key hub and potential choke point. Through traffic was stopped completely after 294 aircraft drawn from all groups in Bomber Command dropped 1,140 tons (1,034 tonnes) of explosives, turning most of the town to rubble and blocking its main roads for three days. Even after repairs, traffic volume was reduced by 50 per cent and some of the roads were still out as late as January 11.³¹ The effects of the interdiction programme profoundly eroded German logistics. As the RCAF's official history notes, the bombing of German rail yards required most "troops and equipment . . . to detrain on the east bank of the Rhine" and attempt to move by road into the Bulge.³² The distances involved ultimately meant that maintaining adequate supplies for the forward troops was impossible. Germany's Commander-in-Chief on the Western Front, Field Marshal Gerd von Rundstedt, described the big picture:

The consequences were disastrous ... it meant that we could not get supplies or troops forward. The further we advanced the further the troops had to march ... the deep penetration of heavy bombers east of

the Rhine against our communications ... were painful for moving our troops, our supplies and our gas ... On the roads our convoys or single motor transport could not move during the day. We could never count on when a certain division would arrive at its destination.³³

German troops were also hindered in moving to and on the battlefield by the huge reduction in fuel stores caused by Allied strategic bombing of oil targets, which at the same time choked off supplies to the Luftwaffe. Between May and September 1944, the “monthly output of synthetic oil was reduced from 436,000 to 152,000 tonnes . . . while production of aviation fuel fell from 156,000 to 10,000 tonnes a month over the same period . . . at a time when the Luftwaffe required about 320,000 tonnes a month.”³⁴ This was the reason why German pilots over the Ardennes had so little flying experience: there was simply not enough fuel to use on training flights.

Given these conditions, the Luftwaffe’s ability to pull off the *Bodenplatte* raid on New Year’s Day was something of a miracle. *Herbstnebel* was supposed to begin with a massive raid against airfields within range of the Ardennes in hopes of destroying enough Allied aircraft on the ground to even the balance in the air and prevent them from interfering with the movement of German ground forces, but the same poor weather that was a prerequisite for launching the ground offensive pushed back the date for *Bodenplatte*. Had it been launched as originally intended on December 16, the Luftwaffe could have struck with much larger forces, but by January 1 it could only muster 900 aircraft. The attack might still have served a purpose on December 23 or 24 when the ground campaign hung in the balance, but by New Year’s there was little that it could contribute to an offensive that had already been defeated.³⁵



Fire crews attempt to save an Avro Lancaster from burning at Melsbroek, Belgium.

Still it went ahead, and the airfields made tempting targets. Wet conditions had compelled Coningham to concentrate 2nd TAF's various wings at a smaller number of airfields than would otherwise have been optimal.³⁶ The waves of German fighters arrived over 17 Allied airfields around 9:25 a.m. after flying under the radar in strict radio silence. Three of the targeted airfields were RCAF wing bases: Evèrè, Heesch, and Eindhoven, the latter also housing No. 83 Group's headquarters. At Evèrè, home to 127 Wing, rain and frost had delayed flights, so the sixty Spitfires on the field were sitting ducks. Twenty-four aircraft were destroyed on the ground, but the wing's British commander, J. E. Johnson, thought "we had escaped lightly. . . . Not one Spitfire should have remained undamaged." Despite achieving complete surprise and catching the Spitfires lined up on the field, "the shooting was atrocious, and the circuit at Evèrè reminded us more of a bunch of beginners on their first solos than pilots of front-line sqns."³⁷ No. 403 Sqn's Operations Record Book described the scene:



Hawker Typhoon of 2nd TAF being overhauled among the wreckage at B78 Eindhoven.

The first day of the New Year and what a way to start it off. At about 0830 hours [sic] this morning we had a social call from Jerry in the form of about 30 aircraft which strafed the 'drome. They strafed everything in sight, the aircraft, hangars, dispersals and personnel and what a mess they made of things. They didn't get away that easy. Three of our kites, flown and led by P/O [Pilot Officer] Steve Butte, P/O Mac Reeves and F/S [Flight Sergeant] Lindsay respectively were just taking off on a patrol when Jerry appeared over the 'drome. Within minutes of becoming airborne, Butte shot down and destroyed three enemy aircraft, two ME 109s and one FW 190. Mac Reeves shot down and destroyed two FW 190s and Lindsay destroyed one ME 109 and probably destroyed a further ME 109. Considering the odds against them, it was a damn good show.³⁸

Two RCAF air and ground crew were killed in the attack, and twelve wounded.

The Luftwaffe had no luck against 126 Wing, stationed at Heesch, because it was met by Spitfires from 411 and 442 Sqn already in the air. These two sqns shot down thirteen enemy aircraft for the loss of one Canadian killed. Ten more Spitfires from 401 Sqn lining up for takeoff when the Germans arrived managed to get airborne and took out six attackers without loss.³⁹ The worst damage was at Eindhoven, where many pilots from both 39 Wing and 143 Wing were still waiting in their ready rooms when the first waves of Fw 190s and Bf 109s arrived. Eight Typhoons from 438 and 440 Sqn were lined up for takeoff; two were shot down in the air, the rest destroyed on the ground. P/O R. A. Watson of 440 Sqn "managed to fire his plane's cannon from the ground

and hit an enemy Fw 190 before his own aircraft was set aflame. ... By the end of the attack 440 had only two aircraft left, both badly damaged.”⁴⁰ The Germans continued to strafe the base for 20 minutes, opposed mainly by anti-aircraft gunners from the attached RAF Regiment, although some pilots and ground crew tried to fight back with small arms. Sergeant W. L. Large, seeing enemy aircraft circle after their first attack,



Bren carried by a Canadian soldier in 1945.

hurried back to dispersal where our Bren guns were kept. There I saw F/Sgt [Flight Sergeant] McGee and we each took a Bren gun and two boxes of clips and stood outside the dispersal door and waited for any Jerry who came within range. ... One aircraft coming from the south turned off the runway and made a steep climbing turn about 120 yards [110 m] away from us at a height of not more than forty feet [12 m]. We both fired, each emptying a full magazine at him. We saw strikes down the engine cowlings in the direction of the cockpit and saw small pieces fall off.”⁴¹

There was one notable success in the air: Sqn Leader Gordon Wonnacott of 414 Sqn (39 Wing) got three of the attackers, earning a Bar to his DFC. However, by the time the attackers had finished at Eindhoven, “the central mess was destroyed, the dispersal hut and Adjutant’s office of No. 440 Sqn wrecked, and every window in the airfield shattered.”⁴² They left 13 dead, dozens wounded, 31 aircraft destroyed, and bomb and petrol dumps on fire. Among the dead at Eindhoven was the new 438 Sqn commander, Flt Lt Peter Wilson. He had just been appointed and was preparing for his first mission with the sqn when he was hit on the tarmac; he managed to crawl out of his Typhoon but succumbed to his wounds.⁴³

Overall, however, the losses inflicted by *Bodenplatte* were more severe for the Germans than for the Allies. Of the 17 airfields targeted, only four suffered significant damage. While sources disagree on precise numbers, 2nd TAF lost about 150 aircraft destroyed and a similar number damaged; American losses were much smaller. Only five 2nd TAF sqns were temporarily put out of action, and the supply of both aircraft and pilot replacements was more than sufficient to make up for these losses without much delay. Against these numbers, the Luftwaffe lost about 300 aircraft and 214 irreplaceable pilots, many to their own anti-aircraft fire. These were its largest single-day losses of the entire war, and a blow from which it never recovered. Like the panzers stranded in the Ardennes, the Luftwaffe was out of fuel and its back was broken. After *Bodenplatte*, it was unable to seriously contest the skies over Germany during what remained of the war.⁴⁴

The Battle of the Bulge did not formally end until the middle of January, after Montgomery's northern counterattack with Hodges' First US Army met up near Houffalize with Patton's thrust from the south, but it was decided before *Bodenplatte* by Allied logistical superiority and ensured by air supremacy. According to one US Army Air Forces assessment, "the critical condition of supply, in its various ramifications, was the prime factor causing the failure of the German effort and affected both the [German Air Force] and the Wehrmacht."⁴⁵ While the Germans starved for fuel, ammunition, and other supplies, the Americans sent

250,000 reinforcements into the Ardennes within the first week. First US Army moved 48,000 vehicles there between December 17 and 26.⁴⁶ Operational researchers from 21st Army Group agreed that the interdiction effort was "decisive," while close support to ground troops was "of much less significance."⁴⁷ Strafing, a fighter's most accurate means of attack, was ineffective against enemy armour and bombing was too inaccurate to make much impact. Despite the exaggerated claims of Allied pilots, few tanks were actually knocked out from the air. Rocket attacks in particular were described by prisoners of war as terrifying, however, and the mere threat of air attack could be enough to induce tank crews to abandon vehicles that were otherwise full of fuel and ready to fight.⁴⁸ Having planes in the sky could be of real benefit to the men on the ground even without firing a shot at the enemy. American troops reported that "the presence of fighter-bombers in the sky reduces artillery fire," as the gunners were reluctant to give their positions away.⁴⁹ Ultimately, however, No. 2 Operational Research Section concluded, and the Germans agreed, that "the contribution of the air forces towards the stemming and final elimination of the enemy thrust into Belgium was very considerable, but ... it was not by the direct destruction of armour, which appears to have been insignificant; but rather by the strafing and bombing of the supply routes, which prevented essential supplies from reaching the front."⁵⁰

By the end of the Ardennes campaign, Allied casualties totalled approximately 77,000, including more than 8,600 dead. German losses amounted to about 85,000, with between 10,000 and 16,000 killed—again, sources do not agree on precise numbers.⁵¹ The end of the campaign and of the war were more certain. As one American account assessed it, "the offensive in the Ardennes used up Germany's strategic reserve[s]" of both air and ground forces, and "the Germans [now] had nothing left except enemies."⁵² By contributing to the Allied effort to destroy the Luftwaffe, strangle the enemy's transportation network, and harass his ground troops, RCAF personnel had played a supporting but significant part in defeating the last, desperate gamble of a dying regime.⁵³

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APPENDIX: ORDERS OF BATTLE

RCAF / 2ND TACTICAL AIR FORCE ORDER OF BATTLE, DECEMBER 1944

Group	Squadrons	Aircraft	Airfield
2 Group (light/medium bombers) including 136 Wing	418	Mosquitos	UK
83 Group (composite)	see below		
84 Group (composite)			
85 Group			
including 148 Wing	409	Mosquitos	B 51 (Lille)
including 149 Wing	410	Mosquitos	B 48 (Amiens)

RCAF / 83 GROUP ORDER OF BATTLE, DECEMBER 1944

Wing	Squadrons	Aircraft	Airfield
39 (Reconnaissance) Wing (RCAF)	400, 414, 430	Spitfires	B 78 (Eindhoven)
121 Wing			
122 Wing			
124 Wing			
125 Wing			
126 (RCAF) Wing	401, 402, 411, 412, 442	Spitfires	B 88 (Heesch)
127 (RCAF) Wing	403, 416, 421, 443	Spitfires	B 56 (Evère)
143 (RCAF) Wing	438, 439, 440	Typhoons	B 78 (Eindhoven)

Dr. Jody Perrun teaches history at the University of Winnipeg, the Royal Military College of Canada, and the University of Manitoba, specializing in the Second World War, the Holocaust, and post-Confederation Canada. He is the author of *The Patriotic Consensus: Unity, Morale, and the Second World War in Winnipeg* (University of Manitoba Press, 2014).

ABBREVIATIONS

2nd TAF	Second Tactical Air Force
AAFEB	Army Air Forces Evaluation Board
a/c	aircraft
AG	Air Group
DFC	Distinguished Flying Cross
Flt Lt	Flight Lieutenant (RAF)

incl.	including
km	kilometre(s)
LGen	Lieutenant-General
m	metre
Me	Messerschmitt
mph	miles per hour
ORS	Operational Research Section
P/O	Pilot Officer (RAF)
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
sqn	squadron
SS	<i>Schutzstaffel</i> (Protective Echelon)
US	United States
vol	volume
yds	yards

NOTES

1. Robert Rhodes James, ed., *Winston S. Churchill: His Complete Speeches, 1897–1963*, vol. 7, 1943–1949 (NY: Chelsea House Publishers, 1974).
2. Peter Caddick-Adams, *Snow & Steel: Battle of the Bulge 1944–45* (London: Preface, 2014), iv.
3. Often referred to as *Wacht am Rhein*, the name of the offensive was actually changed in early December.
4. Williamson Murray and Allan R. Millett, *A War To Be Won: Fighting the Second World War* (Cambridge, MA: Belknap, 2000), 464; and Danny S. Parker, *To Win the Winter Sky: Air War over the Ardennes, 1944–1945* (Conshohocken, PA: Combined, 1994), 127.
5. Caddick-Adams, *Snow & Steel*, 111–16, 239. Sepp Dietrich’s view was telling: “All I had to do was cross a river, capture Brussels and then go on and take the port of Antwerp. And all this in ... the worst three months of the year; through the Ardennes where snow was waist deep and there wasn’t room to deploy four tanks abreast ... when it didn’t get light until eight in the morning and was dark again at four in the afternoon and my tanks can’t fight at night; with divisions that had just been reformed and were composed chiefly of raw untrained recruits; and at Christmas time.”
6. Caddick-Adams, *Snow & Steel*, 96, 191, 314, 470–78; Murray and Millett, *A War To Be Won*, 469; C. P. Stacey, *Official History of the Canadian Army in the Second World War, vol. 3, The Victory Campaign: The Operations in North-West Europe 1944–1945* (Ottawa: Department of National Defence, 1960), 441; and Parker, *Win the Winter Sky*, 258.
7. C. B. Macdonald, “Ardennes Campaign,” in *The Oxford Companion to the Second World War*, ed., I. C. B. Dear and M. R. D. Foot, (Oxford: Oxford University Press, 1995), 52; Brereton Greenhous et al.,

The Crucible of War, 1939–1945: The Official History of the Royal Canadian Air Force, vol. 3 (Toronto: University of Toronto Press, 1994), 876, 885; Harold R. Winton, “Airpower in the Battle of the Bulge: A Case for Effects-Based Operations?,” *Journal of Military and Strategic Studies* 14, no. 1 (Fall 2011): 15; and Caddick-Adams, *Snow & Steel*, 412–19.

8. Greenhous et al., *Crucible of War*, 165, 335–37. Intruder squadrons were specialist units operating against German fighter bases, lines of communication, and V-1 bases.

9. Christopher Shores and Chris Thomas, *2nd Tactical Air Force, Vol. 2: Breakout to Bodenplatte, July 1944 to January 1945* (Hersham, UK: Classic, 2005), 354.

10. Shores and Thomas, *2nd Tactical Air Force, Vol. 2*, 54.

11. Parker, *Win the Winter Sky*, 99–100; and Winton, “Airpower in the Battle of the Bulge,” 4.

12. Parker, *Win the Winter Sky*, 72–8, 134.

13. Shores and Thomas, *2nd Tactical Air Force, Vol. 2*, 359. No. 402 Squadron was then flying as part of No. 125 Wing, stationed at Diest, rather than with the Canadian wings at Eindhoven, Heesch, and Evère.

14. Parker, *Win the Winter Sky*, 169, 245, 281, 318, 362; and Caddick-Adams, *Snow & Steel*, 360.

15. Shores and Thomas, *2nd Tactical Air Force, Vol. 2*, 361.

16. Greenhous et al., *Crucible of War*, 337–38.

17. Shores and Thomas, *2nd Tactical Air Force, Vol. 2*, 365.

18. Shores and Thomas, *2nd Tactical Air Force, Vol. 2*, 363–64.

19. Greenhous et al., *Crucible of War*, 338–40.

20. Shores and Thomas, *2nd Tactical Air Force, Vol. 2*, 372.

21. Christopher Shores and Chris Thomas, *2nd Tactical Air Force Vol. 3: From the Rhine to Victory, January to May 1945* (Hersham, UK: Classic, 2006), 394–400; Shores and Thomas, *2nd Tactical Air Force Vol. 2*, 360–76.

22. Shores and Thomas, *2nd Tactical Air Force, Vol. 2*, 362–65.

23. Army Air Forces Evaluation Board (AAFEB) in the European Theater of Operations, “The Effectiveness of Third Phase Tactical Air Operations in the European Theater, 5 May 1944 – 8 May 1945,” August 1945, Orlando Army Base, Florida, Ike Skelton Combined Arms Research Digital Library, 188, accessed February 15, 2019, <http://cgsc.contentdm.oclc.org/cdm/compoundobject/collection/p4013coll8/id/1488/rec/1>.

24. Parker, *Win the Winter Sky*, 184–85, 293–95.

25. 21 Army Group (AG) No. 2 Operational Research Section (ORS) Joint Report No. 1, “Air Attack on Enemy Armour in the Ardennes Salient,” in *Montgomery’s Scientists: Operational Research in Northwest Europe*, ed. Terry Copp (Waterloo: Laurier Centre for Military, Strategic and Disarmament Studies, 1999), 207–16.

26. AAFEB, “Effectiveness of Third Phase Tactical Air Operations,” 182; Greenhous et al., *Crucible of War*, 332; Winton, “Airpower in the Battle of the Bulge,” 8; Parker, *Win the Winter Sky*, 198; and Laurie Peloquin, “Area Bombing by Day: Bomber Command and the Daylight Offensive, 1944–1945,” *Canadian Military History* 15, no. 3–4 (Summer–Autumn 2006): 34–36.

27. Martin Middlebrook and Chris Everitt, eds., *The Bomber Command War Diaries: An Operational Reference Book, 1939–1945* (Leicester: Midland, 1996), 637; and Parker, *Win the Winter Sky*, 266.
28. AAFEB, “Effectiveness of Third Phase Tactical Air Operations,” 266.
29. Parker, *Win the Winter Sky*, 352.
30. Parker, *Win the Winter Sky*, 253–54, 517.
31. Winton, “Airpower in the Battle of the Bulge,” 13; AAFEB, “Effectiveness of Third Phase Tactical Air Operations,” 187; and Middlebrook and Everitt, *Bomber Command War Diaries*, 637.
32. Greenhous et al., *Crucible of War*, 850.
33. Parker, *Win the Winter Sky*, 237.
34. Greenhous et al., *Crucible of War*, 810.
35. Parker, *Win the Winter Sky*, 129–31, 374–78.
36. Hilary St. George Saunders, *The Royal Air Force 1939–1945*, vol. 3, *The Fight is Won* (London: HMSO, 1954), 209.
37. J. E. Johnson, *Wing Leader* (Toronto: Stoddart, 2000 [1956]), 294; and Greenhous et al., *Crucible of War*, 343.
38. Caddick-Adams, *Snow & Steel*, 357.
39. Greenhous et al., *Crucible of War*, 343; Parker, *Win the Winter Sky*, 393–94. Heesch was not even the target; the German fighters had been aimed at Volkell, got lost, and attacked the wrong airfield.
40. Parker, *Win the Winter Sky*, 402.
41. Greenhous et al., *Crucible of War*, 341.
42. Saunders, *Royal Air Force*, 211.
43. Shores and Thomas, *2nd Tactical Air Force*, Vol. 2, 379; Greenhous et al., *Crucible of War*, 341–43; and Parker, *Win the Winter Sky*, 400–1.
44. Winton, “Airpower in the Battle of the Bulge,” 17; Greenhous et al., *Crucible of War*, 343; Saunders, *Royal Air Force*, 210–11; and Shores and Thomas, *2nd Tactical Air Force*, Vol. 2, 381; Shores and Thomas, *2nd Tactical Air Force*, Vol. 3, 393; Parker, *Win the Winter Sky*, 450–56.
45. AAFEB, “Effectiveness of Third Phase Tactical Air Operations,” 184.
46. Caddick-Adams, *Snow & Steel*, 401.
47. 21 AG No. 2 ORS Memorandum No. 6, “The Contribution of the Air Forces to the Stemming of the Enemy Thrust in the Ardennes,” 154.
48. Ian Gooderson, “Allied Fighter-Bombers Versus German Armour in North-West Europe 1944–1945: Myths and Realities,” *Journal of Strategic Studies* 14, no. 2 (June 1991), 214–17.

49. AAFEB, "Effectiveness of Third Phase Tactical Air Operations," 234.

50. No. 2 ORS, Joint Report No. 1, "Air Attack on Enemy Armour in the Ardennes Salient," 208.

51. Caddick-Adams, *Snow & Steel*, 635.

52. Murray and Millett, *War To Be Won*, 471.

53. Special thanks go to Stephen Harris, Michael Bechthold, Paul Johnston, and Carl Christie for their advice on the preparation of this paper.







SUPPORTING THE AIRBORNE: THE RCAF IN OPERATIONS NEPTUNE AND MARKET GARDEN

BY JODY PERRUN, PHD

Allied paratroopers basked in an elite aura during the Second World War. Whether British, American, or Canadian, they were among the most highly regarded soldiers in the Allied order of battle. Exhaustive and specialist training meant their commitment to the most difficult of operations, and they jealously guarded their status as a breed apart. While not disparaging the commitment or expertise of these elite soldiers, some historians have argued that their use in parachute operations was wasteful, entailing a highly uneconomic allotment of resources and causing prohibitive casualty rates.¹ The two Allied operations employing airborne troops in 1944 produced a mixed record. The relatively successful airborne landings in support of Operation NEPTUNE, the Normandy landings, helped to seal the flanks of the bridgehead against German counterattacks, but Operation MARKET GARDEN proved overly ambitious and failed in its objective to cross the Rhine at Arnhem. Both operations carried extremely high costs in casualties. These stories are well known; less so is the Canadian contribution to the massive air efforts that delivered and supported the parachute and glider-borne troops. The Royal Canadian Air Force (RCAF) supported both of these operations, but its presence has gone largely unrecognized because its role was limited for the most part to a nearly unchallenged presence patrolling the Normandy bridgehead and a modest contribution to transport operations over Arnhem.

RCAF SUPPORT FOR AIRBORNE OPERATIONS ON D-DAY

Enough Canadians served in the “Lost Legion,” that is, in Royal Air Force (RAF) units, to ensure Canadian participation in most air operations throughout the Northwest Europe campaign, but there was no visible RCAF unit in the transport squadrons that deployed Allied paratroops on D-Day. The inclusion of the airborne forces in the Normandy invasion had been somewhat controversial. Air Marshal Sir Trafford Leigh-Mallory, named to command the Allied Expeditionary Air Forces (AEAF), had opposed the plan to drop airborne divisions to seal the flanks of the invasion area as too risky, predicting 80 per cent casualties in troops and aircraft. But the flanks of the bridgehead were expected to be the points most vulnerable to German counterattack, so the American 82nd and 101st Airborne Divisions were designated for the western flank and the British 6th Airborne Division (6th Airborne) for the eastern flank. Deploying three airborne divisions would require a substantial air transport organization and the Americans had 56 squadrons with 900 aircraft, mostly C-47 Dakotas, in their IX Troop Carrier Command. The RAF had created its much smaller Transport Command in March 1943. Until the beginning of that year there were only two transport squadrons in England and few aircraft had been produced for that role, since the British had to focus on fighter and bomber production during the war’s early years. The commencement of planning for Normandy was the spur to create a larger organization. Transport Command’s No. 46 Group, formed on the foundation of 150 Dakotas it received in January 1944, grouped into five squadrons. It joined the ten squadrons of No. 38 Group which used converted Halifax, Albemarle, and Stirling bombers. The entire transport organization was directed from England by a Combined Troop Carrier Command located at Eastcote and staffed by both RAF and American personnel.²

To prepare the way for the invasion, the Allies had assembled, under the AEAF umbrella, a mammoth combined air force with approximately 4,000 bombers and 5,000 fighters of all types to interdict the battle zone, attack coastal defences, and carry out reconnaissance. For its part, the RCAF supplied 16 day-fighter squadrons (3 flying Typhoons, 2 Mustangs, the rest, Spitfires). It also provided 4 squadrons of Mosquito night fighters. As D-Day approached, Nos. 400, 414, and 430 squadrons flew more than 700 of 3,200 Allied reconnaissance flights over France while fighter and fighter-bomber sorties targeted railways, airfields, radar sites, gun positions, and V-1

THE LARGEST AIRBORNE OPERATION EVER CARRIED APPROXIMATELY 20,000 PARACHUTE AND GLIDER-BORNE TROOPS IN 1,200 TRANSPORTS FLYING FROM 22 ENGLISH AIRFIELDS.

launching sites. Pre-invasion air support also included the work accomplished through the Combined Bomber Offensive—to which the RCAF squadrons of Bomber Command contributed—to write down the Luftwaffe by attacking its planes, airfields, and German aircraft factories. These efforts were particularly effective: by D-Day, the Germans had nearly 900 aircraft located in France, but only 500 of them were serviceable and only 185 were available for operations in Normandy. The last days before the invasion were consumed by final preparations. Wing and squadron commanders

were briefed in Portsmouth, personnel were confined to their bases and informed of their missions, and aircraft were painted with the distinctive black-and-white stripes of the invasion pattern which, it was hoped, would help gunners on the ground and in the air recognize friendly forces.³

Finally, the moment arrived to launch what General Dwight D. Eisenhower called the “Great Crusade.” Commencing before midnight on June 5–6, RAF night fighters and bombers attacked coastal gun positions and strafed other German defences. Among them were the Intruders of No. 418 Squadron, which shot up flak positions, searchlights, railways, and airfields “in the greatest single night’s work ever performed by the squadron” to date.⁴ As the naval armada carrying two British, one Canadian, and two American infantry divisions destined for the Normandy beaches made its way across the English Channel, air patrols guarded its approach. RCAF Mosquito squadrons from both the 2nd Tactical Air Force (2nd TAF) and the Air Defence of Great Britain (ADGB) made up part of the escort. During the night, 406 Squadron flew “defensive patrols over the Channel with invasion operations all being without incident.”⁵ Nos. 409 and 410 watched over the beachhead and the North Sea, respectively.⁶ Meanwhile, the three Canadian squadrons (404, 407, and 415) in Coastal Command searched the flanks of the invasion force for German naval vessels.⁷

The massive air escort also protected the three airborne divisions on their way to France. The largest airborne operation ever carried approximately 20,000 parachute and glider-borne troops in 1,200 transports flying from 22 English airfields.⁸ A Canadian observer described the awesome scene witnessed in southern England:

During the early hours, most persons were awakened by a roar of planes overhead. ... A great armada was passing overhead and by the light of the moon ... we saw a scene to warm our hearts. There were heavy bombers and transport planes and behind each the outline of a glider. There were hundreds, and they took over an hour to pass. All the aircraft were flying in formation, using their navigation lights, and the long line stretching across the sky as far as eye could see was one of the most magnificent and thrilling sights we had ever witnessed.⁹

RAF resources were concentrated to deliver the 6th Airborne to its drop zones on the eastern flank. All 38 and 46 Group squadrons were committed, but even with 460 aircraft and 1,120 gliders, there were not enough transports to take the whole division in one lift. The plan called for the 3rd and 5th Parachute Brigades to land on the high ground between the Orne and Dives rivers. They were to seize two bridges over the Orne and the Canal de Caen, capture the coastal gun battery at Merville, and destroy bridges over the Dives to prevent the Germans from moving troops up from the east. To find their way in the dark, the transports and glider tugs depended on their “pathfinders:” sticks of paratroopers preceding the main wave who would mark the drop zones with Eureka radar beacons and coloured lights to guide follow-on aircraft. A second lift would convey the 6th Airlanding Brigade and other divisional troops later in the day, escorted by fighter squadrons from ADGB’s No. 11 Group and from Nos. 83 and 84 Groups of 2nd TAF.¹⁰

Among the first troops to parachute into France on June 6 were men from C Company, 1st Canadian Parachute Regiment. Part of the division’s advance party, their task was to secure drop zone V near Varaville. The group from the first Albemarle jumped at 12:20 a.m., landing near their drop zone, but others from the division subsequently landed as far as 15 miles (25 kilometres [km]) away. Navigational errors in the main wave of transports were caused by pilot inexperience, enemy flak, and high winds. Pilots had been unable to practice under realistic conditions before D-Day, so when the flak opened up they increased speed, dropped altitude, and weaved to avoid being hit, all of which combined to throw many transports off course. Adding to the difficulties, the soldiers’ leg



Waves of paratroopers land in the Netherlands.

bags were not strong enough to take the shock of the parachutes opening and most of their equipment was lost in the jump, including many of the Eureka beacons. Half an hour later, the main wave of transports from 38 and 46 Groups began their drops. Parachutists from the 3rd and 5th Brigades hit the ground just after 1:00 a.m., their jeeps and explosives arriving by glider. Seventy of the gliders were Hamilcars, each carrying 40 men or 8 tons (7 tonnes [t]) of equipment; the rest were Horsas, with 29 men or 3 tons (2.7 t) of supplies. The smaller Horsa was nearly as large as a Dakota and nearly as heavy when loaded. Flying it required skilled and experienced pilots, both in the glider and its tug. Communication between the

two was furnished by intercom, wired through the tow rope joining them.¹¹ A remarkable feat of airmanship was executed by three glider pilots who placed Major John Howard's force right beside the bridge over the Canal de Caen at Bénouville, now known as Pegasus Bridge in honour of the division.¹²

Nevertheless, only a fraction of the 6th Airborne came down in the right place. For example, by 6:00 a.m., only two officers and twenty men from A Company of 1st Canadian Parachute Battalion had been able to assemble at their rendezvous point. B Company had thirty. The Canadian story was representative of the whole division, which was still missing a third of its troops by the end of the day. The scattered drop left many paratroopers isolated and lost, and some were forced to hide or surrender when they could not find their assembly areas. Yet the Germans were also confused by the wide dispersal on both flanks and delayed committing reserves in the absence of firm information about Allied objectives. Bomber Command's No. 3 Group had contributed to their confusion by dropping dummy parachutists with small-arms fire simulators near Caen. Ultimately, though greatly reduced in strength, the 6th Airborne managed to secure all of its objectives before digging in to face the German attacks that followed in the ensuing days. The division would continue to fight as regular infantry until finally withdrawn at the end of the Normandy campaign in August.¹³

As Ian Gooderson points out, tactical air support for the airborne landings on D-Day paled in comparison to the air effort required for deployment. Little consideration was given to the problem beyond what had been done during the interdiction campaign to slow German movement into the battle area.¹⁴ Fortunately, the 6th Airborne was able to accomplish its mission without dedicated air support. Histories of the airborne actions on D-Day, therefore, spare few words for the subject. What was probably the 6th Airborne's first encounter with friendly tactical air forces proved costly, however, for its 3rd Brigade. A group of about forty men was attacked by Allied fighter-bombers while Brigadier James Hill led it to the rendezvous point at le Mesnil: more than two dozen were killed, and Hill himself was wounded.¹⁵

THE SCATTERED DROP LEFT MANY PARATROOPERS ISOLATED AND LOST, AND SOME WERE FORCED TO HIDE OR SURRENDER WHEN THEY COULD NOT FIND THEIR ASSEMBLY AREAS.



Loading a Horsa Glider.

As the battle of Normandy unfolded, the airborne benefitted from the general air superiority that protected all Allied troops from Luftwaffe interference. Routine fighter sweeps watched for German aircraft and on D-Day alone, Allied fighters maintained continuous air cover over the beachhead. The RCAF Spitfire squadrons of 2nd TAF kept busy: Wing Commander L. V. Chadburn's 127 Wing patrolled the western sector over Utah and Omaha Beaches while Wing Commander J. E. Johnson's 144 Wing and Wing Commander G. C. Keefer's 126 Wing covered the eastern sector, including Juno Beach and the 6th Airborne's battle zone. Most RCAF squadrons flew four sorties on D-Day, and the only enemy aircraft any of them spotted were a pair of Focke-Wulf Fw 190s that abruptly fled. Ground targets were picked out by the reconnaissance wing (No. 39) of 2nd TAF's 83 Group, including Nos. 400, 414, and 430 Squadrons. They acted as spotters for naval gunnery on D-Day in addition to their usual tasks, which involved routine patrols searching the roads leading into the assault area at dawn and dusk along with impromptu requests from the army during the day. Pilots relayed intelligence on German forces to the 83 Group Control Centre, which passed it along to the army or other air force units.¹⁶ Often, the fighter-bombers were called in, and the three Canadian Typhoon squadrons in 143 Wing "had been among the busiest units in the AEAf, each flying three ground-attack missions."¹⁷ First, they had attacked beach defences during the initial assault: 439 Squadron hit targets on Juno Beach, the other two hit Sword (440 Squadron) and Gold (438 Squadron). Later in the day, they looked for targets of opportunity around Caen but found little to merit their attention apart from some German trucks and armoured vehicles. Attacking them cost several aircraft damaged and one pilot killed—Flying Officer L. R. Allman of 440 Squadron, hit by anti-aircraft fire.¹⁸ As the RCAF's official history notes, "the German front-line bristled with concentrations of small calibre (20- and 30-millimeter) anti-aircraft artillery made invisible (until they open fire) by the arts of camouflage; and, though flying above three thousand feet [900 metres (m)] put pilots out of range of light Flak, they were still within the range of heavier guns, so that maintaining a straight course was hazardous, if not suicidal."¹⁹

The Luftwaffe reappeared over the beachhead on June 7, providing targets for the fighters of 126 Wing (401, 411, and 412 Squadrons) which shot down nine Junkers Ju 88s and damaged three more. It would be "nearly three weeks ... before the day-fighter Wings would once more encounter the Luftwaffe in significant numbers."²⁰ RCAF night fighters in 406, 409, and 410 Squadrons enjoyed more success operating further inland in the days that followed the invasion, with a string of enemy kills by the end of the month. Although the Germans had moved up fighter reinforcements as early as D plus 1, with more to follow a few days later, they were quickly pushed back from their bases near the front to airfields around Paris.²¹ The Allies were left with virtual air supremacy throughout the balance of the Normandy campaign.

RCAF SUPPORT FOR OPERATION MARKET GARDEN

A factor common to both Operation NEPTUNE in June and MARKET GARDEN in September was that air support could not be provided during an airborne drop or while the paratroopers were scattered, and subsequent tactical support and resupply by air depended on communication of friendly and enemy positions. That required good radios, and casualties to men or equipment would rob paratroopers of the ability to signal their air forces.²² The lack of adequate communications alone might have been enough to doom the British at Arnhem, but as it turned out the plan had enough defects to go around otherwise.

After the Normandy campaign, a strategic debate ensued between British Field Marshal Bernard Montgomery, who proposed a narrow thrust to Berlin, and General Eisenhower, who



Five Allied Commanders (Tedder, Bradley, Eisenhower, Simpson and Montgomery) after the "Maastricht meeting" about the Ardennes strategy (Battle of the Bulge), 7 December 1944.

Unknown photographer (Imperial War Museum, London)

preferred to advance into Germany on a broad front. Montgomery's lack of tact produced acrimony, but Eisenhower gave Monty his shot to cross the Rhine at Arnhem. Getting there required Montgomery's 21st Army Group to cross six water barriers, but the city lay beyond the northern edge of Germany's Westwall defensive position, so taking it would give the Allies an easier path into the heart of the Reich.²³

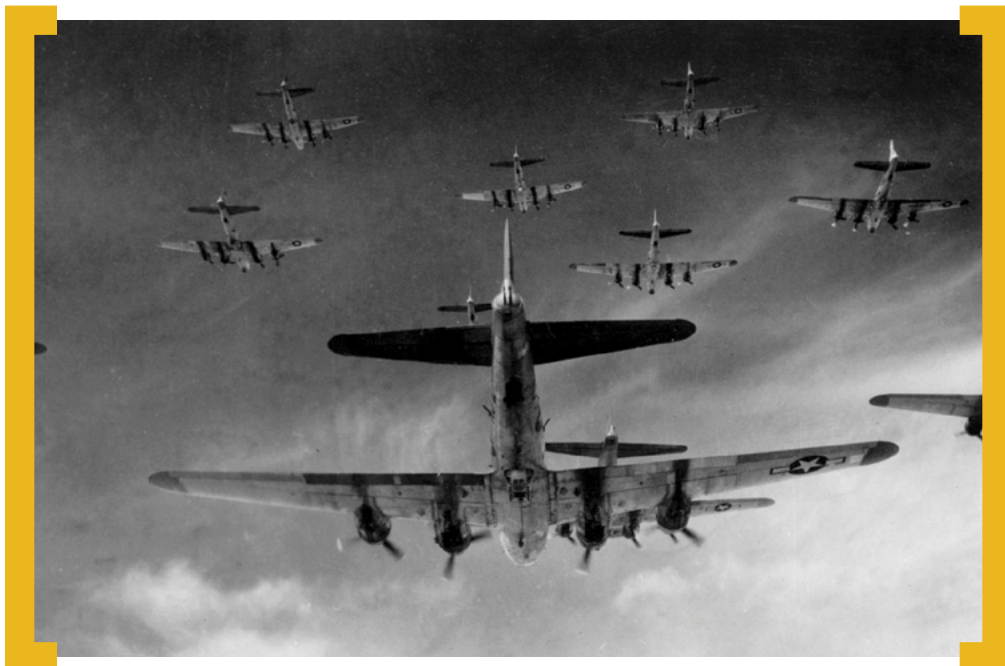
The MARKET GARDEN plan called for Lieutenant-General Brian Horrocks' 30th Corps to thrust up the highway from Eindhoven through Nijmegen to Arnhem. To get 30th Corps through, the 101st Airborne would land near Eindhoven and take two bridges there while the 82nd Airborne captured bridges over the Maas at Grave and the Waal at Nijmegen. The British 1st Airborne Division was to take the last bridge at Arnhem. Preparing the plan for

execution was a rushed affair, with only seven days between Eisenhower's authorization and the operation's launch on September 17, and in hindsight the difficulties seem obvious. The corridor through which 30th Corps had to pass was narrow and the ground swampy, with only one main road. This was "quite unsuitable for an armoured advance on any breadth of front."²⁴ A shortage of aircraft again meant that the 1st Airborne drops on Arnhem would have to be carried out in three lifts over three days. The choice of drop zones was limited by heavy flak at Deelen airfield north of the city and soggy polder land to the south, meaning that the only acceptable alternatives were between six (10 km) and eight miles (13 km) northwest of the bridge, much farther than the division's commander, Major-General R. E. Urquhart, would have preferred.²⁵ These problems might not have proved fatal to the operation had the German army been as close to its ultimate collapse as the Allies believed. When planning began, 30th Corps' intelligence believed that there were "only a few infantry formations in Holland, and no more than 50 to 100 tanks."²⁶ A photo reconnaissance flight on September 12 then indicated that the 9th and 10th SS Panzer Divisions were in the Arnhem area, but the Allied chain of command disregarded the new intelligence because they underestimated the ability of these formations to refit after having been nearly wiped out in Normandy just a few weeks before.²⁷

The shortage of transports which constrained Urquhart's options did not impact the American drops on Eindhoven and Nijmegen. As 1st Airborne Corps commander Lieutenant-General Frederick "Boy" Browning told Urquhart, resources had to be allotted with priority to the Americans: "It's got to be bottom to top, [meaning from the 30th Corps' startline to the final objective], otherwise you'd stand the chance of being massacred."²⁸ These were prophetic words. In any case, on MARKET GARDEN's own D-Day, September 17, United States (US) Eighth Air

Force B-17s prepared the way for the British and American jumps by bombing targets along the transport routes. As Urquhart recalled,

Holland was thick with flak batteries. Long-range American fighters escorting Flying Fortresses were dousing them all the way along the air routes, and we went into Holland with a combined RAF and American fighter escort of 1,200 aircraft. Only twice were Luftwaffe fighters encountered – fifteen Me 109s north of Wesel and a similar number of Focke-Wulf 190s southwest of the same town. They were well out of harm's reach.²⁹



B-17 Flying Fortresses.

The only RCAF squadron participating in the fighter escort was No. 402 from ADGB, but there was further Canadian involvement as 2nd TAF's No. 2 Group, including 406 Squadron, which sent its Mosquitos in strength to strafe the defenders of Nijmegen and Arnhem.³⁰

The first lift to Arnhem, Urquhart's 1st Parachute Brigade and 1st Airlanding Brigade, was conveyed by ten squadrons from Transport Command's 38 Group and six squadrons from 46 Group, using approximately 700 tugs and gliders. The IX Troop Carrier Command contributed another 143 Dakotas to carry the paratroopers. They were preceded by the 21st Independent Parachute Company, which jumped from twelve Stirlings ahead of the rest of the division to mark the drop and landing zones. The air support had been effective, and the first wave met little flak and no fighters. Almost as soon as they touched ground, however, the plan began to go awry. Upon landing they found their radios were defective, a problem that would ultimately carry severe consequences. Less critical, some of the gliders containing the reconnaissance squadron's vehicles did not arrive, which compromised the 2nd Parachute Battalion's race to reach the bridge before German reinforcements got there. The situation soon worsened. Air support had suppressed German flak

at Arnhem but was much less effective near Eindhoven where the 101st Airborne was dropped, and sixteen Dakotas were shot down along with seventeen gliders. One Waco glider came down near Vught; inside, the Germans found the complete plans for MARKET GARDEN on the body of an American who had been killed in the crash.³¹

Although the ground plan thus began to unravel almost immediately, the transports to Arnhem had accomplished their mission without loss. The RCAF's 437 Squadron was one of the 46 Group units towing gliders loaded with paratroopers and their bicycles, motorcycles, jeeps, trailers, guns, and wireless radio sets. The squadron, which operated from Blakehill Farm west of London, had formed on the nucleus of 13 RCAF crews that had become surplus because of a reorganization within Transport Command. They only began to arrive at their new squadron on September 14, just in time for MARKET GARDEN. The squadron's commanding officer was Wing Commander J. A. Sproule, one of the "Lost Legion" who had transferred to the RCAF. Sproule had plenty of experience.



Paratroops leaving an Airspeed Horsa Glider.



Douglas C-47 Dakota.

He had completed a tour with Bomber Command, served as a navigation instructor with the [British Commonwealth Air Training Plan] in Canada, and then returned to England to join No. 24 (Transport) Squadron, which operated "anywhere between Iceland and China." Promoted to command No. 48 Squadron (one of 437's sister units in No. 46 Group), he had towed gliders to the D-Day beachheads and then, in early August, dropped ammunition to the hard-pressed Polish troops holding the mouth of the Falaise "pocket."³²

The aircraft that equipped 437 Squadron, the Dakota, has been described as "versatile, efficient, and economical;" it was useful as a glider tug and for airdropping because of its 5,000-pound (2,268-kilogram [kg]) capacity and stability in flight; however, it was also slow and lacked armour, making it vulnerable to flak and fighters. The Dakota's normal cruising speed of about 160 miles (259 km) per hour was reduced by one-third when it was towing gliders; and as the glider that No. 437 Squadron pilots usually towed—the Horsa—stalled at about 90 miles (145 km) per hour in

level flight, there was little margin for error or mishap. “The work was as hazardous as any in the air during operations since the Daks tugging their gliders were like sitting ducks for ack-ack batteries, travelling at 110 miles (177 km) an hour in a straight line from which they could not deviate.”³³

All 12 crews from 437 Squadron released their gliders over their landing zones without incident on September 17, but their trips became more hazardous beginning with the second lift delivering the 4th Parachute Brigade and additional troops on the 18th. The six aircraft from 437 Squadron ran into some flak, but all of their Horsa gliders made it to their landing zones. Worse was to follow on ensuing days as 30th Corps’ advance was checked by the Germans, the 1st Airborne Division’s perimeter was gradually reduced, and radio signals informing Eastcote of their situation did not get through. Of 390 tons (396 t) dropped to the division on September 19, only 21 tons (21.4 t) were recovered, while the Germans got the rest, and only 41 of 300 tons (47t of 305 t) landed in British hands the next day. The situation was tragic for the men on the ground, who watched as aircrews braved intense flak to release their loads accurately over dropping points which the 1st Airborne no longer held. Troops on the ground tried in vain to signal to the pilots their positions using beacons and parachutes. Then on September 21, the Luftwaffe reappeared and wrought havoc on that day’s unescorted supply run, causing the loss of 20 per cent of the transports.³⁴ Of ten sorties by 437 Squadron on the 21st, five Dakotas were shot down with twelve aircrew and nine Royal Army Service Corps (RASC) personnel killed.³⁵ One of the five crews that failed to return was led by Flying Officer G. P. Hagerman, who “made two runs over the drop zone, in spite of intense anti-aircraft fire, to ensure release of all canisters. On the homeward run, he was attacked by six enemy fighters. The aircraft was so crippled that the crew had to bail out; Hagerman ensured that everybody was out before following. He received a [Distinguished Flying Cross].”³⁶



Troops seated in a Horsa, prior to take-off.

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Fifteen aircraft from the squadron returned to Arnhem on September 23. One was shot down, but the others dropped their loads—normally sixteen panniers per transport—over the battlefield. Panniers were “heavy wicker baskets carrying an average load of 350 pounds [159 kg]” of supplies.

The panniers were pushed to the door of the aircraft on roller conveyors, the release cord of their parachutes being fastened to a sliding ring on a wire running the length of the cargo compartment. When the aircraft was over the target area (usually 1,000 yards [914 m] square), with a 15-foot [4.6 m] white wooden X in the middle) at about 750 feet (229 m), the captain turned on the red light over the rear door as a signal to the army despatchers to get ready to discharge the load. A green light flashed on when they were to let the load go. This could be accomplished in as little as 12 seconds.³⁷

Twelve seconds was an eternity when flying slowly at low altitude in the face of enemy fire, and the courage of aircrews making multiple runs to ensure accurate drops cannot be overstated. The heights of their dedication were demonstrated by an Irish pilot from 271 Squadron, Flight Lieutenant David Lord, who earned a posthumous Victoria Cross for his actions on September 19. After his aircraft was hit by flak and set ablaze, Lord made two runs over Arnhem before crashing, with only one survivor.³⁸ As the perimeter continued to shrink and transport losses mounted, September 23 marked the last attempt to resupply Urquhart’s division from the air after most supplies again fell to the Germans. The cost in casualties to 437 Squadron was 16 aircrew and approximately 13 RASC personnel killed, with 4 prisoners lost.³⁹

The supply runs had not been stopped by the poor weather over parts of England and Holland during MARKET GARDEN’s duration, but other important elements of the plan were gravely compromised. Reinforcements from the Polish Independent Brigade that were scheduled to jump into Arnhem on September 19 were delayed by weather until the 21st. The skies then cleared enough to drop the Poles, but bad weather reduced the available escort, and when the transports ran into “a strong force of Fw 190s near Osnabruck,” they lost 17 aircraft.⁴⁰ The Poles were never able to link up in strength with the remnants of 1st Airborne north of the river and west of Arnhem. In the event, only about 200 Poles were able to cross the river before the division was withdrawn.⁴¹

Tactical air support to the ground troops was also impacted by the weather, although a controversial decision by the Allied command kept 2nd TAF out of action at crucial moments. It was not allowed to operate while troops or supplies were being dropped in order to avoid confusion with the fighter escort from England, and so was confined to supporting the 30th Corps’ ground advance. As it developed, air-to-ground support was only available on five days during MARKET GARDEN, and even then it was scant. On September 17, Typhoons from 2nd TAF’s 83 Group, including some from the Canadian 143 Wing, flew 233 tactical support sorties and helped 30th Corps overcome German anti-tank guns on the road to Eindhoven, though the British were unable to reach the city that day. Fog and rain then limited Canadian Typhoon sorties over the next four days. Some interdiction missions were flown over the Rhineland on the 22nd, but it was the 23rd before a few Typhoons showed up for the first time over Arnhem. There were 22 sorties flown on the 24th and 81 on the 25th. This was too late to be of any real help, as the battle had essentially been decided while the squadrons waited for flying weather.⁴²

The Canadian Spitfire wings were only marginally more involved in maintaining Allied air superiority. Until September 21, 126 and 127 Wings had been largely out of the action over Holland, while frequently moving to keep up with the armies as they advanced from France into Belgium. But on the 21st and 22nd, seven different RCAF squadrons moved up to airfield B 68 at

Le Culot, allowing them to fly patrols over Nijmegen and Arnhem. For their part, the Germans had only about 200 fighters available initially, increasing to 350 by September 21. While the Polish Brigade approached Arnhem late that afternoon, No. 414 Squadron (from 39 Wing) claimed an Fw 190 destroyed over Nijmegen, its first victory since converting to Spitfires at the end of August. Bad weather again reduced air support on September 22, only clearing on the afternoon of the 23rd when a few Spitfires and Typhoons hit German targets around the 1st Airborne's perimeter. Two days later, as the division was preparing to withdraw south of the Rhine, six RCAF squadrons together shot down 13 enemy aircraft over Nijmegen and Arnhem for the loss of 3 of their own pilots killed.⁴³ It was too little, too late to alter the course of a lost battle.



Lieutenant-General Brian Horrocks.

The conclusion of Operation MARKET GARDEN can be summed up briefly: the two American airborne divisions ultimately managed to take their objectives at Eindhoven and Nijmegen and allow the 30th Corps to advance towards Arnhem, but German resistance prevented Horrocks from reaching the bridge in time. The 1st Airborne had been told to expect 30th Corps to arrive in two days, and Browning had stated that four days would be the limit of the division's endurance; it was finally withdrawn on September 25 after nine days of fighting, with only 2,163 men left of its original complement of 9,000.⁴⁴ John Terraine was scathing in his assessment of the operation:

There is no aspect of the preparation of that tragic fiasco that does not fill one with dismay. The idea of pushing a vulnerable force far out on a limb only approachable along the defiles of exposed Dutch roads between the dykes; the lack of liaison between 21 Army Group and the First Allied Airborne Army; the defiant neglect of Intelligence about German concentrations, especially of armour; the failure to coordinate Tactical Air action; the gamble on the autumn weather—all add up to a recipe for disaster which could only have one result in the face of the German Army, even in September 1944.⁴⁵

Regarding criticism of their air support, 21st Army Group's Chief of Operations later wrote that "failure in the Arnhem sector was not the fault of the air forces and bad weather. ... It is correct that the whole planning procedure was too rushed. It was done in London, so that we had no influence upon it."⁴⁶ The plan had been formulated by the First Allied Airborne Army, and 2nd TAF's commander, Air Marshal Sir Arthur Coningham, agreed that lack of cooperation was an important factor in the outcome. He wrote that "the Tactical Air Force, through whose area and on whose front the airborne operations were conducted, must have a very considerable say with regard to the provision and coordination of air escort, air support subsequent to the landing, air cover day and night, and emergency re-supply when weather conditions prevent flying from bases outside the tactical area."⁴⁷ But Coningham had missed the planning conference before MARKET GARDEN;

therefore, he had no input when it was decided that 83 Group would be grounded while the airborne troops were transported and resupplied, and no input even during the delays in those missions due to bad weather.⁴⁸

ASSESSING THE AIRBORNE OPERATIONS

Terraine wrote about the “bitter lesson” and “the sheer wastefulness of the airborne style of war.” The use of airborne troops in Operation HUSKY had been a farce in 1943, with gliders and paratroopers scattered all over Sicily or drowned in the sea. The 1st British Airborne Division subsequently had at least 17 operations planned and then cancelled before Arnhem, and because of its losses there, the division saw no further action. During the Battle of Normandy, while the three airborne divisions ultimately achieved their objectives of sealing the flanks, casualties were similarly massive. Of approximately 20,000 British and American paratroopers deployed in Normandy, the 6th Airborne lost 4,457 total casualties, including 821 killed and 927 missing (only approximately half of whom became prisoners of war while the rest, presumably, were killed); the 82nd Airborne Division lost 4,355 casualties (1,142 killed), while the 101st lost 3,936 casualties with 868 killed.⁴⁹ With loss rates of between 60 and 80 per cent of the troops deployed in NEPTUNE and MARKET GARDEN, airborne operations were an unsustainable draw on the pool of reinforcement personnel.

Terraine also points out that beyond “the waste of elite troops, there was the diversion of air effort in these ambitious actions, especially air transport, of which the RAF certainly did not have any to spare.”⁵⁰ Ironically, while the scale of resources marshaled by the Allies to deploy the airborne divisions was impressive, there was much less attention devoted to the provision of subsequent tactical air support once they were on the ground. Lack of adequate support was certainly one reason for the 1st Airborne’s defeat at Arnhem.

Although the commitment of paratroops meant high costs, their potential value was too tempting to forego. The prospect of their use had influenced the German Army Group “B” commander Erwin Rommel to adapt his plan to defend Normandy by siphoning troops away from the coast and requiring diversion of both

labour and materiel for tasks such as the planting of anti-glider obstacles in likely landing areas.⁵¹ Montgomery’s plan for MARKET GARDEN might have ended the war months earlier had the Germans been as weak as the Allies believed. Ultimately, the greatest value the airborne divisions offered in Northwest Europe was probably as a strategic force in being, requiring the Germans to

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remain on guard against a *coup de main* somewhere behind the front lines. That value could only be realized if the assets were occasionally utilized. When the airborne divisions were deployed, RCAF squadrons and “Lost Legion” personnel provided transport and tactical support. That support was limited by necessity because the bulk of RCAF assets were committed to its primary roles in Bomber Command and in 2nd TAF. Still, RCAF personnel played an important part in maintaining air superiority over the airborne battlefields, and demonstrated great valour in their attempts to resupply the 1st Airborne in MARKET GARDEN.

Dr. Jody Perrun teaches history at the University of Winnipeg, the Royal Military College of Canada, and the University of Manitoba, specializing in the Second World War, the Holocaust, and post-Confederation Canada. He is the author of *The Patriotic Consensus: Unity, Morale, and the Second World War in Winnipeg* (University of Manitoba Press, 2014).

ABBREVIATIONS

2nd TAF	Second Tactical Air Force
ADGB	Air Defence of Great Britain
AEAF	Allied Expeditionary Air Force
Fw 190	Focke-Wulf Fw 190 (German)
HS RCAF	Historical Section of the Royal Canadian Air Force
LAC	Library and Archives Canada
mfm	microfilm
ORB	Operations Record Book
RAF	Royal Air Force
RASC	Royal Army Service Corps
RCAF	Royal Canadian Air Force
UTP	University of Toronto Press

NOTES

1. John Terraine, *A Time for Courage: The Royal Air Force in the European War, 1939–1945* (NY: Macmillan, 1985), 669.
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3. Shores and Thomas, *2nd Tactical Air Force Vol. 1*, 126–27; Greenhous et al., *Crucible of War*, 265, 284–92; and Hugh A. Halliday, *Typhoon and Tempest: The Canadian Story* (Toronto: CANAV Books, 1992), 49.
4. Library and Archives Canada (LAC), mfm (microfilm) reel C-12290, No. 418 Squadron Operations Record Book (ORB), June 1944.
5. LAC, mfm reel C-12272, No. 406 Squadron ORB, June 1944.
6. LAC, mfm reel 12276, No. 409 Squadron ORB, June 1944; mfm reel 12277, No. 410 Squadron ORB, June 1944.
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8. Keith Grint, *Leadership, Management and Command: Rethinking D-Day* (New York: Palgrave Macmillan, 2008), 327–28.
9. Historical Section of the RCAF (HS RCAF), *The RCAF Overseas, Vol. 2: The Fifth Year* (Toronto: Oxford University Press, 1945) 245–46.
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11. Terraine, *Time for Courage*, 630; Greenhous et al., *Crucible of War*, 881.
12. Bernd Horn and Michel Wyczynski, *Paras Versus the Reich: Canada's Paratroopers at War, 1942–1945* (Toronto: Dundurn, 2003), 134–37; Crookenden, *Dropzone Normandy*, 189; Terraine, *Time for Courage*, 630–31; and Grint, *Leadership, Management and Command*, 328.
13. Horn and Wyczynski, *Paras Versus the Reich*, 138–43; Grint, *Leadership, Management and Command*, 336; Crookenden, *Dropzone Normandy*, 172; Copp, *Fields of Fire*, 41; Terraine, *Time for Courage*, 642.
14. Ian Gooderson, *Air Power at the Battlefield: Allied Close Air Support in Europe, 1943–45* (London: Frank Cass, 1998), 94–5.
15. Horn and Wyczynski, *Paras Versus the Reich*, 140.
16. Shores and Thomas, *2nd Tactical Air Force Vol. 1*, 127; J. E. Johnson, *Wing Leader* (Toronto: Stoddart, 2000), 220–22; HS RCAF, *RCAF Overseas*, 246–47; David L. Bashow, *All the Fine Young Eagles: In the Cockpit*

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17. Greenhous et al., *Crucible of War*, 294–95.
18. Shores and Thomas, *2nd Tactical Air Force Vol. 1*, 133.
19. Greenhous et al., *Crucible of War*, 297.
20. Bashow, *Fine Young Eagles*, 276; and Shores and Thomas, *2nd Tactical Air Force Vol. 1*, 142.
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24. Christopher Shores and Chris Thomas, *2nd Tactical Air Force Vol. 2: Breakout to Bodenplatte, July 1944 to January 1945* (Hersham, UK: Classic, 2005), 291–92.
25. R. E. Urquhart with Wilfred Greatorex, *Arnhem* (London: Cassel, 1958), 6–10.
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28. Urquhart, *Arnhem*, 5.
29. Urquhart, *Arnhem*, 33.
30. Greenhous et al., *Crucible of War*, 325–26; and Shores and Thomas, *2nd Tactical Air Force Vol. 2*, 293.
31. Urquhart, *Arnhem*, 5–10, 32–42; and Ryan, *Bridge Too Far*, 216–22, 254, 281.
32. Greenhous et al., *Crucible of War*, 879–82.
33. Greenhous et al., *Crucible of War*, 880–81.
34. Ryan, *Bridge Too Far*, 423, 496; and Urquhart, *Arnhem*, 89, 127.
35. Hugh A. Halliday, “Airmen Over Arnhem: Air Force, Part 29,” *Legion Magazine* (October 2008), accessed February 21, 2019, <https://legionmagazine.com/en/2008/10/airmen-over-arnhem/>.
36. Larry Milberry and Hugh A. Halliday, *The Royal Canadian Air Force at War, 1939–1945* (Toronto: CANAV Books, 1990), 423.
37. Greenhous et al., *Crucible of War*, 883.
38. Urquhart, *Arnhem*, 89–90.
39. Halliday, “Airmen Over Arnhem.”
40. Shores and Thomas, *2nd Tactical Air Force Vol. 2*, 301.

41. Urquhart, *Arnhem*, 152.

42. Gooderson, *Air Power at the Battlefield*, 91–8; Shores and Thomas, *2nd Tactical Air Force Vol. 2*, 293; and Halliday, *Typhoon and Tempest*, 76–7.

43. Shores and Thomas, *2nd Tactical Air Force Vol. 2*, 294, 302; Christopher Shores and Chris Thomas, *2nd Tactical Air Force Vol. 3: From the Rhine to Victory, January to May 1945* (Hersham, UK: Classic, 2006), 559; Halliday, “Airmen Over Arnhem;” Urquhart, *Arnhem*, 127; Ryan, *Bridge Too Far*, 533, 542; and Greenhous et al., *Crucible of War*, 326.

44. Caddick-Adams, *Snow & Steel*, 92.

45. Terraine, *Time for Courage*, 668.

46. Vincent Orange, *Coningham: A Biography of Air Marshal Sir Arthur Coningham* (London: Methuen, 1990), 216.

47. Orange, *Coningham*, 216.

48. Terraine, *Time for Courage*, 670.

49. Grint, *Leadership, Management and Command*, 328–36; Crookenden, *Dropzone Normandy*, 284–85.

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51. Horn and Wyczynski, *Paras Versus the Reich*, 119.



Armourers loading a belt of 20 mm cannon shells in a Typhoon.

SPITFIRES, TYPHOONS & MUSTANGS: RCAF FIGHTERS IN NORMANDY

By Mike Bechthold



INTRODUCTION

“I took out our first June 6 patrol at 0625,” remembers Squadron Leader Danny Browne, commander of No. 441 Squadron. “If your preparations hadn’t been adequate at that point there was nothing you could do about it. You were either ready or you weren’t. We were ready.”¹ The Royal Canadian Air Force (RCAF) as a whole was also ready and played a major role on D-Day and throughout the Battle of Normandy.

The invasion of France in June 1944 was the culmination of years of detailed planning and preparation; success required the close cooperation of the air, ground, and sea forces. On June 6, more than 12,000 aircraft took to the air to protect the invasion fleet, provide intelligence, carry men and supplies, and bomb the enemy. The RCAF contributed 37 squadrons to this total.² This was an impressive achievement for a service that could only mobilize 4,061 men and 19 modern aircraft at the start of the war.³ The massive Allied air armada with its significant Canadian component prevented any kind of concerted response by the German Luftwaffe and made an essential contribution to the success of the ground campaign.

Discord marked the history of army–air force cooperation prior to Normandy. Power struggles and questions of employment threatened to dilute the potential of tactical air power. Success in Normandy depended on effective air support. Historian John Terraine’s appraisal that “air power was the decisive factor in the Normandy campaign” overstates its contribution, but it cannot be forgotten that two German armies were destroyed with the loss of half a million men in just 76 days of fighting.⁴ This article will provide a brief overview of the background, structure, and operations of RCAF fighter operations in Normandy before examining some of the challenges faced by the British 2nd Tactical Air Force (2nd TAF).

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BACKGROUND

Preparations for the invasion had been underway for months. The establishment of a successful bridgehead required deception about the point of the attack. Bridges, railyards, and other transportation targets from Brittany to the Scheldt were attacked. For every bomb dropped in the planned invasion area, two were dropped in the Pas de Calais where the landings were expected. It worked: the Germans knew an attack was coming, but not where. At the start of June, German Army Group B’s weekly report stated: “The continuation and systematic increase of enemy air attacks and more intensive minelaying ... [indicate] the enemy’s readiness for invasion. Concentration of air attacks on coastal defences between Dunkirk and Dieppe and on the Seine–Oise bridges confirm the proposed focal point of a large-scale landing.”⁵

The task of protecting the bridgehead and providing support to the ground forces was primarily the responsibility of 2nd TAF and the 9th Air Force of the United States (US). Second TAF was formed in 1943 to support the army by establishing and maintaining air superiority, providing air reconnaissance, and attacking enemy ground targets. It was composed of two composite groups of fighter-bombers: a night-fighter group and one of medium bombers. RCAF squadrons were assigned to 83 Composite Group and formed the majority of the group's squadrons. As the most experienced formation, 83 Group was assigned to support the 2nd British Army, which, for the Normandy invasion, included the 3rd Canadian Infantry Division and 2nd Canadian Armoured Brigade. In addition, many Canadian pilots served in Royal Air Force (RAF) fighter squadrons.⁶

Five Canadian fighter wings, each with three 18-aircraft squadrons (39 officers and 743 men per squadron), were assigned to 83 Group: 39, 126, 127, 143, and 144.⁷ Three wings flew the Supermarine Spitfire IX, which excelled as a fighter but was less effective in the ground support role. "It was fairly easy to [attack] a straight line like cutting a rail and we did an awful lot of rail interdiction," recalled Squadron Leader Browne, but we "couldn't really hit a target and anybody that tells you you can hit a tank with a bomb [while] dive bombing in a Spitfire is overstating its accuracy."⁸ Wing Commander Hugh Godefroy agreed: "It wasn't long until we discovered that this technique of dive bombing was extremely inaccurate."⁹ Using cannons to attack ground targets could be devastating, but it was a problematic tactic. Flight Lieutenant William A. Olmstead of No. 442 Squadron recalled that the Spitfire was a very unstable gun platform which made strafing a dangerous, though thrilling, task.¹⁰



Hawker Typhoon being rearmed.

The fourth RCAF wing—143—was equipped with the Hawker Typhoon 1B. The Canadians exclusively flew the aircraft as a "Bombphoon" carrying two 500- or 1000-pound (226.8 kilograms [kg] or 453.6 kg) bombs. The aircraft was robust and excelled at low-level operations.¹¹ The effectiveness of these aircraft in the ground-attack role will be explored later in this article. The final wing—39 Reconnaissance—was equipped with a Spitfire and two Mustang squadrons tasked with providing tactical reconnaissance for the army.

The Allied air campaign on June 6 and the days that followed overwhelmed the German air force. The scene in the movie *The Longest Day* where *Geschwaderkommodore* Joseph Priller and his wingman make a desultory strafing run over Sword and Juno beaches is an apt analogy for the Luftwaffe's efforts that day. American historian Richard Hallion states, "The Luftwaffe's appearance was so minuscule that Allied counter-air measures against the few German aircraft that did appear are not worth mentioning."¹² Air Marshal Sir Arthur Coningham continued to make air superiority his main mission, but as the German air threat receded, more aircraft were released for battlefield attack missions. By July and August, aircraft were flying in pairs, released from the need to fly in squadron strength for self-protection.



Rocket-firing Typhoons at the Falaise Gap, Normandy, 1944 © IWM (Art.IWM ART LD 4756).

THE MYTH

The role and effectiveness of tactical air power in Normandy continues to be strongly romanticized. Frank Wootton's painting, "Rocket-firing Typhoons at the Falaise Gap, Normandy, 1944," portrays a battlefield filled with destroyed tanks and other vehicles while their executioners fly low overhead.¹³ In popular culture, the climactic scene of Steven Spielberg's extraordinary movie, *Saving Private Ryan*, sees an American fighter-bomber making a cameo appearance. As the beleaguered survivors of Ryan's rescue party are about to be overrun, a P-51 Mustang miraculously appears. Without hesitation, the pilot attacks the German Tiger tank as it crosses the bridge within metres of Captain John H. Miller (played by Tom Hanks). A bomb is dropped and with unfailing accuracy the tank is destroyed with no collateral damage. In one short scene, Spielberg captures the public's perception of close air support. Questions of target acquisition, air-ground liaison, bomb lines, weapons accuracy, and a myriad of other details need not be considered. Tactical air support, however, was exceedingly complex. Armies and air forces have struggled with these issues since the dawn of the age of flight. From Arras in 1917 to Cyrenaica in 1941, the complexities of using aircraft to support the army continued to be refined.¹⁴ By Normandy in the summer of 1944, many of the control issues had been solved, but tension remained between the two services. An examination of the entire Normandy campaign is beyond the scope of this paper, but two examples—Operation TOTALIZE / Worthington Force and the fighting at the French village of Mortain—will help us understand the issues facing the RCAF and tactical air forces in the summer of 1944.

THE REALITY: WORTHINGTON FORCE

The case of Worthington Force, a Canadian armoured battlegroup that became lost in the middle of a Normandy battle, is not generally considered from an air power perspective, but such an examination can reveal much about the abilities and limitations of RCAF/RAF tactical air support during the Normandy campaign. In the early morning hours of August 9, 1944, during the second phase of Operation TOTALIZE, a battlegroup under of the command of Lieutenant-Colonel Donald Worthington (British Columbia Regiment [BCRs] and the Algonquin Regiment [Alg. R.]) set out in the dark to capture Point 195 north of Falaise. When daylight broke, Worthington confidently reported to 4th Canadian Armoured Brigade headquarters (HQ) that he was on the objective and requested immediate support to defeat the determined German attempts to dislodge him. Tragically, the battlegroup had lost its way in the dark and ended up on a piece of high ground near Hill 140, some six and half kilometres (km) east of its intended destination. Worthington did not realize his mistake until after he lost communications. By the end of the day, his battlegroup had been destroyed at the cost of 240 casualties (85 killed, 121 wounded, and 34 captured), along with the loss of 47 tanks and numerous other armoured vehicles and half-tracks.¹⁵

It is interesting to ponder the fate of Worthington Force if it had had the benefit of armoured column cover (ACC), as did US tank units since, “it [Worthington Force] would have had no difficulty identifying its location or relaying information to the divisional commander.”¹⁶ The battlegroup would still have lost its way during the night advance, but come morning, it would have established communications with the aircraft overhead and been provided with the necessary support during the course of the day’s operations. The basic idea of ACC involved a Sherman tank which mounted a very high frequency (VHF) radio and an air force air support party officer. This tank would be positioned near the head of an armoured column and would control a flight of four or more fighter-bombers tasked to its support. The aircraft could be used in either a reconnaissance or attack capacity. It was the latter role which was so remarkable. Target control, so long coveted and jealously controlled by the air force, had been delegated to a relatively junior army commander. Any resistance that blocked the path of the armoured column could be assigned to the orbiting aircraft. These targets would then be attacked immediately. If the target was larger than the flight could handle, or if the aircraft expended their bombs, ammunition, or fuel, additional aircraft could quickly be summoned. Successive flights of aircraft would provide cover during daylight hours for the column. Each flight would remain on station for 30 to 90 minutes. It would then be replaced by another flight. If no requests came from the armoured column, the ACC flight was released to seek out targets of opportunity.¹⁷

ACC was relatively new to the US system, having been introduced just after the launch of Operation COBRA on July 26, 1945. This level of decentralization marked a significant change



Canadian troops searching German prisoners during the early stages of Operation TOTALIZE.

from an air force system that, prior to Normandy, fought hard to institute and maintain a centralized organization free of undue interference from the army.¹⁸ The British army and RAF were moving towards decentralization with the use of visual control posts (VCPs) and “cab ranks,”¹⁹ but these were much more limited options in use and in effectiveness than ACC. Hypothetical as it was, ACC might have saved Worthington Force, but it was not an option for Canadian and British operations in the summer of 1944.²⁰

Air power did play an important secondary role in the battle. Though Worthington Force was not in contact with higher headquarters and was not directly supported by a contact car and its air force controller, the battlegroup was protected by air strikes during the day. Two rocket-firing Typhoons appeared over the battlegroup soon after the break of dawn on August 9. The RAF pilots were likely on an armed reconnaissance mission with orders to attack enemy targets found beyond the designated bomb line. They discovered their dream target: a large

concentration of stationary tanks and vehicles in enemy territory. Aerial reconnaissance photos taken during the battle show the rectangular field where Worthington Force made its stand. The position, on the crest of a small rise, dominated the surrounding ground as the wheat fields fell away to lower ground. Squat bushes and straggling trees offered some concealment at ground level for the battlegroup, but there was no overhead protection or cover. That was no concern to Worthington and his men. The Luftwaffe had not been a factor in the campaign, so Allied troops paid little attention to hiding themselves from the air.²¹ When the RAF arrived, Major Lyle Monk, an Algonquin company commander, remembered that the “Typhoons circled overhead, then let fly at us with their rockets and machine guns. We quickly got out our recognition signals and burned yellow smoke. The planes rocked their wings in acknowledgement.” Aerial reconnaissance photos taken later in the day show the air recognition panels which were deployed to alert Allied aircraft. Monk recalls no casualties from the mistaken attack and reported that the Typhoons “returned at half-hour intervals all day long, rocketing and strafing the enemy around us. They were heartily cheered many times during the day.”²² Lieutenant Ken Gartley, of the Alg. R., also praised the air support. He said that the Typhoons gave good support and helped to silence the German guns. He observed that the battlegroup suffered heavy casualties from German mortar and artillery fire, which increased in intensity when the aircraft were not overhead.²³

It is evident that the RAF pilots reported on the location of the Canadian position as flights later that day continued to provide essential support to the hard-pressed battlegroup. By mid-afternoon, casualties were mounting as the Germans fed more troops and tanks into the battle to destroy the isolated Canadian outpost. Numerous German attacks were defeated, often with the help of the RAF. About 1400 hours, the Germans could be seen forming up to attack from the east and south and the Germans systematically shelled the Canadian position in advance of the attack. Just in time, Monk related, “the Typhoons arrived back and strafed the enemy who were caught in the open and suffered heavily. Between the Typhoons, the fire from our one remaining tank, and our Brens [submachine guns], no enemy got within 600 yards [548.7 metres (m)].”²⁴

A remarkable report issued by First Canadian Army on August 20, 1944, listed 52 distinct cases of friendly fire between August 16 and 18.

However, there were mistakes. With no forward air controller to brief newly arrived pilots, there were further incidents of friendly fire. Soon after the German attack described by Monk was defeated, Lieutenant Robert Saville described the “happy situation when Typhoons could be seen approaching, which turned to disgust when they attacked us.”²⁵ Lieutenant A. E. Biddlecombe provided another view of this attack:

About 3 p.m. three groups of five rocket-firing Typhoons arrived on the scene. They circled and then formed into a line ahead and dived at us, each plane firing two rockets on each pass. We tossed out orange smoke markers and pulled the orange blinds over the back decks. This had no effect, so I then made a large white star on the ground with a can of chloride-of-lime I got out of Sgt. Glendenning’s tank. This also had no effect as they continued with their attack until out of rockets. This attack, like that of the Germans, came in from the East side. It was aggravating, and must have been an amusing show for the watching Germans. The only tank I saw hit from this attack was an RHQ [Regimental Headquarters] tank that had already been knocked out earlier in the day. I wonder what score they reported when they got back.²⁶

Kurt Meyer, the commander of 12th SS *Hitlerjugend* Panzer Division, ordered the attacks to destroy Worthington Force. When aircraft appeared over the battlefield, he initially feared they would dive on his exposed tanks, but, he recalled,

the aircraft attacked the Canadian battle group. Not a single aircraft attacked a Tiger or Panther. The hill was covered in the smoke of exploding tanks in a few moments. Tigers and Panthers took advantage of the chaos and took possession of the ridge. The ridgeline looked like a tank cemetery.”²⁷

He goes on to describe how the air attacks drove a group of Canadians to abandon the ridge in the afternoon and surrender to the Germans. This account is problematic for several reasons,²⁸ but it confirms some of the difficulties encountered in providing air support for the battlegroup.



12th SS Panzer Division
Hitlerjugend insignia.

Target identification continued to plague the tactical air forces during the Normandy campaign and after. When discussing friendly fire casualties caused by air attack, most accounts deal with large incidents such as Operations COBRA, TOTALIZE, and TRACTABLE, in which short bombings by strategic bombers, both RAF and United States Army Air Forces (USAAF), caused hundreds of fatalities among Allied troops. The tactical air forces also attacked friendly troops with shocking regularity; the casualty numbers were small in isolation but prodigious in aggregate.

A remarkable report issued by First Canadian Army on August 20, 1944, listed 52 distinct cases of friendly fire between August 16 and 18. Attacks against Canadian, Polish, and British troops were carried out by RAF Spitfires, Mustangs, and Typhoons, as well as American Lightnings, resulting in 77 men dead, 286 wounded, and 63 vehicles damaged and destroyed. Incomplete reports indicated an additional 72 men were wounded in 1 British Corps,

while no casualty reports were available from 3rd Canadian Infantry Division. The levels of death and destruction are not very much different from the horrendous friendly fire casualties caused by the heavy bombings in Operations COBRA and TRACTABLE.²⁹ The report insisted, in the strongest possible terms, that more must be done to prevent such friendly fire incidents lest tactical air operations act to curtail future activities rather than support them.³⁰

Another major issue for Worthington Force was communications, which remained effectively lost for the duration of the battle. After reporting incorrectly to 4th Canadian Armoured Brigade HQ that it had arrived at Point 195, the last communication was received from the battlegroup at 0755 hours reiterating their assumed position. An increasingly nervous HQ staff tried repeatedly throughout the day to find Worthington Force. Both the Manitoba Dragoons and the Governor General's Foot Guard were ordered to search in the area of Point 195 for the missing battlegroup, and Brigadier J. N. Lane, the 4th Canadian Armoured Division artillery commander, set off in his personal aircraft to search for the missing men. Being lost meant the battlegroup did not receive any reinforcements, supplies, and perhaps most importantly, no artillery support during the course of the day.



Lieutenant-Colonel Donald Worthington.

It did, however, receive regular air support. The battlegroup deployed without an organic “tentacle” or contact car, which was not unusual in the Anglo-Canadian army in Normandy. At higher levels, brigade and above, there were close links between the Canadians and the RAF during Operation TOTALIZE. The fighter-bomber groups of 2nd TAF (Nos. 83 and 84) flew 1,002 sorties on August 9, and the headquarters of 4th Canadian Armoured Brigade reported that the “rocket-firing Typhoons provided great assistance to our forward troops. They were controlled from the ground by an RAF officer attached to our HQ.”³¹ However, the relationship between the army and the RAF on August 9 raises more questions than it answers. How was it possible that the RAF pilots who discovered the battlegroup, and those that returned to support it during the course of the day, did not report its location? Why was the presence of a substantial and unexpected Allied formation found beyond the bomb line not reported? And if the pilots did report, why did this information not find its way to 4th Armoured Brigade HQ?

During the battle, a VCP mounted in a Sherman tank was located forward with Booth's HQ. The Air Support Targets log on August 9 shows the targets it engaged. At 1618 hours, an attack was requested by the Poles on four or five tanks slightly west of Soignolles. It appears the attack was carried out, but the log notes no results observed. A few minutes later, the Poles requested a second attack on a concentration of tanks near Quesnay. The results were recorded as “very successful.” Several missions were refused earlier in the day, including one at noon, which would have taken aircraft directly over Worthington Force, and another at 1500 hours against tanks and self-propelled guns 2 km west of the actual Worthington Force location. It is unknown why these missions were cancelled. A handwritten note at the bottom of the log notes, “The VCP was on the ASSU

[Army Support Signals Unit] net today and intercepting all messages: VCP engaged all targets they could engage. Army and Corps HQ were not kept completely in the picture.”³² The operations record book of 84 Group concurred, recording on August 9 that “again it cannot be said that close support operations played a decisive part in what small achievement the ground forces made.”³³

There was a disconnect between the RAF and army channels of communications which was not overcome by the VCP attached to 4th Canadian Armoured Brigade HQ. The war diary for the “G” Air Branch of First Canadian Army recorded the next day:

Weather good. Flying continued at a great rate. TOTALIZE moving and troops can use as much air support as they can get. VCP from 484 ACC now operating on 4th Cdn Armd Bde [Canadian Armoured Brigade] met with fair success. We are much more in the picture.³⁴

This was a tacit admission of the problems of the previous day.

The Normandy microcosm of August 9 shows the strengths and weaknesses of the RAF air-support system. It was a flexible system that could respond quickly to a changing tactical situation. Tactical aircraft could intervene and provide timely and effective support to the ground forces, even though limited liaison was possible in the absence of direct VHF radio communications. However, tactical aircraft could also repeatedly attack friendly troops, even after the friendly troops’ location was marked with air recognition panels. This might have been less a problem had previous RAF missions not



P-51 Mustang.

failed to share information regarding the whereabouts of the friendly troops. The biggest failure, then, was the inability of the army and the air force to communicate. A query from the army might have prompted the RAF to report the location of the missing battlegroup, while the RAF should have shared the discovery of a friendly unit found in an unexpected location. Neither occurred, demonstrating the need for improved coordination between the two services.

OPERATIONAL RESEARCH AND MORTAIN

Operational research (OR) was defined by one of its first practitioners, Robert Watson-Watt, as “an investigation carried out, by scientific method, on actual operations, recent or impending, at the request of those responsible for the initiation or conduct of those operations, and explicitly directed to the better, more effective and more economical conduct of similar operations in the future.”³⁵ The RAF embraced OR based on its success early in the war, and sections were established

in most RAF commands. The army was also interested in the potential of OR and established sections to examine a variety of questions related to artillery, armour, and other infantry weapons. Montgomery's 21st Army Group went to Normandy with its own integral OR section.³⁶

Battlefield targets such as tanks and artillery were high-priority air force targets. The RAF, however, insisted that attacks on lines of communications were a better use of air resources. This difference stemmed from the air force understanding that battlefield targets were the most difficult to find, the most difficult to hit, and the most dangerous to attack. Air-delivered weapons such as bombs and rockets were imprecise. The Ground Attack Section of the Operational Research Section / Allied Expeditionary Air Force (ORS/AEAF) defined the problem in May 1944:

A 50 percent zone of 400 yards [365.8 m] is not too unsuitable for area targets, but hopeless for the small targets that are so vital in army support work. Many hundreds of sorties would be necessary to make sure of hitting a bridge when the scatter is so large. Instead, something like 100 yards [91 m] is needed to keep the sorties down to a reasonable number. Even then there must not be too few if it is an important target. This accuracy is obtainable by good pilots, both in dive bombing and in level bombing with the right sight, but it needs more practice than we have had.³⁷

In 1943, the RAF conducted trials in attacking battlefield targets. In one test, a mock German artillery division—48 guns, 538 men, and supporting equipment—was marginally damaged when attacked by fighter aircraft. A similar test was conducted against a single, 4-gun troop of medium artillery. Despite being given a precise 6-figure map reference, the attacking pilots were unable to locate the camouflaged position.³⁸

OR studies prior to the Normandy invasion indicated that the RAF would have a tough time effectively hitting the targets requested by the army. In April 1944, sorties were flown against various viaducts, bridges, and gun emplacements in France for the primary purpose of determining the accuracy of fighter-bomber and rocket projectile (RP) attacks. Photo-reconnaissance aircraft were specially detailed to capture a complete record of the attacks. Results of the individual strikes varied. Attacks on the Mirville Viaduct resulted in one or two bomb hits out of 82 dropped and 15 RP hits out of 247 aimed. Similar attacks on two small bridges at Baupre resulted in no hits for the expenditure of 147 bombs and 128 RPs. The radius of the 50 percent zone around the Mirville Viaduct was calculated to be 75 yards (68.5 m) for RP and 300 yards (274 m) for dive bombing. The report suggested the 50 percent zones should be reduced by half. This would effectively double the strength of the attacking force as the destruction of a target would require half the missions to achieve the same results. Training was the most important single factor in the accuracy of pilots:

In order to hit a small target with RP, the pilot must be at the right height and dive angle, have the correct speed, have his sight on the target and the right angular depression on his sight, make the correct wind allowances and be free from skid or "g", but in addition he must pull out the right amount for the right time ... No athlete thinks that running only at sports meetings is sufficient, but puts in a lot of practice in between them. In other words, operations alone are not enough, but must be backed at intervals by practice.

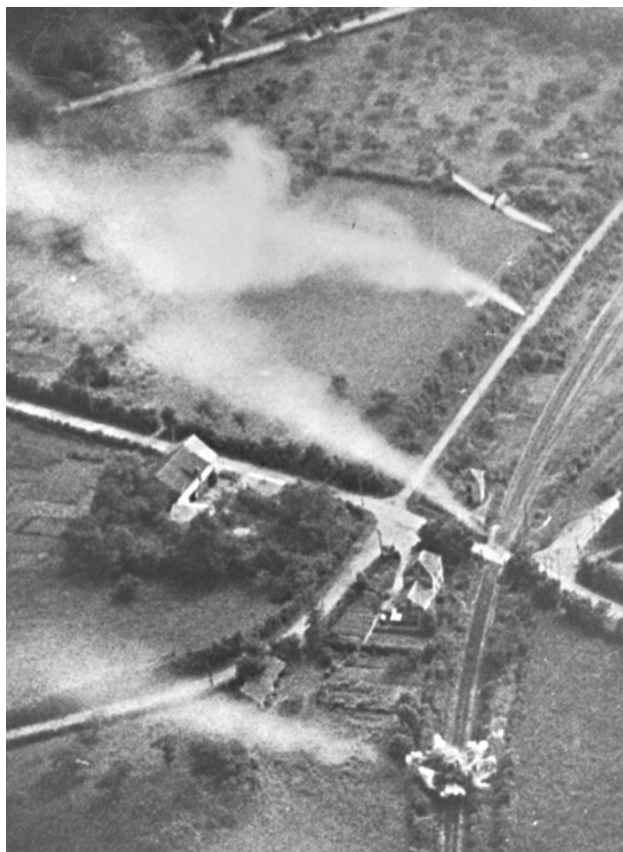
The report also suggested that accuracy could be improved by increasing the zeal of the pilots and by pressing the attack to a closer range (but at the cost of higher casualties).³⁹



Armourers loading RP-3 rockets onto a Hawker Typhoon.

Our best understanding of the effectiveness of aircraft in close support operations comes from a series of reports based on the Normandy experience. The first report, *Tactical Employment of Rocket Projectiles*, demonstrated that even though tanks were at the top of the list of suitable RP targets, and that a single rocket was sufficient to destroy any German tank, not many tanks were actually destroyed by RPs.⁴⁰ A second report, *Analysis of German Tank Casualties in France*, compiled by No. 2 ORS, 21 Army Group, showed that the dominant cause behind the destruction of German tanks was armour-piercing shot (from tank and anti-tank guns). However, the number of armoured fighting vehicles destroyed by air weapons, principally the RP, was “not inconsiderable.”⁴¹ The third report, *The Rocket-Firing Typhoon in Close Support of Military Operations*, was jointly written by No. 2 ORS, 21 Army Group and ORS 2nd TAF. It found that the RP was more accurate than bombs, but significantly less accurate than cannons or machine guns. Based on operational results and experience gained at firing ranges, it found that the mean displacement of RP rounds was 46 yards (42 m), though the best pilots in a squadron could consistently put their shots within 20 yards (18 m) of the target. The report provided a “practical guide to the effort required to obtain direct hits on typical targets.” The number of rockets increased significantly as the target decreased in size. A barn (120 feet [36.5 m] by 54 feet [16.5 m] by 50 feet [15 m]) would require seven RPs for a 50 percent chance of a hit; a large gun position (10 yards [9 m] in diameter) would require 88 RPs or the equivalent of 11 aircraft sorties. A total of 140 rockets (or 18 sorties) would be needed for a 50 percent chance of a hit on a Panther tank, while that number would more than double (350 RPs / 44 sorties) to hit a small gun position that was 5 yards (4.5 m) in diameter. These figures clearly demonstrate the difficulty faced by the air force when attacking targets most desired by the army. As the report stated in its conclusion, “the greatest effect of attacks by rocket firing Typhoons in close support is morale, both on the enemy and our own troops.”⁴²

The evidence presented by the ORS showed that Allied fighter aircraft were not effective at hitting the types of targets most desired by the army. The RAF recognized this fact before D-Day. Guns in open pits, railway tracks, radar stations, and trains were recommended as the best targets for RP Typhoons. Tanks were “not a profitable target and should normally be looked after by the army. In an emergency, an enemy formation could be seriously crippled by using a large number of sorties.”⁴³ This report would prove to be prophetic. An examination of tactical air power on a day-to-day basis in Normandy shows that close air support did not have much to offer the army. The air forces were much more effective at interdiction and other tasks away from the battlefield, such as air superiority and photo reconnaissance. Terry Copp argues that the air forces “waged a separate war against the enemy’s air force, lines of communication, and targets of opportunity ... and were overwhelmingly successful at winning the campaign they chose to fight, but it was not the same battle the army was waging.”⁴⁴ Targets on the battlefield, such as tanks and guns, were too scattered and difficult to find and hit. Also, the cost in pilots and aircraft for these types of missions was prohibitively high. However, on rare occasions, tactical air power played a crucial, if not decisive, role on the battlefield. The best-known example was the “Day of the Typhoon,” the failed German counteroffensive at Mortain on August 7, 1944.



Smoke trails mark the tracks of rockets speeding towards the target during an attack by Royal Air Force Typhoons on German communications behind the Western Front.

Operation *Lüttich* was a counterattack ordered by Hitler aimed at capturing Avranches and cutting off the units of General George S. Patton’s Third US Army, which was advancing rapidly across Brittany. The 47th Panzer Corps was formed to accomplish this and four panzer divisions (2nd, 1st SS (*Schutzstaffel*), 2nd SS, and 116th) were collected from other areas of the German front in Normandy. The attack was to be supported by 300 Luftwaffe aircraft. The offensive began on the night of August 6/7 when darkness and ground fog allowed the Germans to make good progress. Their advance was checked near the town of Mortain by the heroic stand of the US 30th Infantry Division. When the weather cleared around 1300 hours on August 7, Allied aircraft, alerted by Ultra intercepts, found the German armoured columns closely packed and in the open. This, combined with negligible anti-aircraft fire, allowed the Typhoons of 2nd TAF and Thunderbolts of the 9th Air Force to press their attacks to very close range. The RAF concentrated on destroying the enemy armour while the 9th Air Force interdicted supply and prevented the Luftwaffe from interfering. By the end of the day, the German counteroffensive had been blunted by the combination of American ground action and the intervention of Allied air power.⁴⁵

The ability of the RAF to concentrate their striking power on the German offensive was impressive. The RP Typhoons of 121 and 124 Wings alone flew 305 sorties. Flight Lieutenant Derek Stevenson of 245 Squadron recalled his experiences at Mortain along with two RCAF squadron mates:

It was like a scene from Dante's Inferno—the whole area was filled with tanks and what was probably the trucks of their supply echelon—soft skinned vehicles which stood no chance against our cannon ... There seemed to be burning tanks and trucks everywhere. I followed Doug's section [Flight Lieutenant D. L. Gross, RCAF] down against what looked like five tanks and three trucks trapped in a narrow lane and unable to move, completely forgetting about the flak in the excitement of getting a tank in my sight.

I fired off a pair of rockets at it and opened up with my cannon. Twice more we dived down to attack ... I actually flew through the debris of a tank that had blown up, fortunately without damaging my aircraft. I had been lucky once again but the same could not be said for Flight Lieutenant Lou Parker, RCAF ... His aircraft was hit by flak.⁴⁶

Victory in Normandy was not based on the decisive influence of tactical air. Rather, the air forces made a significant contribution as part of the team that comprehensively defeated the German army.

Parker's Typhoon crashed but he survived by parachuting from his aircraft and evading German forces upon landing. After a few days on the run, he met up with US troops and returned to flying operations.⁴⁷

The Canadian Typhoon wing was also present, attacking targets east of Vire. No. 440 Squadron reported that "in the morning an extremely heavy fog covered the district and it was almost like a very fine rain." Flight operations commenced after the sun burned off the fog. No. 439 Squadron attacked a

group of 12 stationary tanks 3 km north of Mortain as well as over 30 tanks and other vehicles nearby. All three Canadian squadrons considered their bombing to be accurate, but no results were observed due to ground mist and intense anti-aircraft fire.⁴⁸

The role and importance of air power at Mortain is somewhat contentious. The RAF was credited by many as being the single most important factor in stopping the German offensive. Air Vice-Marshal Arthur Coningham, the commander of 2nd TAF, stated after the war, "This was to date one of the best demonstrations of the tactical use of air power which had been given in this war. It proved that a tactical air force may be a decisive battle-winning factor."⁴⁹ The results claimed by the RAF Typhoon pilots support this assertion. The total included 89 tanks destroyed, 56 tracked vehicles probably destroyed, 151 motor vehicles smoking or on fire as well as 56 tanks and 81 motor vehicles damaged.⁵⁰

ORS 2 TAF and No. 2 ORS conducted independent investigations of the site. The main focus of these reports was to verify the pilots' claims. The studies looked at the entire battle area. All vehicles found were catalogued and examined to determine the cause of destruction. The results were quite different from those given by the pilots. They attributed the destruction of only 21 to 26 armoured fighting vehicles (AFVs) directly to air strikes. It is clear that the pilots inflated their claims. There was also a significant cost for the air effort. Aircraft and pilot losses were relatively light (5 Typhoons shot down, 1 pilot killed, and 1 seriously wounded), but the material cost must also be considered. It required approximately 22 tons (22,000 kg) of supplies (fuel, oil, and ammunition) for one squadron to fly 24 sorties in a day. By extrapolation, the RP Typhoon effort alone consumed nearly 260 tons (260,000 kg) of supply, not an inconsiderable amount when all materials must be transported across the sea.⁵¹

The German attack foundered against the bastion of the 30th Division and their supporting artillery. Air power played an important supporting role neatly summed up in the introduction to the report on the work of No. 2 ORS in Northwest Europe: "The truth of the matter is that rockets knocked out a number of tanks, caused a great confusion amongst the enemy and, without any doubt, speeded the collapse of the counterattack."⁵² This is a fair assessment.

Air power at Mortain caused significant damage and destruction to the German forces engaged. While some air power advocates would like to consider these battles typical, they were not. Special circumstances, including an abnormal concentration of enemy forces, conspired to present an ideal target for tactical air attacks. In these rare circumstances, air power was able to accomplish the mission envisioned for it by the army. But this was not business as usual. This was the emergency situation envisioned by RAF planners before D-Day.



Supermarine Spitfire Mk IXb, 611 Squadron.

CONCLUSION

Victory in Normandy was not based on the decisive influence of tactical air. Rather, the air forces made a significant contribution as part of the team that comprehensively defeated the German army. Cooperation between the army and the air force had come a long way since the start of the war. Perhaps for the first time, the two services were beginning to understand each other and adapt their requests and missions to take advantage of what could be offered, rather than what was expected. OR demonstrated that fighter aircraft were not the best weapon to destroy German tanks and other battlefield targets. However, in an emergency, the tactical air forces could surge and make an appreciable difference on the battlefield. This type of effort was not sustainable, but it could be effective in the short term as events at Mortain showed. Coordination between the two services had improved significantly. The American development of ACC and the British use of VCPs showed what was possible when close communications were established and when the air force had an abundance of resources so that they could “penny-packet” small groups of aircraft to individual army formations.

The provision of tactical air support was a work in progress during the Second World War. Hollywood makes the timely destruction of German tanks seem simple, but it was a complex, expensive and difficult task. The British and Americans struggled throughout the war to improve air operations in support of the army. By the time of Normandy, they had created an effective, but not perfect, system. Great advances had been made in aircraft, technology, tactics and perhaps most importantly, personal relations, which could make or break the provision of effective and timely support.

As the Allied armies reached the Seine River and the Normandy campaign evolved into a breakout operation, the Canadian fighter squadrons found themselves somewhat sidelined as their aircraft, especially the short-range Spitfires, lacked the range to participate in the pursuit. Evaluating their effectiveness in Normandy is a difficult proposition. The nine Spitfire squadrons combined to claim 239 enemy aircraft destroyed. This number is almost certainly too high and relates to only one aspect of their contribution. Casualties were high. Amongst the RCAF squadrons in 83 Group, 95 pilots were killed or captured during operations. The losses were roughly equal across the different aircraft types, though slightly higher in the Typhoon squadrons and lower for the reconnaissance squadrons.⁵³ In distinguishing the Canadian contribution in Normandy, perhaps we should give Wing Commander Hugh Godefroy the last word:

I was told by one experienced Canadian fighter pilot that German fighter pilots felt less secure when they knew they were up against fighter pilots from former British colonies. The British, like the Germans, tended to do the same thing in an orderly manner. But the “Colonial” pilots could never be depended on to do the same thing twice.⁵⁴

Mike Bechthold holds a PhD in History from the University of New South Wales, Canberra, Australia, and an MA and Honours BA from Wilfrid Laurier University, Waterloo, Ontario. For 22 years, Mike worked as the Communications Director of the Laurier Centre for Military Strategic and Disarmament Studies and as Managing Editor of *Canadian Military History*, an academic quarterly journal. He is the author or editor numerous books and articles. He specializes in the fields of military air power (especially tactical air operations in the First and Second World Wars), the Canadian Army in Normandy and Northwest Europe, and the Canadian Corps in the Great War. He is currently the Executive Director of the Juno Beach Centre Association and also teaches history part time at Wilfrid Laurier University. He previously worked at WLU Press as the production coordinator and acquisitions editor in military history.

ABBREVIATIONS

2nd TAF	British Second Tactical Air Force
ACC	armoured column cover
AEAF	Allied Expeditionary Air Force
AFHRA	Air Force Historical Research Agency (United States)
Alg. R.	Algonquin Regiment
BCR	British Columbia Regiment
Coy	Company
HQ	headquarters
kg	kilogram
km	kilometre
LAC	Library and Archives Canada
Lt	lieutenant
m	metre
OC	officer commanding
OR	operational research
ORS	Operational Research Section
R	Regiment
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
RG	Record Group
RP	rocket projectiles
TNA	The National Archives (United Kingdom)
VCP	visual control post
VHF	very high frequency

NOTES

1. Jean E. Portugal, ed., *We Were There*, vol. 7: *The RCAF and Others – A Record for Canada* (Toronto: The Royal Canadian Military Institute, 1998), 3,312.

2. These squadrons belonged to 83 Group (15) and 85 Group (2) of 2nd TAF. In addition, there were 3 Canadian squadrons in Air Defence of Great Britain, 14 Canadian squadrons in Bomber Command, and 3 Canadian squadrons in Coastal Command, for a grand total of 37 Canadian squadrons supporting the D-Day landings. Canada, RCAF, “Operation Overlord: D-Day Remembered,” news article, June 6, 2018, accessed January 9, 2019, <<http://www.rcaf-arc.forces.gc.ca/en/article-template-standard.page?doc=operation-overlord-d-day-remembered/hw38cgbh>>.

3. Brereton Greenhous, Stephen J. Harris, William C. Johnston, *The Crucible of War, 1939–1945*, vol. 3, *The Official History of the Royal Canadian Air Force* (Toronto: The University of Toronto Press, 1994), ch. 1; and William March, “Royal Canadian Air Force,” *The Canadian Encyclopedia*, last modified March 30, 2015, accessed January 9, 2019, <https://www.thecanadianencyclopedia.ca/en/article/royal-canadian-air-force>.

4. John Terraine, *The Right of the Line: The Royal Air Force in the European War, 1939–1945* (London: Hodder and Stoughton, 1985), 284; and Terry Copp, *Fields of Fire: The Canadians in Normandy* (Toronto: University of Toronto Press, 2003), 255.

5. James A. Wood, ed., *Army of the West: The Weekly Reports of German Army Group B from Normandy to the West Wall* (Mechanicsburg, PA: Stackpole Books, 2007), 34.

6. First Canadian Army was originally paired with the Canadian 83 Group to spearhead the invasion. In January 1944, Second British Army was selected to lead the attack but the RCAF role did not change as “83 Group has been developed as the initial striking force.” Greenhous et al, *Crucible of War*, 271–72.

7. Greenhous et al, *Crucible of War*, 278–79, 300.

8. Portugal, *We Were There*, 3,313.

9. Hugh Constant Godefroy, *Lucky Thirteen* (London: Canada’s Wings, Inc., 1983), 237.

10. Bill Olmsted, *Blue Skies: The Autobiography of a Canadian Spitfire Pilot in World War II* (Toronto: Stoddart, 1987), 179.

11. The Typhoon was famously armed in Normandy with RPs. The difficulty training pilots in both RP and bombing techniques as well as the five- to six-hour changeover time from one armament to the other meant that squadrons used the Typhoon exclusively in the rocket or bomber role. Greenhous et al, *Crucible of War*, 278.

12. Richard P. Hallion, *D-Day 1944: Air Power Over the Normandy Beaches and Beyond* (Washington, DC: Air Force History and Heritage Program, 1994), 8.

13. Frank Wootton, “Rocket-firing Typhoons at the Falaise Gap, Normandy, 1944,” Imperial War Museum ART LD 4756, accessed January 9, 2019, <<https://www.iwm.org.uk/collections/item/object/38698>>.

14. For an overview of Arras and Cyrenaica, see Mike Bechthold, “Bloody April Revisited: The Royal Flying Corps at the Battle of Arras, 1917,” *British Journal of Military History* 4, no. 2 (2018), 50–69, accessed January 9, 2019, <<http://bjmh.org.uk/index.php/bjmh/article/view/212>>; and Mike Bechthold, *Flying to Victory: Raymond Collishaw and the Western Desert Campaign, 1940–1941* (Norman, OK: University of Oklahoma Press, 2017).

15. For a full account of the Worthington Force story, see Mike Bechthold, "Lost in Normandy: The Odyssey of Worthington Force, 9 August 1944," *Canadian Military History* 19, no. 2 (Spring 2010): 5–24.

16. Copp, *Fields of Fire*, 208–9.

17. Colonel E. L. Johnson, "Air Support Report," 6 August 1944, contained in Air-Ground Joint Operations, Headquarters First U.S. Army G-3 Air Section and Headquarters IX Tactical Air Command, n.d., 10–11; US Air Force Historical Research Agency (AFHRA) microfilm reel B5724; "Unit History, IX Fighter Command and IX Tactical Air Command Covering Period 1 July 1944 to 31 July 1944," 5; and Major Brody, "Air Support of Ground Force Operations," Immediate Report No. 30 (Combat Observations), Headquarters Twelfth Army Group, 25 August 1944, AFHRA reel B5059.

18. For a full discussion of the North African Campaign and its role as the genesis of Allied tactical air-support doctrine, see B. Michael Bechthold, "A Question of Success: Tactical Air Doctrine and Practice in North Africa, 1942–43," *Journal of Military History* 68, no. 3 (July 2004): 821–51.

19. A "cab rank" was an orbiting point close to the forward edge of battle where close support aircraft would loiter until called upon.

20. For details on the use of "cab rank" in Northwest Europe, see Ian Gooderson, *Air Power at the Battlefront: Allied Close Air Support in Europe 1943–45* (London: Frank Cass, 1998), 87–94; and Paul Johnston, "Tactical Air Power Controversies in Normandy: A Question of Doctrine," *Canadian Military History* 9, no. 2 (Spring 2000): 59–71.

21. From the air, the Sherman tanks of the BCRs and half-tracks of the Algonquins were clearly visible around the perimeter as were the shell scrapes, freshly dug by the infantry. Numerous aerial reconnaissance photos taken by the RAF on the day of the battle are found in the Laurier Centre for Military Strategic and Disarmament Studies (LCMSDS) Air Photo Collection. A selection of these were published in Bechthold, "Lost in Normandy."

22. Major L. C. Monk, "An Account of the Battle Participation of the Algonquin Regiment between August 6 and August 11, 1944 (Monk report)," appendix in the war diary of the Algonquin Regiment, August 1944, 6.

23. "The Algonquins' First Battle Inoculation" by Lt [Lieutenant] Ken Gartley, O.C. [officer commanding] 11 Pl. [platoon], "B" Coy [company], Alg. R., appendix in the war diary of the Alg. R., August 1944, 2.

24. Monk, "An Account," 6.

25. "Outline of Events ("C" Coy) Algonquin Regiment, Aug. 8, 9, 10, 1944, by Lt Robert Saville, O.C. 15 Pl, "C" Coy, Alg. R., n.d., appendix in the war diary of the Algonquin Regiment, August 1944.

26. Lieutenant A. E. Biddlecombe, "The British Columbia Regiment in Operation 'Totalize,'" n.d. British Columbia Regiment Archives, Vancouver, BC.

27. Kurt Meyer, *Grenadiers: The Story of Waffen SS General Kurt "Panzer" Meyer* (Mechanicsburg, PA: Stackpole Books, 2005 [1957]), 286. Ironically, on the next page, Meyer explains that all 47 of the destroyed Canadian tanks had fallen to the guns of his panzers.

28. The after-action reports written by the survivors of the battle clearly indicate that the position was taken only late in the day after all the remaining tanks and survivors who were able to had evacuated to the north. Also, it is highly unlikely that any Canadian soldiers would willingly surrender to the 12th SS given the murderous history with respect to the Canadians of that division. See Copp, *Fields of Fire*, 66–67, 71.

29. Operation COBRA: 136 men killed and 621 wounded; Operation TRACTABLE: 150 men killed and 241 wounded. See Arthur T. Harris, "Report on the Bombing of Our Own Troops during Operation 'Tractable': 14 August 1944," *Canadian Military History* 15, nos. 3 & 4 (Summer-Autumn 2006), 101–12.

30. An RAF staff officer at 84 Group headquarters compiled the report in large measure to demonstrate that the attacks on Canadian troops were not carried out by 84 Group aircraft, which were assigned to support First Canadian Army. The attacks were bad, but it would be worse if they had been carried out by the very aircraft specifically tasked to support the Canadians. "Attacks on Own Tps [troops]," 20 August 1944, Appendix D, War Diary, General Staff, First Canadian Army, August 1944, Library and Archives Canada (LAC) (Record Group) RG 24, C17, vol. 13,624 (found on microfilm reel T-6684, in War Diaries collection at heritage.canadiana.ca. For a slightly different perspective, see The National Archives (United Kingdom) (TNA) WO 205/232 report in *Air Power at the Battlefield: Allied Close Air Support in Europe 1943–45*, Ian Gooderson (London: Frank Cass, 1998), 33.

31. War Diary, HQ 4th Canadian Armoured Brigade, August 1944.

32. Log, Air Support Targets, 9 August 1944. Kindly shared by John Rickard.

33. Operations Record Book, 84 Group RAF, August 1944, TNA AIR 25/709. Kindly shared by John Rickard.

34. War Diary, G Air Branch, Main HQ, First Canadian Army, August 1944, LAC RG 24, C17, Vol. 13654.

35. Joseph F. McCloskey, "British Operational Research in World War II," *Operations Research* 35, no. 3 (May-June 1987), 467.

36. A good starting point for understanding OR in the Second World War is United Kingdom, Air Ministry, *The Origins and Development of Operational Research in the Royal Air Force* (London, 1963); and Terry Copp, ed., *Montgomery's Scientists: Operational Research in Northwest Europe, The Work of No.2 Operational Research Section with 21 Army Group June 1944 to July 1945* (Waterloo, ON: Laurier Centre for Military Strategic and Disarmament Studies, 2000).

37. Letter, Ground Attack Section, ORS/AEAF to Group Captain A. V. Harvey, AEAF, 2 May 1944, TNA AIR 37/497. A 50 percent zone is the radius of a circle in which half of all munitions will fall.

38. "Artillery Positions as Targets for Army Support Aircraft," RAF Fighter Command Tactical Memo No. 30, 14 March 1943.

39. "The Accuracy of Attacks on Small Targets by Fighter-Bombers and R.P. Fighters," ORS (AEAF) Report No. 16, 10 June 1944, TNA AIR 37/497.

40. "Tactical Employment of Rocket Projectiles (up to October 1944)," RAF Tactical Bulletin No. 45, November 1944, TNA AIR 37/415.

41. "Analysis of German Tank Casualties in France, 6 June to 31 August 1944," Report No. 17, No. 2 ORS, 21 Army Group, in *Montgomery's Scientists*, Copp, ed., 399–406. Overall, AP (armour piercing) projectiles were responsible for just under 66 percent of all tank casualties, while air weapons accounted for between 13 and 25 percent of the total.

42. "Rocket Firing Typhoons in Close Support of Military Operations," Joint Report No. 3, No. 2 ORS, 21 Army Group and ORS 2nd Tactical Air Force, in *Montgomery's Scientists*, Copp, ed., 219–39.

43. "Recipe for Bombing," ORS report, n.d. (April-May 1944), TNA AIR 37/497. This report lists various targets and suggests the expected results based on the aircraft and type of munitions.

44. Copp, *Fields of Fire*, 259–60.

45. For a full account of the Mortain operation, see Mark J. Reardon, *Victory at Mortain: Stopping Hitler's Panzer Counteroffensive* (Lawrence, KS: University Press of Kansas, 2003); Martin Blumenson, *Breakout and Pursuit* (Washington, DC: US Government Printing Office, 1961), 457–75; and Carlo D'Este, *Decision in Normandy* (New York, E. P. Dutton, Inc., 1983), 414–19.

46. Derek Leyland Stephenson, *Six Crashes Later: The Story of a Fighter Pilot* (Pollinger in Print, 2006), 356–57.

47. Christopher Shores and Chris Thomas, *2nd Tactical Air Force*, vol. 2: *Breakout to Bodenplatte, July 1944 to January 1945* (Hersham, Surrey: Classic Publications, 2005), 250.

48. Operations Record Books, 438, 439, and 440 Squadrons, August 1944, Héritage Canadiana micro-film collection, heritage.canadiana.ca reels C-12317 and C-12318.

49. Sir Arthur Coningham, *Report Concerning Operations Carried out by Second Tactical Air Force Between 6th June 1944 and 9th May 1945*, November 1945, 11, TNA AIR 57/876; and Sir Trafford Leigh-Mallory, "Operations by the Allied Expeditionary Air Force in N.W. Europe from November 15th, 1943 to September 30th, 1944," *The London Gazette*, Fourth Supplement, 31 December 1946, paras 289–91.

50. Coningham, *Report Concerning Operations*, 11.

51. Shores and Thomas, *2nd Tactical Air Force*, 248.

52. Copp, "Introduction," *Montgomery's Scientists*, 44.

53. Greenhous et al, *Crucible of War*, 321–22.

54. Portugal, *We Were There*, 3,308.

"Canadian airmen in Holland are smoking cigars now and paying for them with 1,000-pound bombs. The cigars were captured from stores intended for the elite SS German troops. The bombs are dropped by Typhoon pilots in cooperation with the 2nd British Army. These airmen want Canadians to know that they don't want anything for nothing, so they have chalked the message on one of their bombs. They are ground crew with the Wildcat, City of Montreal Squadron.

In front: leading aircraftmen (LACs) Jack McKellar, Bob Martin, Wally Goltz and Gord Kerswill. At back: Ed Adair, Ian 'Jock' Leask and Fred Barber."







WORTH THE COST:

BOMBING, OVERLORD, AND THE RCAF

BY JODY PERRUN, PHD



More than seven decades after the Second World War ended, the employment of strategic bombing against targets in Germany and occupied Europe remains perhaps the most controversial element of the Allies' war effort. Critics of the area-bombing campaign have pointed to the large numbers of civilian and air force casualties and questioned the impact on German war production, to cite just a few points that have often been debated. Leaving aside the questions of morality and legality that have informed debate over area bombing of the Reich, it is worthwhile to ponder the effectiveness of using strategic bombers in a tactical-support role during Operation OVERLORD and to recognize the part played by the Royal Canadian Air Force (RCAF) in providing that support. When the Allies launched the re-invasion of Northwest Europe with the landings in Normandy on D-Day, June 6, 1944, the strategic air forces of Britain (which included the RCAF) and the United States (US) helped prepare the way by striking a variety of targets within the invasion area and beyond, and would continue to support ground operations as the campaign developed. The contributions to the land battle made by the strategic bomber forces were perhaps even more deserving of critical scrutiny than their operations over Germany. Were they worth the costs inflicted in materiel damage and casualties to civilians and friendly troops?

Soon after planning for the invasion began, the May 1943 Trident Conference in Washington determined that the Allied strategic bomber forces would be used in direct support of the ground campaign. Any invasion attempt would be prohibitively costly unless the Allies were able to win air superiority over the battle zone. The destruction of the Luftwaffe was also crucial to the success of continued bomber operations over Germany. The Pointblank directive which followed Trident in June, therefore, ordered the Royal Air Force's (RAF's) Bomber Command and the US Army Air Forces (USAAF) to attack aircraft production facilities and to destroy the Luftwaffe in the air as well as on the ground. This task was facilitated during the winter of 1943–44, when the P-51 Mustang, a long-range fighter, became available to escort American day bombers. The Allies were so successful in achieving this objective that by D-Day, German air power had ceased to be a factor of any real importance over the Normandy battlefields.

Were they worth the costs inflicted in materiel damage and casualties to civilians and friendly troops?

The men who led the strategic air forces were not enthusiastic about their new task. The fundamental position of Air Chief Marshal Sir Arthur Harris, Air Officer Commanding-in-Chief RAF Bomber Command, and General Carl Spaatz, commander of US Strategic Air Forces in Europe, was that the continued bombing of Germany would hasten the end of the war by destroying the industrial and materiel resources that were vital to the war effort. This was not simply a question of strategy, since diversions from strategic bombing to ground support curtailed air force autonomy. The heavy bombers nonetheless took on a number of

tasks in support of the invasion as D-Day approached. Over the winter, "Gardening" operations, for example, planted sea mines to disrupt German naval activity along the occupied coast. More important was the Transportation Plan, intended to isolate the Normandy battlefields from enemy reinforcements by interdiction strikes to knock out railways, roads, and bridges.¹



P-51 Mustang.

Canadian airmen participated in these operations as part of Bomber Command, primarily in RCAF squadrons of No. 6 Group, formed in January 1943, but they also flew in RAF squadrons as well. The shift to invasion-support missions was a welcome reprieve for all of Bomber Command from the high casualties suffered over the winter in attacks on targets like Berlin and Nuremberg, but perhaps even more so for Canadian crews. No. 6 Group comprised thirteen squadrons on the eve of the invasion and eleven of them flew Halifax variants. Five of those flew the by-then inferior Halifax IIs and Vs, which had suffered prohibitive loss rates during the winter campaign against Berlin. In February, Nos. 419, 428, 431, and 434 Squadrons were reassigned to relatively safer Gardening and Transportation Plan operations.² Shorter distances and the reduction of the Luftwaffe's presence outside Germany helped reduce losses until these squadrons could be re-equipped with better aircraft, chiefly the Halifax III, although two would get the Lancaster X. A new group commander, Air Vice-Marshal C. M. "Black Mike" McEwen, brought a more intense interest in training that also helped reduce aircrew losses.³ Gordon Gross, who joined 433 Squadron as a mid-upper gunner in the spring of 1944, remembered that "as a crew we found the Halifax III a real challenge. We had completed our operational training on twin-engine Wellington bombers . . . [and we] were delighted with the performance of the sturdy Halifax III, which gave new confidence and assurance and was often referred to as the flying tank."⁴

The Transportation Plan attacked targets all over occupied Northwest Europe, thereby contributing to Allied deception measures aimed at disguising the location of the assault. The key was France, however, and the plan's feasibility was tested when Harris was ordered at the beginning of March 1944 to make a series of experimental raids against French railway marshalling yards.

Canadian squadrons flew roughly half of these sorties, the accuracy of which prompted a massive series of raids against key railway centres in France and Belgium beginning in mid-April.⁵ The damage inflicted by Bomber Command and the Eighth Air Force reduced French railway traffic by eighty per cent by the end of June, imposing significant delays on German units moving into Normandy once the invasion began.⁶ A typical assessment of the interdiction effort's precise impact on German deployments notes that:

It took the German 275th Infantry Division a week to travel the 150 miles [241 km] from Fougères to the front. Two panzer divisions, shifting from the east, traveled from Poland to France in no more time than it took them to move from eastern France to Normandy. Men of a German Air Force unit left The Hague by train on 18 June and, after a circuitous tour through Holland, Belgium, the Rhineland, and eastern France, were unable to reach the battle area before 3 July.⁷



Avro Lancaster.

Other analyses are more equivocal. According to Robert Vogel, a number of German formations were able to move into the battle area within just a few days, so “the experiences of the various divisions ordered to the front, therefore, appear to have varied greatly.”⁸

One Transportation Plan raid on the night of June 12–13 produced the lone Victoria Cross (VC)

won by a member of 6 Group. The story of Pilot Officer Andrew Mynarski's ill-fated attack on Cambrai has been described in detail elsewhere. Suffice it to say that it is difficult to imagine a more valorous and poignant display of courage. Mynarski was the mid-upper gunner on a 419 Squadron Lancaster X that was hit by a German night-fighter and burst into flames en route to the target. Ordered to bail out, Mynarski noticed the rear gunner, Pat Brophy, trapped in the tail turret on the other side of a wall of flames. Mynarski disregarded his friend's protests to save himself and worked in vain to dislodge the jammed turret as his own clothing caught fire. His efforts clearly futile, Mynarski offered Brophy a final salute before plunging through the hatch. Mynarski plummeted to the ground with his parachute also on fire; he was found by the French but perished from his injuries. Brophy, miraculously, survived the Lancaster's crash and provided the testimony of his friend's heroism that earned Mynarski the VC.⁹

Bomber Command's attention was primarily concentrated on invasion-support operations from mid-April to mid-September, as the strategic bomber forces were placed under the direction of General Dwight D. Eisenhower and SHAEF (Supreme Headquarters, Allied Expeditionary Force) to assist the ground campaign. While the bombers targeted railways, bridges, and airfields before D-Day, minelaying also focused on securing the sea lanes to the landing beaches. Nearly half of the 2,198 Gardening sorties from March to May were flown by 6 Group. Germany's Atlantic Wall fortifications furnished another key set of targets. Bomber Command had attacked thirty

coastal gun batteries throughout May, and ten batteries covering the landing areas received special attention on the night of June 5–6. Of these, 6 Group attacked Merville, Franceville, Houlgate, and Longues, with indifferent results.¹⁰ For Gordon Gross of 433 Squadron, however, this was a memorable trip: “there was no doubt that this one was going to be different. Our aircraft was being bombed up with 500-pounders with no incendiaries which indicated a tactical target and not an industrial target in Germany. . . . Our target was the coastal gun batteries at Houlgate and the briefing was loud and clear, these guns must come out so Jerry can’t shell the navy.” After bombing their target and heading back to England, Gross’ crew caught an unforgettable sight:

Heading west we were suddenly captivated by the ships seen below through the broken clouds, all shapes and sizes, anything you had ever seen in the recce books and some not yet registered. Row after row of them in neat lines all headed to the Normandy coast. It was an unbelievable sight, the largest armada ever assembled, and we were getting a special panoramic view of it. . . . It was one of the most exciting events of our lives. We had had a part in the Great Invasion . . . we had bombed enemy guns and had actually flown over the Invasion Armada only a few hours before Allied troops would start landing on the Normandy beaches.¹¹

However exciting for the aircrews, little of tactical value was accomplished. Although one gun was apparently knocked out at Longues (sources disagree) and battery communications and fire control were disrupted, the others continued to fire until being suppressed by naval gunfire or overrun by ground troops. Attempts to blind German radar surveillance were more successful. Numerous attacks were made in the weeks before D-Day against radar stations like the one at Douvres-la-Délivrande, which had its radar knocked out though the garrison remained a thorn in the side of Canadian and British troops until June 17.¹² RAF squadrons, meanwhile, flew special electronic jamming operations. Canadian pilot Murray Peden explained the objective of his mission the night of the invasion. Five B-17s from his 214 Squadron (of 100 Group),

together with a force of about three times as many Lancasters, were to establish a strong patrol line some 80 or 90 miles [129 or 145 km] northeast of the beaches, protecting the left flank of the great assault from aerial interference. We would be dropping window continuously, to maintain the threat of other heavy-bomber forces thrusting inland, and blanketing with a continuous and impenetrable curtain of jamming every channel of communication used by the German night fighters.¹³

Other aircraft provided further electronic countermeasures against enemy radar and communications, operating oddly named jamming devices, such as Airborne Cigar, Serrate, and Mandrel.¹⁴

Following the D-Day landings, the strength of German resistance threatened to turn the Battle of Normandy into a stalemate. General Bernard Montgomery, whose 21st Army Group commanded the ground campaign, came under increasing criticism by early July for his failure to take Caen, a D-Day objective, and decided to use heavy bombers during Operation CHARNWOOD in the hope that the great destructive power they could unleash might facilitate the city’s capture. After CHARNWOOD, heavy bombing would accompany every major Allied operation in Normandy. Because pre-war air doctrine had focused on strategic bombing, however, the technique to do what Montgomery proposed, with Eisenhower’s blessing, had not been devised. They were, in effect, improvising a new form of heavy air support for which there existed scant precedent.



A Handley Page Halifax flies over the suburbs of Caen, France, during a major daylight raid to assist the Normandy land battle during Operation CHARNWOOD.

Bomber Command had already carried out some small-scale interdiction strikes on German positions, such as the crossroads at Villers-Bocage, but CHARNWOOD was “only the second time anyone had proposed the use of strategic bombers in direct support of a ground operation.”¹⁵ The first occasion had been at Monte Cassino on the Italian front, and the effort had not produced satisfactory results. The debris created by bombing the town and the monastery merely provided cover for the defenders and obstructed the attackers, with craters caused by the high-explosive bombs preventing tanks from advancing in support. Harris and Spaatz both raised objections to this sort of mission. They insisted that the very nature of heavy bombers made them unsuitable for close support: the aircraft had not been designed for such a purpose, a suitable method of attack did not exist, nor had the aircrews been trained for it. Whereas, fighter-bombers could fly in cab-rank, on call for impromptu support, heavy-

bomber targets were fixed before aircraft left the ground in England and could not be altered thereafter. The resulting inflexibility did not allow for changes in the tactical situation, such as the dispositions of enemy forces. Moreover, the relatively wide bomb-dispersal pattern on the ground meant that they were less able than medium bombers to hit smaller targets, such as troop and equipment concentrations.¹⁶

Nonetheless, Bomber Command was then under SHAEF's direction so the attack against the northern outskirts of Caen proceeded on the evening of July 7. No one knew exactly what to expect from what was, in effect, an experiment, and precautions were taken accordingly. Pending further experience, the bomb line was set 6,000 yards (5,500 metres [m]) ahead of the forward troops “to limit the dangers of friendly fire.” Bomber Command also insisted on carrying out the attack in daylight so that the aiming points could be assured. At 2150 hours, 467 bombers, including 87 from 6 Group, commenced dropping 2,562 tons (2,324 tonnes) of high explosive with time fuses delayed to explode the next morning in conjunction with the ground assault by Second British Army's 1st Corps, which included 3rd



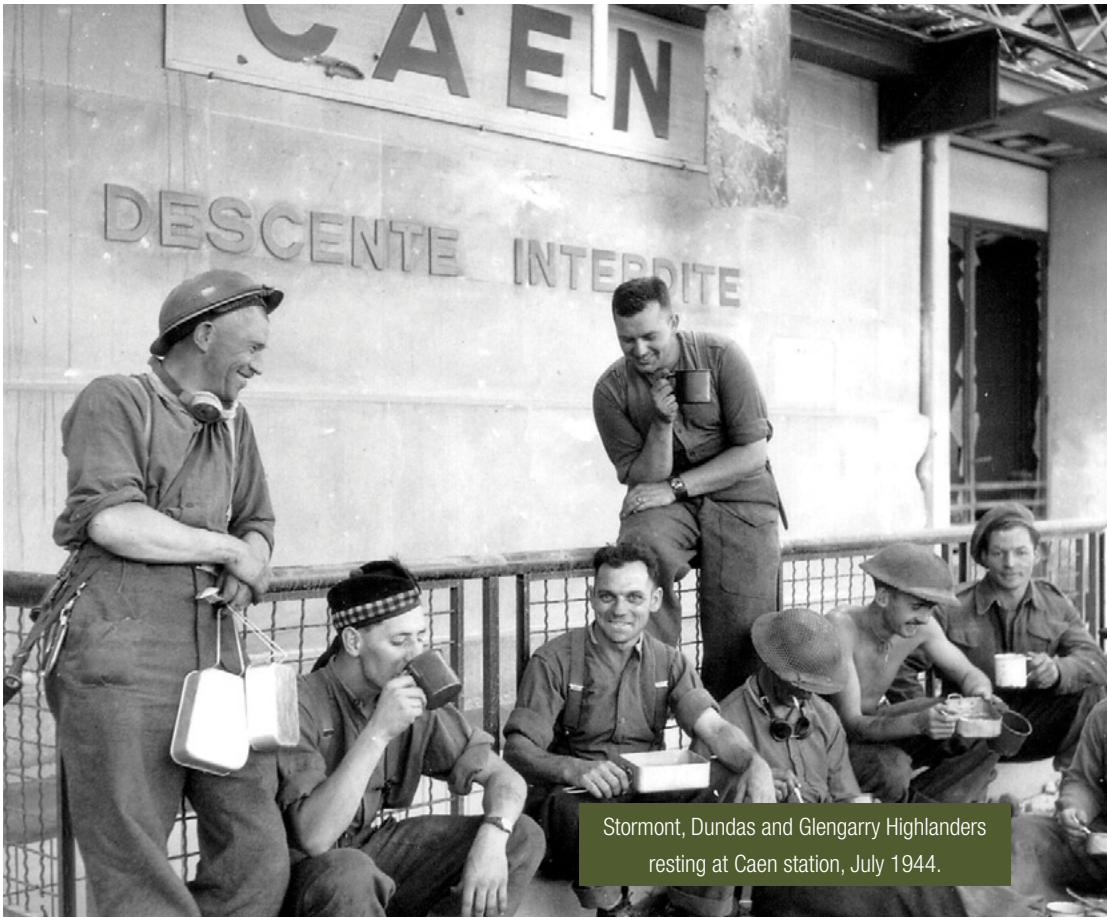
A soldier keeps a sharp lookout for snipers in the ruins of Caen, 9 July 1944. He is armed with a Lee Enfield .303 rifle.



Canadian infantry rest during their advance south and east of Caen.

Canadian Infantry Division. The results of the bombardment suggested that further development of the doctrine governing their employment in such tasks was needed. Because 1st Corps was held so far back and did not commence its attack until first light on the following morning, six hours after the bombing run, any surprise or shock value was lost.¹⁷ Rubble impeded the infantry's advance and offered cover to the defenders, as at Cassino. Once again, craters presented anti-tank obstacles. The exact tactical purpose of the bombing, moreover, has remained in question, since the main German defensive positions were outside the target area.¹⁸ For the soldiers of 1st Corps, however, there was "much enthusiasm . . . for this new kind of fire support." Canadian infantrymen reportedly "found the 'smoke and flame wonderful,'" and it was said to have "improved their morale 500 per cent."¹⁹

CHARNWOOD delivered the northern half of Caen to 21st Army Group, but the portion south of the river Orne was still in German hands. Montgomery next ordered the first major armoured operation on Second Army's front. The objectives of Operation GOODWOOD were entirely unclear. Montgomery spoke in terms that raised expectations of a breakout, but at the same time he described it as a "holding operation" designed to attract the German armoured reserves to the eastern flank, thereby facilitating an American breakout further west. In the event, GOODWOOD's gains were unimpressive, though the fighting produced heavy casualties. As a holding operation, Terry Copp and Robert Vogel suggest that "the cost was far too high" and "as a breakout operation it was a dismal failure."²⁰



Stormont, Dundas and Glengarry Highlanders resting at Caen station, July 1944.

Meanwhile, Lieutenant-General Guy Simonds' 2nd Canadian Corps had become operational as part of Second Army on July 11. The Canadians had secondary responsibilities during GOODWOOD, as the main attack was to be made by the 7th, 11th, and Guards Armoured Divisions. The infantry would then follow to consolidate and create a firm base for further operations to break into the open country south of Caen. The British Army still thought of the tank as a weapon to be used for infantry support or to exploit a break in the enemy's line, so the tactics to be used were something of a departure from the norm. GOODWOOD called for heavy-bomber strikes on the flanks of the army's axis of advance to isolate the corridor through which it would pass, with medium bombers dropping fragmentation bombs, which would not crater the ground, on "soft" targets, such as infantry and gun positions directly in front of the leading troops. In this manner, German strong points that might otherwise hold up the advance would be obliterated without making the area impassable to the tanks spearheading the assault. Medium-bomber strikes in front of the leading units would compensate for the lack of artillery support once the tanks had advanced out of range.²¹

Operation GOODWOOD opened on the morning of July 18, 1944, with British and American air strikes; it was "one of the most awesome air attacks ever launched on ground troops."²² Results were mixed. Bomber Command alone sent 942 aircraft, nearly 200 of them from 6 Group, and accurately hit most of its targets. A British Bombing Analysis Unit that examined the battlefield

reported that one area “resembled the surface of the moon.’ It found the rusting remains of an entire panzer company—fifteen tanks and twelve half-tracks. . . .”²³ As for the Americans, only 26 per cent of the bombs they dropped were on target.²⁴ Most “scattered over the countryside. In the ensuing ground assault, Allied troops encountered particularly stiff resistance in the American target areas.”²⁵ Although the bomb line had been placed only 900 yards (823 m) in front of the forward troops—an improvement since CHARNWOOD—the ground advance did not begin until 90 minutes after the last bomb fell, so the Germans were again given time to recover. Although the attack completed the capture of Caen and gained some ground to the south, it could only have been a disappointment to Montgomery and Second Army’s Lieutenant-General Miles Dempsey,

considering the massive amount of fire-power—over 4,500 aircraft and 500 guns—that had been assembled in support.²⁶

Canadian infantrymen reportedly “found the ‘smoke and flame wonderful,’” and it was said to have “improved their morale 500 per cent.”

As the stalemate continued on Second Army’s front, neither had there been much movement in First U.S. Army’s sector south of the Cotentin Peninsula. General Omar Bradley had been unable to make much headway during an abortive offensive in late June, and after the bombing of Caen he decided that air power could be the answer to his problem, as well.²⁷ Heavy bombing of German defences was the centrepiece of the plan for Operation COBRA, but, while it did assist the American breakout in late July, short drops on the 24th and 25th killed 136 American troops and wounded 621.²⁸ Part of the cause was the absence of any method of communication between

ground troops and pilots in the air. Characteristics inherent to the operation of these particular aircraft were also responsible. Standard procedure for Eighth Air Force called for all planes in a formation to drop their bomb loads along with the lead plane, which alone made corrections in aim for range and lateral drift.²⁹ This technique produced an elongated bomb pattern on the ground, which made concentrations on specific targets harder to achieve. COBRA represented the first occasion where significant casualties were taken by friendly ground forces as a result of close air support by heavy bombers; others soon followed.

Simonds’ 2nd Canadian Corps, meanwhile, was stalled at Verrières Ridge as August opened. Following the precedents of CHARNWOOD, GOODWOOD, and COBRA, Simonds called upon heavy bombers to blast a passage through the German defensive lines blocking his path from Caen to Falaise. Bombing in Operation TOTALIZE would accompany both phases of the ground assault, and was arranged in progressive waves timed to move with the troops, not altogether unlike the creeping barrages of the Great War. TOTALIZE would mark the first close-support operation at night and the first armoured assault mounted in darkness. Historians have criticized the plan for being too complex, and perhaps it was a too-clever product of Simonds’ fertile mind. True or not, the degree of coordination between army and air force required by such tactics would prove elusive, with



A Cromwell tank and jeep pass an abandoned German PAK 43/41 gun during Operation TOTALIZE.

profound consequences for Canadian and Allied troops. At 2300 hours on August 7, Bomber Command kicked off the attack by hitting five targets on the flanks of 2nd Corps' line of advance. Nearly one-quarter of the 1,100 aircraft dispatched were from 6 Group, but only two-thirds of the total released their bombs on targets that quickly became obscured by smoke and dust. Despite some claims exaggerating the impact of the air strike, operational researchers later reported that the bombing of certain targets was inaccurate, possibly due to the premature firing of the artillery's flare shells used to mark the aiming points. Either way, little that mattered was hit. The armoured columns of tanks and infantry, nonetheless, broke through

the German front line and moved to their objective areas about three miles (five km) in the rear, from which the second-phase assault would be launched shortly after noon on the 8th.³⁰

As the tanks struggled forward to continue the advance, the rumble of four-engine bombers again filled the air south of Caen. Targets were marked for the 681 B-17s sent by Eighth Air Force the same way they had been the night before, using 25-pound flare shells. Flak disrupted the bomber formations on the run-in to the targets, which were again obscured by smoke and dust. Only 497 Fortresses bombed, and of the 55 tactical groups that made the attack, "no more than 16 . . . bombed in or adjacent to the target areas."³¹ Two or three of the 12-plane groups bombed First Canadian Army rear positions just south of Caen, however.³² A 2nd Corps situation report described the event vividly:

The great excitement today was the "precision" bombing of the Yanks as opposed . . . to the Lancaster bombing last night. We heard the bombers going towards [the] enemy just as we started lunch. A few minutes later they came back lower, and we crowded out to watch them. The sun glinted on their wings and they were a fine sight heading back to England, with their job well done (as we thought). Suddenly, they opened bomb doors (there were 12 of them) and down came the bombs, and the rolling thunderclaps were all round us and lasted for about 4 minutes, and it felt like 1 ½ hrs. Their job well done they sailed on for England. Just as we were about to start lunch again we saw another 12 stream into sight. They were heading NE [northeast] of us, but on seeing the billowing clouds of smoke and dust their pals had created they turned and made straight for Cormelles, letting us have it again. This we felt was anything but funny. We had visions of two and three thousand Forts unloading on us in lots of 12 all afternoon. Fortunately only one more lot dropped anything, and some poor sods up East of Caen got the last dose. . . . Altogether not a nice business though thank goodness it did not hit the [forward troops]. How any pilot in his senses could mistake Caen I cannot imagine. He did however.³³

The bombing seems to have accomplished little beyond killing 65 Canadian and Polish troops and wounding 250.³⁴ Simonds reported that his corps' "fighting efficiency has NOT been affected by inaccurate bombing by 8 USAAR,"³⁵ but casualties to some of the assaulting infantry battalions and the artillery supporting them make such claims dubious.³⁶

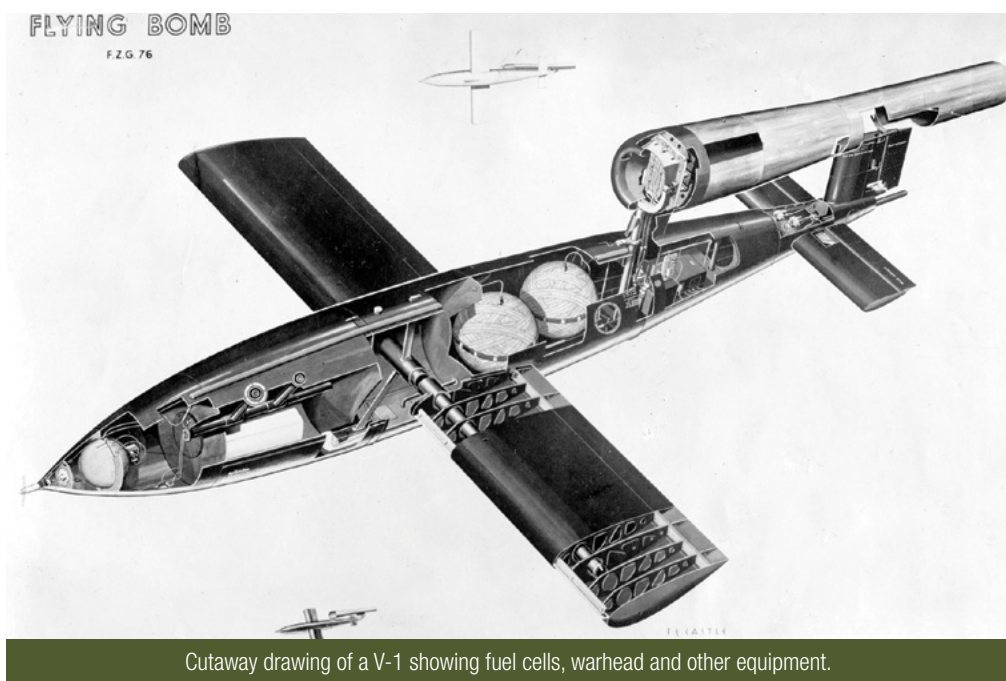
TOTALIZE ground to a halt well short of its ultimate objective two days later, just as the failure of Hitler's counter-attack at Mortain prompted the encirclement of German forces in the Falaise pocket. With the stakes thus raised, Simonds launched Operation TRACTABLE on August 14. Heavy bombers would again open the attack by hitting German gun areas covering the Caen-Falaise road. The armoured columns of 2nd Corps were then to skirt the defences north of Potigny, protected from enemy observation by a smokescreen instead of darkness, and cross the river Laison to the east. Falaise would be captured and its exits dominated to prevent the escape of enemy units.³⁷

In an incredible case of miscommunication, Bomber Command's target indicator colour was the same as the army's position indicator.

TRACTABLE also failed to take Falaise. The armoured columns were seriously inhibited by the dust they stirred up on the hot, dry, August afternoon that slowed their movement and forced the tanks to navigate by the sun. Long delays were imposed when tanks were unable to cross the Laison, which had not been considered a serious obstacle. Again, Canadian positions were bombed by a friendly air force, but this time the culprit was Bomber Command. Of the 805 aircraft dispatched, 227 came from 6 Group. Another 65 soldiers were killed, with 241 wounded and 91 missing, when 126 planes—a third of them Canadian—misidentified their targets and dropped short. It turned out that many aircraft had failed to properly time their runs from Caen to the target area,

and when the soldiers fired yellow smoke to indicate their positions, they only drew the attention of subsequent bombers. In an incredible case of miscommunication, Bomber Command's target indicator colour was the same as the army's position indicator. The official history of the RCAF argues that Bomber Command was "unarguably aware" of SHAEF's standing orders to use yellow smoke, notwithstanding Arthur Harris' attempt to deflect criticism by claiming that no one told him it would be used by the army. An investigation followed that led to further safeguards for future ground-support missions. All aircrews were henceforth required to make timed runs to their targets, and additional master bombers with "cancellation pyrotechnics" would be employed to increase aiming efficiency.³⁸ Aircrews who had bombed the wrong targets were reassigned, and some individuals suffered reduction in rank. As for 6 Group, despite the TRACTABLE mishap, the performance of its squadrons over the last year of the war—in terms of bombing accuracy and aircraft loss rate—was as good as any in Bomber Command and better than many.³⁹ For Bomber Command, TRACTABLE was an unfortunate error, but one which it did not repeat.

Although TRACTABLE, like TOTALIZE, failed to take Falaise, subsequent fighting brought the Battle of Normandy to a conclusion by the end of August. 1st Canadian Army was then assigned the task of clearing the Channel Ports, and Bomber Command supported the attack on Le Havre by Lieutenant-General John Crocker's 1st British Corps in early September. Operation ASTONIA was particularly controversial because "Crocker's plans included the employment of heavy bombers without any apparent concern for civilian casualties."⁴⁰ Apparently "considerable" damage was done to open batteries, but the concrete gun emplacements of the fortress town were largely unaffected.⁴¹ According to one study, "no good explanation has been offered for the decision to target sections of the old city which were not related to the coastal gun batteries . . . but Crocker may have hoped to shock the German garrison into surrender by a demonstration of raw power." The enemy surrendered shortly after the ground assault began, but not before 1,536 civilians had been killed and 517 left missing by the bombing.⁴²



Cutaway drawing of a V-1 showing fuel cells, warhead and other equipment.

Bomber Command had continued to raid transportation targets and coastal fortifications throughout the OVERLORD campaign, as well as English Channel ports like Calais and Boulogne. It also hit the V-1 and V-2 launching sites along the still-occupied coast throughout the summer.⁴³ As OVERLORD's requirements diminished, the heavies returned to area targets in Germany, Luftwaffe bases, and industrial and oil facilities. By mid-September, the strategic bomber forces were released from SHAEF command, though they continued to answer periodic calls to support the armies until the final collapse of the Third Reich in May 1945.

What judgments can we make concerning the contributions of heavy bombers to the ground campaign in Normandy? First, the variety of supporting tasks was impressive; they strangled the transportation network into the battle zone, chased the German navy from the occupied coast, attacked beach defences, provided close tactical support to a number of ground operations, and blinded the Luftwaffe through attacks on radar stations and the use of electronic countermeasures. Not

every task was successfully executed, particularly the missions providing close tactical support to ground troops. Facing potentially prohibitive casualty rates, the army turned to the strategic air forces to solve the problems it faced on the ground. We must remember that this was a role for which they had not been designed and no doctrine existed to guide training. When heavy bombers were used for close support in 1944 and 1945, the technique was thus improvised and experimental. Operation COBRA showed the devastating effect upon enemy troops that bombers could produce given fortuitous circumstances, although this was the exception rather than the rule. 21st Army Group's Operational Research Section (ORS) concluded after the Battle of Normandy that the wide bomb-dispersal pattern on the ground made heavy bombers an "uneconomical" method of destroying "widely dispersed targets" or "point targets" such as artillery, because of the extremely high number of aircraft and bombs that would be required to ensure destruction of even a few such targets.⁴⁴ The ORS found that enemy personnel and equipment casualties lost through heavy bombing in Operations CHARNWOOD, GOODWOOD, BLUECOAT, and TOTALIZE were few. September attacks in the Calais area and on the coastal defence batteries at Cap Gris Nez all supported the conclusion that heavy-bomber strikes were not effective against casemated gun positions.⁴⁵ Bombing was clearly not capable of rendering the kind of results that the army had hoped for.

The most valuable contributions made by heavy bombing in close support of ground troops seem to have been largely intangible. Bombing no doubt required the defenders to take shelter, thus reducing their reaction time to a ground assault. Defensive effort was expended against aircraft that might otherwise have been directed at ground troops. The effect on morale was potentially the greatest benefit. This was the opinion of No. 2 ORS, though it pointed out that the enemy was quick to recover, so attacks had to be pressed immediately following the cessation of bombing. The ORS admitted that this particular effect of bombing could not be quantified, and discouraged reliance on it.⁴⁶ Still, the impact on German soldiers could be incapacitating:

even if they survive the experience of a bombing attack, most troops in the immediate area of heavy bombers appear to be in no condition to fight, especially if very heavy [high-explosive] bombs have been used. They are usually dazed for a considerable period, and the average enemy soldier is depressed and constantly uneasy lest he should find himself in an area that is likely to be bombed.⁴⁷

The effects on Allied soldiers' morale varied depending on their own experiences. After CHARNWOOD and GOODWOOD, the ORS stated that all of the soldiers it interviewed "were unanimous in their desire for more bombing support."⁴⁸ But after TOTALIZE and TRACTABLE, Jacques Guérin of the Régiment de la Chaudière said, "I did not want any help

"You learn to trust them and then all of a sudden the bomb doors open and they rain bombs on you. It was pretty demoralizing."



Typhoon aircraft in Holland.



Canadian troops with armour support advance cautiously through the streets of Falaise. Abandoned German PAK 43/41 gun during Operation TOTALIZE.

whatever from the air.”⁴⁹ Noel Cantin of the Fort Garry Horse explained that “you learn to trust them and then all of a sudden the bomb doors open and they rain bombs on you. It was pretty demoralizing.”⁵⁰ These men, of course, had both been bombed by friendly aircraft. Bill Neil of the 8th Reconnaissance Regiment, on the other hand, felt that the contribution made by the air forces was invaluable.⁵¹ The general view from the soldiers seemed to be that fighter-bombers, particularly the Typhoon, could best provide close support because of the flexibility and speed of their response. The use of air power was not a panacea for the infantry, “but men can go a long way on hope.”⁵²

Unfortunately, longstanding, inter-service rivalries between army and air force precluded the maximum degree of cooperation throughout the war. Heavy, tactical air support was “only grudgingly provided by the airmen, and its inherent characteristics [were] never . . . fully understood by the soldiers.”⁵³ The most effective support was probably provided by fulfilling the tasks for which the weapon had been shaped: hitting strategic targets like oil, which compromised the ability of both the German army and air force to defend Normandy. The impact on German oil production was dramatic; the “monthly output of synthetic oil was reduced from 436,000 to 152,000 tonnes between May and September, while production of aviation fuel fell from 156,000 to 10,000 tonnes a month over the same period . . . at a time when the Luftwaffe required about 320,000 tonnes a month.”⁵⁴

Perhaps even greater than the impact on oil, ironically, was Harris’ continued fixation on area targets in Germany on every occasion when his command was not needed or able—usually because of weather—to support OVERLORD. His relentless commitment to area bombing required the Luftwaffe to defend the skies over the Reich with most of its air strength, thus denuding its ability to support Germany’s front-line troops elsewhere.⁵⁵ Even when it was not providing direct tactical support to 21st Army Group, Bomber Command contributed to victory in Normandy.

Assessing the ultimate value of using heavy bombers to support the invasion requires weighing the costs to civilians and friendly troops against the benefits provided. Approximately 350 Allied soldiers and 8,000 Norman civilians were killed by Allied bombs, including 2,000 in Caen and many others in towns like Lisieux and Saint-Lô that had been attacked in the first days after the landings. Thousands more were injured and left homeless, their towns and cities laid to waste. One

report on the damage in Caen estimated that 80 per cent of the city's housing had been rendered uninhabitable.⁵⁶ How many holes were left in how many families by these losses? How many more holes would there have been if the German air force and navy had been left free to attack the armada as it sailed for the invasion beaches? How many more ships would have been sunk had the coastal batteries not been harassed? What toll would the Luftwaffe have exacted on Allied infantry if air superiority had not been won over the battlefields? How much more stout would the German defence have been without the Transportation Plan and the demoralization wrought by bombing? It is true that the use of heavy bombers in close support of operations like CHARNWOOD, COBRA, TOTALIZE, and TRACTABLE was not particularly effective, but when employed on tasks more suited to their design, such as the oil campaign, their contribution made a difference. Fuel shortages, for example, meant less opportunity for flight training before Luftwaffe pilots were sent against Allied bombers, and inexperienced pilots did not have a long life expectancy.

The cost of bombing was high, and not only for those on the ground. Bomber Command suffered 55,000 fatal casualties during the war, and nearly one-fifth were Canadian. Put another way, of the approximately 40,000 Canadians who served in Bomber Command during the war, roughly one in four was killed on operations.⁵⁷ Such was the cost of victory for the Allied military forces, and of liberation from Nazi oppression for civilians. Was liberation worth the price? The countless monuments both large and small “en souvenir,” “en hommage,” or “en reconnaissance à nos libérateurs” that today grace the villages, towns, and cities throughout the old battle zone suggest that for Normans and others who had experienced Nazi rule, it was.

Dr. Jody Perrun teaches history at the University of Winnipeg, the Royal Military College of Canada, and the University of Manitoba, specializing in the Second World War, the Holocaust, and post-Confederation Canada. He is the author of *The Patriotic Consensus: Unity, Morale, and the Second World War in Winnipeg* (Manitoba: University of Manitoba Press, 2014).



This convoy was preparing to move out when RCAF Typhoons moved in and the resultant terrific damage caused by the rocket-bearing planes is clearly shown by the photograph.

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ABBREVIATIONS

DHH	Directorate of History and Heritage
km	kilometre(s)
LAC	Library and Archives Canada
ORS	Operational Research Section
m	metre(s)
mfm	microfilm
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
RG	Record Group
SHAEF	Supreme Headquarters, Allied Expeditionary Force
US	United States
USAAF	United States Army Air Forces
VC	Victoria Cross

NOTES

1. Brereton Greenhous et al., *The Crucible of War, 1939–1945: The Official History of the Royal Canadian Air Force*, Volume III (Toronto, University of Toronto Press, 1994), 790–91.

2. The other squadron, No. 429, converted to Halifax IIIs.

3. Greenhous et al., *Crucible of War*, 637, 755, 780.

4. Gordon Gross, “A Trip to Remember: An Airman’s View of D-Day,” *Canadian Military History* 10, no. 2 (Spring 2001): 76.

5. David L. Bashow, *No Prouder Place: Canadians and the Bomber Command Experience, 1939–1945* (St. Catharines: Vanwell, 2005), 321; Greenhous et al., *Crucible of War*, 791.

6. Greenhous et al., *Crucible of War*, 809.

7. James A. Huston, “The Tactical Use of Air Power in World War II: The Army Experience,” *Military Review* 32 (July 1952): 35. For a similar assessment, see Carlo D’Este, *Decision in Normandy* (New York, Penguin Putnam, 1994), 232–33.

8. Robert Vogel, "Tactical Air Power in Normandy: Some Thoughts on the Interdiction Plan," *Canadian Military History* 3, no. 1 (Spring 1994): 42.
9. Bashow, *No Prouder Place*, 334–37. Another VC with a Canadian connection was won by Squadron Leader Ian Bazalgette. Born in Calgary but largely raised in England, Bazalgette won his award for leading a 635 Squadron attack on a V-1 rocket site in France on August 4, 1944.
10. Greenhous et al., *Crucible of War*, 799, 805–6.
11. Gross, "Trip to Remember," 76–78.
12. Steven J. Zaloga, *D-Day Fortifications in Normandy* (Oxford: Osprey, 2005), 34–38; C. P. Stacey, *Official History of the Canadian Army in the Second World War, Volume III, The Victory Campaign: The Operations in North-West Europe 1944–1945* (Ottawa: National Defence, 1960), 70, 134, 144; Vogel, "Tactical Air Power," 39.
13. Murray Peden, *A Thousand Shall Fall* (Toronto: Stoddart, 1988), 381–82.
14. Martin Middlebrook and Chris Everitt, eds., *The Bomber Command War Diaries: An Operational Reference Book, 1939–1945* (Leicester: Midland, 1996), 522–23.
15. D'Este, *Decision in Normandy*, 226.
16. Ian Gooderson, "Heavy and Medium Bombers: How Successful Were They in the Tactical Close Air Support Role During World War II?," *Journal of Strategic Studies* 15, no. 3 (1992): 367–99.
17. Greenhous et al., *Crucible of War*, 812–13.
18. Terry Copp and Bill McAndrew, *Battle Exhaustion: Soldiers and Psychiatrists in the Canadian Army, 1939–1945* (Montreal/Kingston: McGill-Queen's University Press, 1990), 116–17.
19. Greenhouse et al., *Crucible of War*, 812–13.
20. Terry Copp and Robert Vogel, *Maple Leaf Route: Falaise* (Alma, ON: Maple Leaf Route, 1983), 42.
21. Copp and Vogel, *Maple Leaf Route: Falaise*, 40–42; D'Este, *Decision in Normandy*, 353–60.
22. Greenhous et al., *Crucible of War*, 311, 814.
23. Richard G. Davis, *Carl A. Spaatz and the Air War in Europe* (Washington: Department of the Air Force, 1993), 462.
24. US, Directorate of History and Heritage (DHH) 81/882 mfm [microfilm], U.S. Air Force Historical Study No. 88, "The Employment of Strategic Bombers in a Tactical Role, 1941–1951" (Alabama: Maxwell Air Force Base, Air University, 1953), 81.
25. Davis, *Carl A. Spaatz*, 462.
26. Copp and Vogel, *Maple Leaf Route: Falaise*, 42.
27. D'Este, *Decision in Normandy*, 337–43.
28. Davis, *Carl A. Spaatz*, 470–74. Casualty statistics vary depending on the source of information.

29. Davis, *Carl A. Spaatz*, 477. The RAF's procedure differed in that it used Pathfinder aircraft and master bombers to identify targets, drop luminous target indicators, and correct bombing errors by re-directing oncoming pilots, who would individually bomb the target-indicator concentrations.

30. Jody Perrun, "Missed Opportunities: First Canadian Army and the Air Plan for Operation TOTALIZE, 7-10 August 1944" (master's thesis, Carleton University, 1999), 75–127.

31. US, DHH, U.S. Air Force Historical Study No. 88, 81.

32. Library and Archives Canada (LAC) RG (Record Group) 24 vol. 10818 file 225C2.093 (D2), Situation Report 8 Aug. 1944.

33. Library and Archives Canada (LAC) RG (Record Group) 24 vol. 10818 file 225C2.093 (D2), Situation Report 8 Aug. 1944.

34. Stacey, *Official History of the Canadian Army*, 223.

35. LAC RG 24 v. 13624, First Cdn (Canadian) Army MAIN Ops (Operations) Log, 8 Aug 44.

36. Perrun, "Missed Opportunities," 135–39, 161.

37. John A. English, *The Canadian Army and the Normandy Campaign: A Study of Failure in High Command* (New York: Praeger, 1991), 293.

38. Middlebrook and Everitt, *Bomber Command War Diaries*, 562; Greenhous et al., *Crucible of War*, 816–20.

39. Greenhous et al., *Crucible of War*, 803.

40. Terry Copp and Michelle Fowler, "Heavy Bombers and Civil Affairs: First Canadian Army in France, July–September 1944," *Canadian Military History* 22, no. 2 (Spring 2013): 12.

41. Stacey, *Official History of the Canadian Army*, 332–34.

42. Copp and Fowler, "Heavy Bombers and Civil Affairs," 12.

43. Bashow, *No Prouder Place*, 474; Greenhous et al., *Crucible of War*, 806, 811.

44. 21 Army Group No. 2 Operational Research Section (ORS) Report No.14, "Heavy Bombing in Support of the Army," in *Montgomery's Scientists: Operational Research in Northwest Europe*, ed., Terry Copp (Waterloo, ON: Laurier Centre for Military, Strategic and Disarmament Studies, 2000), 99–106.

45. Stacey, *Official History of the Canadian Army*, 348–53.

46. Copp, *Montgomery's Scientists*, 105–6.

47. US, DHH 87/243, Current Reports from Overseas #65, 29 Nov 44.

48. 21 Army Group No. 2 ORS Report No. 6, "Bombing in Operation GOODWOOD," in Copp, *Montgomery's Scientists*, 79–86.

49. Noel A. Cantin, "Fort Garry Horse Regimental Museum Oral History Project," interview, June 23, 1979, 15.

50. Noel A. Cantin, "Fort Garry Horse Regimental Museum Oral History Project," interview, June 23, 1979, 15.
51. Bill Neil, author interview, Winnipeg, September 2, 1998.
52. Copp and McAndrew, *Battle Exhaustion*, 145.
53. Gooderson, "Heavy and Medium Bombers," 390–91. According to 1st Canadian Army's chief of staff, "the staff at Group HQ were apparently under the impression that the Army was trying to get control of the Air Force formations associated with it. We gained the distinct impression . . . that the Air Force was more anxious to assert its independence than to co-operate to the maximum extent with the Army." C. C. Mann (lecture to the Canadian Staff Course, Royal Military College, Kingston, ON, July 25, 1946), LAC, MG 30 E157 v. 24.
54. Greenhous et al., *Crucible of War*, 810.
55. Bashow, *No Prouder Place*, 469; Greenhous et al., *Crucible of War*, 820.
56. Stephen A. Bourque, "Operational Fires: Lisieux and Saint-Lô – The Destruction of Two Norman Towns on D-Day," *Canadian Military History* 192, no. 2 (Spring 2010): 26, 38; Copp and Fowler, "Heavy Bombers and Civil Affairs," 8.
57. Bashow, *No Prouder Place*, 457–58.

Far from his home in Sudbury, Ontario, Flying Officer J. Kalen, has taken his Typhoon over the French invasion coast many times since the landings began. His RCAF fighter and bomber squadron is much feared by German ground troops.

