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Repairing the wing cannon on an RCAF Mark IX Spitfire in Normandy, 1944.

## CREATING THE 2<sup>ND</sup> TACTICAL AIR FORCE RAF: INTER-SERVICE AND ANGLO-CANADIAN CO-OPERATION IN THE SECOND WORLD WAR<sup>1</sup>

by Dr. David Ian Hall

The success ultimately enjoyed by Anglo-Canadian and American armies during the final two years of the Second World War had its roots in the effective and overwhelming air support that these armies received. First in North Africa, and later in Italy and North West Europe, American, British and Empire armies fought most if not all of their battles with the knowledge that they enjoyed unassailable air superiority throughout the battle area and, consequently, they expected considerable tactical air support. By 1944 this decisive advantage was confirmed when the twin factors of matériel superiority and common doctrine were actively combined. The latter — an accepted common doctrine — was attained through hard-earned battle experience in North Africa and the resolution of a long and tortuous debate, mainly in London, over who should control aircraft on the battlefield. This debate had raged on since the end of the First World War. The two main protagonists were the British Army and the Royal Air Force, but in a small yet relevant way, tangential to its resolution, was Canadian participation.

At the start of the war there were many joint and combined difficulties to overcome. “When the first squadron [Royal Canadian Air Force (RCAF) army co-operation squadron] went to Britain in early 1940,” wrote Canada’s official historians, “it inevitably became embroiled in all the troubles which frustrated its RAF peers, in addition to those problems inherent in the broader picture of Anglo-Canadian cooperation.”<sup>2</sup> Airmen and soldiers did not work well together at the outset of the war, and Anglo-Canadian co-operation struggled on a number of practical and political levels. However, the Anglo-Canadian partnership had as many benefits as disadvantages, especially in terms of the combined resources marshalled for war, namely matériel, manpower and, in the case of army-air co-operation, intellectual capital. Building on the recent scholarship of historians Terry Copp, Alex Douglas, Brereton Greenhous,

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Stephen Harris and Ian Gooderson,<sup>3</sup> this article highlights the beneficial effect of Anglo-Canadian cooperation in reaching a solution to one of the great operational and tactical riddles of the Second World War:

**“Air superiority over the battle area was an essential pre-condition for an effective and sustained contribution by air forces to a land battle.”**

the provision of comprehensive, effective and flexible air support for ground forces. It is very much a story of ideas, intellectual development and

institutions, where theory is translated into practice, and national differences helped to provide solutions rather than lead — as is often the accepted perception — to additional and insurmountable problems.

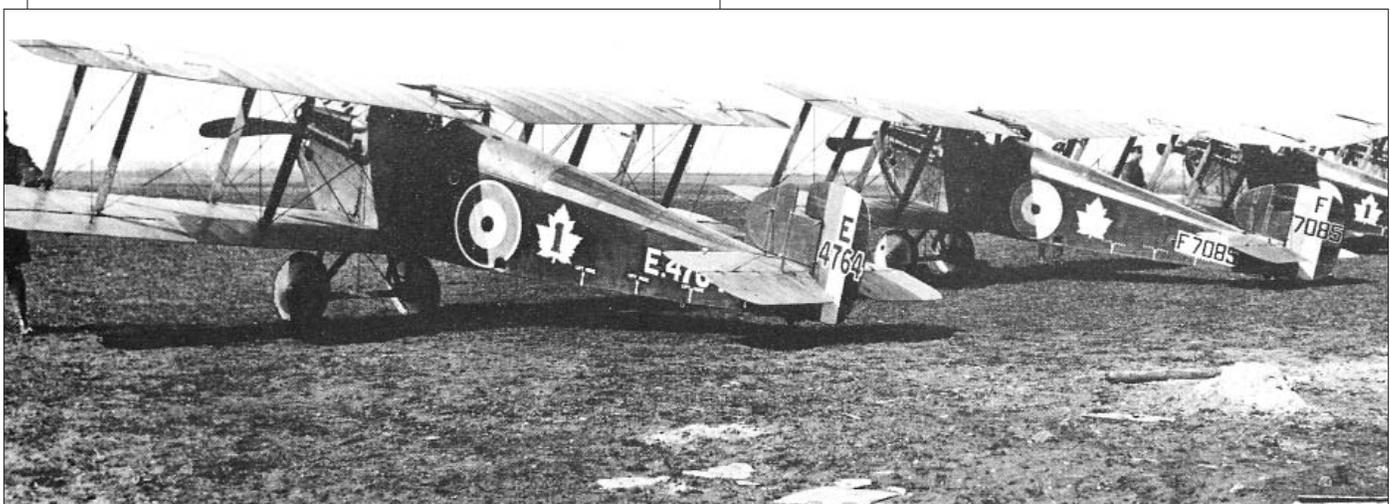
This article provides a brief examination of the nature of the inter-service crisis and the Anglo-Canadian connection in the debate over air support in the Second World War and, notably, the process by which this issue was settled. For most students of military history, it will not come as a surprise to read that the impasse over developing effective air support and the solution to the problem are both found in the ten or twenty years before the war began. It is axiomatic that the strategy and operations of any war can be understood only in the light of the conditions and preparations that preceded them. Technology, doctrine, training and leadership — what Peter Paret calls the essentials of action in war — are products of both peacetime developments and neglect. Battle experience often leads to change, but pre-war elements also continue to affect the way nations and their armed forces fight even the longest wars. Paret’s theory that the nature of military action has its antecedents in the past has proven merit as a methodological approach to the study of military history.<sup>4</sup>

### **DEVELOPMENT OF AIR SUPPORT IN THE FIRST WORLD WAR**

**A**t the end of the First World War, Great Britain stood alone amongst the great Powers as the pre-eminent air power in the world. During the last two years of the war, British aircraft accounted for 7,054 enemy aircraft destroyed, dropped 6,942 tons of bombs, flew over 900,000

operational hours and fired over 10.5 million rounds at targets on the ground.<sup>5</sup> When the Armistice took effect on 11 November 1918, the Royal Air Force (RAF) mustered some 22,000 aircraft and just fewer than 300,000 personnel.<sup>6</sup> In less than five years of war, British combat aviation had undergone an extraordinary transformation from its humble pre-war beginning of two small reconnaissance forces of fifty front line aircraft each for the Army and the Royal Navy.<sup>7</sup> Between 1914 and 1918, the Royal Flying Corps (RFC) and the Royal Naval Air Service (RNAS), followed by the RAF, had performed every major air power role and mission,<sup>8</sup> the very roles and missions that are the core capabilities of modern air forces today. The wide variety of these first experiences in air operations, however, should not mask the fact that Britain’s first air war was an army co-operation war.<sup>9</sup> Most of Britain’s air effort was subordinate to the Army’s military campaigns on the Western Front where army commanders increasingly were pre-occupied with the tactical problems of achieving a breakthrough. The Army viewed aircraft as auxiliary forces, similar to artillery and the new tanks, which were sub-allotted to army corps at the front, and placed under the direct control of each respective corps commander. Aircraft were used as ‘flying artillery’ to help the infantry advance. Army commanders, seeking the ultimate in close air support — to the exclusion of all other forms of combat aviation — employed as many aircraft as possible in a ground attack role at the forefront of their contact battle.<sup>10</sup>

These practices became increasingly problematic for Britain’s airmen. Reflecting on their own operational experience, it was not long before they identified a number of enduring air power characteristics — height, speed and reach. They also deduced the benefits to be had from a system of centralized command and control. Employment of such a system would enable an air commander to concentrate all available aircraft at critical times and points in a battle and, most important, ensure a maximum effort ‘in support of the decisive tasks’. The Army’s preferred method — that of decentralized command — increasingly was regarded by many airmen as wasteful and inefficient; it also entailed dispersion of effort on inconsequential objectives. At the Battle of Amiens in August 1918, the RAF tried, for the first time in the war, a rudimentary system of centralized control. Both services, also for the first time in the war, conducted their operations in accordance with a



Sopwith Dolphins belonging to No. 1 (Fighter) Squadron, CAF at Upper Heyford, England, 1918.

joint army-air plan. The air operations were only a limited success, but Amiens, and subsequent air operations flown during the last hundred days of the war, convinced British airmen that better results were achieved when air forces were concentrated against targets both above and beyond those traditionally selected by army commanders. When the attainment of air superiority was the first objective, followed by operations designed to isolate the battlefield, air forces demonstrated their real potential to make a decisive impact on operations taking place on the ground. Buoyed by their recent discoveries, Britain's airmen espoused a yet unwritten doctrine that emphasized a more strategic application of air forces based on air power's core capabilities of air superiority, interdiction and long-range bombing.<sup>11</sup>

Air power, Britain's air practitioners and fledgling theorists believed, offered a new way of approaching the strategic and operational challenges of war. Their faith in the ability of air forces to exert a strategic influence on the conduct of war in the future led naturally to a number of ambitious post-war plans. Even before the war had ended, the Air Council tendered its plan to increase the RAF by 154 squadrons, thus raising its peacetime establishment to no less than 348 squadrons.<sup>12</sup> The Air Staff also had high hopes for the RAF's future role in providing for Britain's post-war security. They envisaged both an independent strike force for home defence and an air policing force to patrol the Empire. A broad outline of the RAF's strategic plan was submitted to the Cabinet in December 1918, by the then Chief of the Air Staff, Major-General Sir Frederick Sykes.<sup>13</sup>

By all accounts, the future should have looked very bright for the new service, with its special contribution to safeguarding national interests and fighting any future war. But this was not to be. Instead of expansion, the RAF underwent a massive reduction. Lloyd George's coalition government needed money to pay for its war-time promises, such as 'Homes fit for Heroes' and other long-delayed social programmes.<sup>14</sup> Moreover, a war-weary Britain was in no mood to start planning for the next war when the 'Great War to end all Wars' had just been fought and won.<sup>15</sup> In January 1919, Winston Churchill was appointed Secretary of State for both War and Air. His task was straightforward; he was to roll up the RAF. Before the end of the month the process of dissolution had begun, and, in less than a year, the world's largest air force was reduced to twenty-five squadrons and less than 27,000 officers and other ranks.<sup>16</sup>

### THE RCAF BETWEEN THE WARS

The post-war years were also difficult ones for the Royal Canadian Air Force (RCAF). Canada did not have a national air force during the First World War. Thousands of Canadian airmen made a contribution to the advent of air warfare, but most of them did so as individuals serving in British air forces. The Royal Canadian Naval Air Service and the Canadian Air Force (Overseas), both small and very

late creations, were established and disbanded during the last year of the war. Two years would pass before the Canadian government established a small, non-permanent Canadian Air Force (CAF), designed along 'militia' lines, and firmly tied to the civil sector. In 1924, it received 'Royal' designation, became a permanent force that was a directorate of the Army, and mustered some 68 officers and 307 other ranks. Air defence following RAF concepts was the RCAF's primary military role, but throughout the 1920s and most of the 1930s this very small air force was responsible for a wide variety of civil as well as military air matters. Whilst Canadian airmen favoured the development of an independent air force similar to that of the RAF, Canada's soldiers preferred a force that corresponded to the old Military Wing of the Royal Flying Corps. Heavily influenced by Brigadier General A.G.L. McNaughton, a dedicated advocate of air power in the land battle, the RCAF's inter-war experience and training leaned more towards cooperation with the Army than the exercise of independent air power.<sup>17</sup>

The rise of international tensions in the mid-1930s led to a reduction of the RCAF's civil duties, and in 1938 the RCAF became an independent service. Still small in size,



RCAF groundcrew painting invasion stripes on a 411 Squadron Spitfire just prior to the invasion of Normandy, June 1944.

numbering some 150 officers and less than 1,000 other ranks, and operating 31 obsolete aircraft, the RCAF was hardly a modern air force ready to go to war. Constrained by acute shortages in equipment and personnel, training in 1939 was both difficult and less than realistic. Training, such as it was, was carried out by individual squadrons, and emphasized tactical procedures in air-to-air fighting, ground attack and torpedo runs. The RCAF would start the war as an auxiliary air arm to land and naval units. As an interesting aside, the Canadian approach to army cooperation was exactly what the British Army wanted, and would have had, had its vision of air support rather than that of the RAF's been 'official' policy. In the autumn of 1939, the 1st Canadian Division sailed for England. With it went one army co-operation squadron, No. 110 Squadron, RCAF, equipped with Westland Lysanders.<sup>18</sup>

## THE DEBATE OVER AIR-GROUND COOPERATION

The debate over the strategic application of air forces in national defence was more hotly contested in Britain during the 1920s than it was in Canada. Air Marshal Sir Hugh Trenchard, the Chief of the Air Staff, was increasingly worried that his colleagues in the Army and the Royal Navy neither had the ability nor the desire to develop air power properly. In the spring of 1921, Trenchard warned:

The nation that considers and develops its air forces as an auxiliary arm to the older services will suffer a rude awakening if faced by a nation which has recognised that the air may become a primary medium of war and has developed its air power accordingly.<sup>19</sup>

After extensive analysis of the use and misuse of air forces, Trenchard and the Air Staff established a set of first principles of air warfare — offensive initiative, air superiority, concentration of force, and the need for centralized command and control — principles which served the RAF well in its development of theory and doctrine throughout the inter-war years and the Second World War.<sup>20</sup> The RAF's advocacy of these principles, and its advancement of the concept of 'air power', severely strained relations with the Army and the Royal Navy. Division and hostility were compounded further by deep cuts in defence expenditures and the lack of a common approach within the services to

once command of the air over the intended area of operations had been established, air forces would make their greatest impact through offensive action designed to 'isolate the battlefield' from enemy reinforcement and supply. Both training exercises in the UK and war experience in China and Spain convinced the airmen that air attacks in the contact battle area were ineffective and uneconomical.<sup>23</sup> Targets were difficult to find and hit, losses in aircraft and crews were unacceptably high, and finite air forces quickly depleted in a close support role also lost their ability to maintain the all-important condition of air superiority. Army officers were unimpressed by this logic. They wanted large numbers of specialized aircraft sub-allotted to field commanders to shield their men from enemy air attack and to provide offensive air support — loosely described by the soldiers as flying artillery — to destroy enemy armour, artillery and strong points at the forefront of the battlefield. This is what air forces did in the Great War. The Army, therefore, concluded the soldiers, required its own army-air arm. Anything less was unacceptable.<sup>24</sup>

Irreconcilable differences on matters of principle and deep-seated mistrust over intent bedevilled most dealings between the two services as they struggled to find a mutually acceptable solution to the air support dilemma. The ignominious defeat of the British Expeditionary Forces in France in June 1940, as well as early setbacks in the Middle East against Rommel and the *Afrika Korps*, merely made a bad situation worse. A severe lack of resources and technical problems with both aircraft and rudimentary communications systems also hindered the rapid development of a comprehensive, flexible and quick-to-react air support system. But these problems, severe as they were, were still much easier to overcome than the conceptual differences over air-ground cooperation between Britain's soldiers and airmen.

Defeat at the hands of the *Wehrmacht* convinced most soldiers that they had been right all along: the Army required its own aircraft if it was to have any chance of success in a modern war. Furthermore, the War Office claimed that the Army required its own specialized air forces, consisting of a fighter umbrella for defence and dive-bombers for close offensive support, sub-allotted to ground commanders at both corps and divisional levels. This, claimed the General Staff, was what the German Army enjoyed.<sup>25</sup> The Air Staff disagreed. Effective air support, cited the airmen, was dependent on a high degree of air superiority. To achieve this superiority demanded an air force superior in strength to the enemy air force opposite: a unified air force consisting of bombers, fighters, reconnaissance, communication and transportation aircraft all operated under centralized command, with the flexibility to switch from one task to another as strategic circumstances dictated. Success was not to be found in vast numbers of specialized support aircraft tethered to the ground forces.<sup>26</sup>

the planning and conduct of war at the strategic level. Whilst the RAF concentrated on how to defend Britain from air attack and the Royal Navy concerned itself with maintaining open seas — both strategic tasks — the Army focused on the tactical practicalities of defending the Empire. Worse still, none of the services, either individually or in any combination, possessed the doctrine, force structure or operational level of command necessary to make the vital link between the strategic direction of war and its tactical execution.<sup>21</sup>

On the subject of air support for the Army, the RAF and the Army waged a fierce political battle over the proper employment of finite air forces in war — an acrimonious and divisive struggle that remained unresolved until the spring of 1943.<sup>22</sup> As a general rule, the airmen tended to see a wider, strategic application of air power. In a land battle,

## RESOLVING THE LAND-AIR COOPERATION DILEMMA

During the exceedingly anxious late summer and autumn of 1940, the two services searched for answers to the air support question. Despite a most unhelpful report produced



An RCAF airfield in France, 1944.

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by General Bartholomew — which blamed the RAF for most of the Army’s woes in France, demanded the immediate creation of an army-air arm, and confirmed the War Office’s obsolete understanding of how air power should be applied in a land battle — some soldiers and airmen worked well together on a number of effective joint army-air reforms. The most important of these were the air support experiments conducted in Northern Ireland by Group Captain A.H. Wann and Colonel J.D. Woodall.<sup>27</sup> Wann and Woodall identified the need for a tactical air force: an RAF formation that was equipped and trained to obtain air superiority by offensive air action and to attack battlefield targets in close cooperation with the ground forces. From 5 September to 28 October 1940, they directed a series of signals exercises and command and control trials that led to the formation of a rudimentary combined (army/air) battle headquarters equipped with direct communication links to forward troops and both forward and rear airfields. At the end of the year, the Army and the RAF celebrated three major achievements: the creation of a Combined Central Operations Room at GHQ Home Forces, the adoption of Close Support Bomber Controls following the extensive experiments and trials in Northern Ireland and, on 1 December, the formation of Army Cooperation Command.<sup>28</sup> Working within Army Cooperation Command, from 1941 to mid-1943, RCAF army cooperation squadrons and most RCAF fighter squadrons in the UK developed and refined their tactical procedures for close and direct support operations in a land battle.<sup>29</sup>

A parallel air support system was forged in the hard test of battle in North Africa during the spring and summer months of 1941. Immediately following the two failed attempts to relieve Tobruk in May and June — Operations “Brevity” (15-17 May) and “Battleaxe” (15-17 June) — the two newly appointed air and land commanders, Air Vice Marshal Arthur Tedder and General Sir Claude Auchinleck, initiated a series of joint army-air conferences and exercises aimed at solving the air support problem.<sup>30</sup> Air Support Controls (ASC) — an innovative joint command structure, similar to the Wann Woodall system, to control combined land-air operations — was constructed and tested. In addition to command and control exercises, a number of air trials tested bomber and fighter aircraft in a variety of tasks to determine their optimum roles in ground support operations. Out of these efforts emerged a new tactical air system, one that eventually proved effective in both attack and defence and against either pre-arranged or impromptu targets. The joint command and signals network was the nervous system of the new air support system and the fighter-bomber was its talons and teeth.

Important as these technical and tactical developments were to the success eventually achieved in British air support operations, effective co-operation, for Tedder, still required major improvements in coordination between soldiers and airmen. Air superiority over the battle area was an essential precondition for an effective and sustained contribution by air forces to a land battle. Once a satisfactory air situation was attained, the whole Air Force with all of its available strength could be switched to direct support; in effect, saturating the battlefield with air power. If the Army was to take full advantage of the air effort it would, on occasion and under certain circumstances, have to adapt both the timing and the location of its operations on the ground. To attain a sufficient level of

mutual understanding, Tedder believed that a combined land and air plan, drafted by the two services working as equals, was required. Army and air commanders, he further counselled, must work together throughout all stages of drafting, planning and executing their operations. Unity of purpose would be their guide.<sup>31</sup> The accuracy of Tedder’s theory was confirmed a year later by the successful partnership of General Bernard Montgomery, the newly appointed commander of the Eighth Army, and Air Vice Marshal Arthur Coningham, the commander of the Western Desert Air Force.



Repairing flak damage to an RCAF Spitfire, Holland, 1944.

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Later in the war, Montgomery’s monumental ego would sabotage his relationship with Coningham and other British, American and Canadian commanders, but it was that same ego and burning desire to defeat the Germans that led him in the summer of 1942 to search out his air counterpart in Egypt and construct a winning air-land strategy.

RAF historian, Sir Maurice Dean, identified three vital elements necessary for effective army-air cooperation. They were goodwill (the willingness to cooperate), sound principles and tactics, and reliable communications.<sup>32</sup> By the summer of 1942 all three were in evidence in the Western Desert. Similar levels of cooperation and understanding between the Army and the RAF did not exist back in England. In March 1942, the Chief of the Imperial General Staff (CIGS), General Sir Alan Brooke, re-opened the bitter and protracted debate on an air arm for the Army. Brooke and many of his colleagues at the War Office believed that only the creation of a separate army-air force, made up of specially designed aircraft, flown by carefully trained pilots and controlled by an army commander-in-chief in the field, would guarantee the Army adequate air support. A number of proposals were put forward throughout the spring. The most fanciful was Brooke’s own demand for 111 squadrons of specialized close support aircraft and another 207 squadrons of transport aircraft to meet the Army’s minimum requirements. Additional support, namely fighter protection and bomber attacks against enemy troops and positions, was also requested from the independent air forces. Air Marshal Sir Charles Portal, Chief of the Air Staff, correctly pointed out that additional air support was not possible if the Army’s demand for per-

manently assigned squadrons was met; the army-air arm proposed by the CIGS exceeded the first-line strength of the entire RAF.<sup>33</sup> Experience in North Africa confirmed that when fighting with limited air resources against an enemy of comparable quality and strength, “only a centralised and flexible organisation can achieve ... the air situation in which naval and land forces can operate [successfully].” Therefore, Portal urged his Army counterpart to adopt the principles of the Middle East system as the basis for developing future army-air support.<sup>34</sup>

The soldiers were not impressed with Portal’s suggestion. Many generals, including Canadian General A.G.L. McNaughton, and even a few airmen, were openly critical of the RAF’s approach to integrated air-ground operations.<sup>35</sup> The General Staff wanted No. 2 Group, Bomber Command, built up to twenty squadrons and transferred to Army Cooperation Command. Another proposal originating out of

situation as a whole and co-ordinate support and reconnaissance operations with fighter operations to maintain the air situation.” On 21 July 1942, Air Marshal Sir John Slessor presented his proposal for such a force: a mixed force of fighters, light bombers, army support and reconnaissance squadrons organized in groups all under the command of a single air commander. In the United Kingdom, only Fighter Command had a communication system robust enough to provide the centralized control that the RAF desired, as well as the flexibility to expand and extend the Air Support Control system along Western Desert Air Force lines. Slessor therefore proposed to amalgamate Army Cooperation Command into his new composite force — what would eventually become the 2nd Tactical Air Force — and establish it in No. 11 Group, Fighter Command.<sup>38</sup>

After almost a year of rancour over who would develop Britain’s tactical air forces, either Fighter Command or Army Cooperation Command, the new Air Expeditionary Force Headquarters was established in Fighter Command. Support for this decision came from many quarters outside of the Air Staff and Fighter Command. Churchill favoured the Air Staff’s proposal and, after the RAF’s Composite Group demonstrated its clear advantages in Exercise “Spartan” in March 1943, Air Marshal Sir Arthur Barratt, the commander of Army Cooperation Command, gave his full and unequivocal endorsement to the new system.<sup>39</sup> Support also came from Field Marshal Montgomery, who publicly renounced the old War Office belief that army commanders should control their own supporting air forces.<sup>40</sup>

The Chiefs of Staff approved the RAF’s Air Expeditionary Force (AEF) on 1 May. The AEF would provide a Composite Group for each British and Canadian army taking part in the Normandy invasion and all subsequent operations thereafter. Each Composite Group contained fighter, bomber and reconnaissance aircraft, but they were not restricted to a prescribed ‘fixed strength’. The commander of these air forces was free to move aircraft from one group to another as circumstances and opportunities dictated in order to exploit the inherent flexibility and striking power of his force. Command arrangements conformed closely with the proven methods of the Western Desert Air Force, but a larger and more sophisticated version of the desert air support controls linked the GHQ/AHQ to joint army-air headquarters along the entire chain of command, right down to the most forward units. All air support requests were evaluated by the air commander, who gave priority to those objectives that he decided were vital to the overall success of the land operations. In this way, air support was not frittered away on attractive yet inconsequential tasks.<sup>41</sup>

The AEF was renamed the 2nd Tactical Air Force (2nd TAF) on 1 June 1943, and eventually included No. 2 Group (transferred from Bomber Command) and Nos. 83 and 84 Composite Groups. About half of the squadrons attached to No. 83 Group were Canadian. Seventeen RCAF squadrons ultimately served in 2nd TAF in a variety of air superiority and ground attack roles. Throughout the North West Europe campaign, two RCAF fighter wings (Nos. 126 and 127) and one fighter-bomber wing provided a small part of the overwhelming air superiority enjoyed by Allied armies.<sup>42</sup>



RCAF Typhoons armed and ready to go.

GHQ Home Forces, entitled the Thorold Paper and drafted by Air Commodore Henry Thorold and Colonel Claude Oxborrow, called for the creation of a new RAF Army Air Support Group of twelve squadrons of bombers and fighters specially designed for ground attack.<sup>36</sup> All of the Army’s proposals violated the RAF’s ‘first principles’, particularly those of centralized command and concentration of force. Perhaps most telling, however, was a report written by the Joint Planning Committee, which warned:

Under the existing set-up there are too many RAF Commands concerned .... For Round-Up [the pre-Overlord codeword for the Allied cross-channel invasion of the continent] we must have a single air force command. The nucleus of this command must be established now.<sup>37</sup>

## CREATION OF THE 2ND TACTICAL AIR FORCE

Support was growing for a composite group of all types of aircraft under one air commander “who could see the air

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The Anglo-Canadian partnership was multi-faceted and highly successful. In particular, the RAF and the RCAF drew on both their common traditions and their respective differences in operational heritage, exchanged ideas and shared tactical experiences to their mutual advantage. From the summer of 1944 onward, British and Canadian armies finally had in operation a joint army-air system that provided effective and timely air support at the operational level. Even then, problems with tactical execution were still encountered. At times, unfamiliar operating proce-

dures confused both soldiers and airmen alike, and inaccurate weapons, namely rockets and free-fall bombs, made for a fairly blunt and resource-intense instrument.<sup>43</sup> These shortcomings do not, however, detract from what was a remarkable achievement in inter-service and Anglo-Canadian co-operation during the Second World War.



## NOTES

1. A shorter version of this paper was presented at the Canadian Military History Conference held in Ottawa, Ontario, Canada, 5-9 May 2000.
2. Brereton Greenhous, Stephen Harris, William Johnston and William Rawlings, "The Crucible of War 1939-1945," *The Official History of the Royal Canadian Air Force*, Vol. III (Toronto, 1994), p. 173.
3. Terry Copp and Robert Vogel, "Anglo-Canadian Tactical Air Power in Normandy: A Reassessment" (unpublished, Virginia, American Military Institute, 1987); W.A.B. Douglas, "The Creation of a National Air Force," *The Official History of the Royal Canadian Air Force*, Vol. III (Toronto, 1986); B. Greenhous, S. Harris, et al., *op cit*; and Ian Gooderson, *Air Power at the Battlefield: Allied Close Air Support in Europe 1943-45* (London, 1998).
4. See Shelford Bidwell and Dominick Graham, *Fire-Power. British Army Weapons and the Theories of War 1904-1945* (London, 1982); Harold Winton, *To Change an Army. General Sir John Burnett-Stuart and British Armoured Doctrine, 1927-1938* (London, 1988); John A. English, *The Canadian Army and the Normandy Campaign: A Study of Failure in High Command* (New York, 1991); James S. Corum, *The Roots of Blitzkrieg. Hans von Seeckt and German Military Reform* (Lawrence, Kansas, 1992); and Peter Paret, *Understanding War* (Princeton, New Jersey, 1992).
5. Sykes Papers MFC 77/13/62, "Synopsis of British Air Effort throughout the War," 1 January 1919, RAF Museum, RAF Hendon; and Malcolm Cooper, *The Birth of Independent Air Power. British Air Policy in the First World War* (London, 1986), p. 154.
6. Norman Gibbs, *Grand Strategy*, Vol. I (London, 1976), p. 46; and Malcolm Cooper, *op cit*, p. xv.
7. At the beginning of August 1914, the Royal Flying Corps despatched 50 aircraft to France with the BEF. It left behind in the UK another 75 aircraft of assorted types, most of which were not fit to fly. The Royal Naval Air Service counted 100 aircraft and one air ship on its order of battle, but half of its aircraft were unable to fly. Both air arms planned to use their small number of aircraft as 'eyes in the air', and employed them accordingly on observation and reconnaissance missions. See Malcolm Cooper, *op cit*, pp. 9 and 18; and Shelford Bidwell and Dominick Graham, *op cit*, pp. 101-103.
8. During the war, British aircraft were deployed on reconnaissance missions, artillery observation, air transportation, escort and interceptor missions, air-to-air combat, bombing and strafing of enemy troops and positions, close air support, direct air support, indirect air support, fighter sweeps and air superiority work, and independent bombing operations of a strategic nature. Detailed accounts of Britain's air effort during the First World War are provided in Sir Walter Raleigh and H.A. Jones, *The War in the Air*, 6 vols. (Oxford, 1922-1937); Sir W. Sholto Douglas, *Years of Combat. A Personal Story of the First World War in the Air* (London, 1963); Lee Kennett, *The First Air War, 1914-1918* (New York, 1991); and S.F. Wise, "Canadian Airmen and the First World War," *The Official History of the Royal Canadian Air Force*, Vol. I (Toronto, 1980).
9. J.C. Slessor, *Air Power and Armies* (Oxford, 1936), p. 1.
10. Malcolm Cooper, *op cit*, pp. 62-62, J.C. Slessor, *op cit*, pp. 87-88; Sir Maurice Dean, *The Royal Air Force and Two World Wars* (London, 1971), pp. 21-23; and Lee Kennett, "Developments to 1939," in B.F. Cooling, *Close Air Support* (Washington, DC, 1990), pp. 15-16.
11. PRO AIR 8/13, Cmd Paper 100: Synopsis of British Air Effort During the War (1 January 1919); MRAF Lord Trenchard Papers MFC 76/1/357 Lecture XII, "The Value of a Centralised Air Force," RAF Museum, RAF Hendon; J.C. Slessor, *op cit, passim*; Shelford Bidwell and Dominick Graham, *op cit*, pp. 143-145; and Peter Daybell, "The March Retreat of 1918 - The Last Battle of the Royal Flying Corps," *Air Power Review* Vol. 1, No.1 (1998), pp. 86-101.
12. PRO AIR 6/13, 57th Meeting of the Air Council, 4 November 1918.
13. PRO CAB 24/71, Memorandum on the Air Power Requirements of the Empire from the CAS to the Cabinet, 9 December 1918.
14. Philip Abrams, "The Failure of Social Reform: 1918-1920," *Past and Present*, No. 24, April 1963, pp. 43-64.
15. Michael Howard, *The Continental Commitment* (London, 1971), pp. 74-75; and D.C. Watt, *Too Serious a Business* (London, 1975), pp. 32-34, 47.
16. Brooke-Popham Papers: VII/22, "RAF History - The first 25 Years" (unpublished, 1943), Liddell Hart Centre for Military Archives, King's College London; and Malcolm Smith, *British Air Strategy Between the Wars* (Oxford, 1984), p. 22.
17. S.F. Wise, *op cit*, pp. 579-620; and W.A.B. Douglas, *op cit*, pp. 37-90.
18. W.A.B. Douglas, *op cit*, pp. 119-148; and B. Greenhous, S. Harris, et al., *op cit*, pp. 172-174.
19. PRO AIR 8/2, Remarks by the Chief of the Air Staff, 30 May 1921.
20. PRO AIR 5/299. The RAF's first official attempt to codify the lessons of the 1914-1918 War and produce an air doctrine began in 1922 with the publication of RAF Operations Manual CD 22 (sometimes referred to as Air Publication (AP) 882). This manual was re-named and re-issued in 1928 as AP 1300 RAF War Manual, Part I - Operations.
21. Shelford Bidwell and Dominick Graham, *op cit*, pp. 1-4; and Harold Winton, *op cit*, pp. 1-2.
22. See David Ian Hall, "The Birth of the Tactical Air Force: British Theory and Practice of Air Support in the West, 1939-1943," *D. Phil Thesis* (University of Oxford, 1996).
23. PRO AIR 10/5547, Air Publication 3235, *The Second World War 1939-1945. The Royal Air Force, Air Support* (London, 1955), pp. 9-11. See also AIR 40/342 and 343 Air Staff Notes on Air Operations in China; and AIR 40/219 and 222 Air Staff Notes on Air Aspects of the Spanish Civil War.
24. PRO WO 193/685, Notes on the General Staff Memorandum on Services Required from the RAF for the Field Force, May-June 1939.
25. PRO CAB 106/246, Despatch from the C-in-C, BEF, General the Viscount Gort, 25 July 1940; and WO 106/1754, Co-operation of the Air Forces with the BEF during the period 10-31 May 1940, memorandum prepared by MO7, 18 June 1940.
26. PRO AIR 35/354, Battle of France: BAFF, Despatch by AOC-in-C Air Marshal Sir Arthur Barratt, July 1940.
27. Group Captain A.H. Wann commanded the Advanced Air Striking Force, RAF (AASF) light bomber squadrons in France in 1940 and Colonel J.D. Woodall was Air Marshal Barratt's Military Staff Officer at Headquarters British Air Forces in France (BAFF). A copy of the Wann Woodall Report is reprinted in full in the War Office narrative "Army Air Support," PRO WO 277/34, Appendix C (1945). See also PRO AIR 39/140, Close Support by Bomber and Fighter Aircraft (1940-41), and Ian Gooderson, *op cit*, pp. 24-25.
28. C.E. Carrington, "Army/Air Co-operation, 1939-1943," *Journal of the Royal United Services Institute*, Vol. 115 (December 1970), pp. 38-43.
29. No. 414 Sqn RCAF joined No. 400 Sqn RCAF in Army Co-operation Command in August 1941. Both squadrons were equipped with Curtiss Tomahawks and later with North American Mustang Is. Brought together into No. 39 Army Co-operation Wing, RCAF, they were joined by No. 430 Sqn in January 1943. Following brief stints with Fighter Command, and later a fighter-reconnaissance role, the three squadrons again served together as No. 39 Wing in No. 83 Group, 2nd Tactical Air Force. See B. Greenhous, S. Harris, et al., *op cit*, p. 164.
30. Lord Tedder, *With Prejudice* (London, 1966), pp. 124, 127-8, 138-143; and Sir Maurice Dean, *op cit*, p. 212.
31. Portal Papers, File 12, Nos. 4 and 4a, correspondence between Portal and Tedder, 5 and 11 September 1941, Christ Church, Oxford; and Lord Tedder, *op cit*, pp. 163-4.
32. Sir Maurice Dean, *op cit*, p. 215.
33. PRO CAB 80/35 COS(42)164, 10 March 1942; and J.R.M. Butler, *Grand Strategy*, Vol. III, part II, pp. 529-544.
34. PRO AIR 8/989, Air Forces for Co-operation with the Army and the Navy, DO(42)34, 1 April 1942.
35. B. Greenhous, S. Harris, et al., *op cit*, pp. 226-227.
36. PRO AIR 20/2812, Army Co-operation: The "Thorold" Paper, 25 May 1942; and C.E. Carrington, *Soldier at Bomber Command* (London, 1987), pp. 83-4.
37. PRO AIR 8/1063, Command and Planning, JP(42)517, 21 May 1942.
38. PRO CAB 80/37 COS(42)351, Continental Operations 1943: Operational Organisation and System of Command of the RAF, 21 July 1942. The "Slessor" Report is reprinted in full in WO 277/34 Army Air Support, Appendix K.
39. PRO AIR 39/128, Exercise "Spartan": Report, March 1943; AIR 10/5547, Air Support, p. 41; and C.E. Carrington, *op cit*, pp. 113-114.
40. PRO AIR 20/4582, "Air Power in the Land Battle" pamphlet (February 1943); and AIR 29/2490, Tedder to Portal, 17 February 1943.
41. PRO AIR 10/5547, Air Support, pp. 41-3.
42. B. Greenhous, S. Harris, et al., *op cit*, p. 165.
43. Ian Gooderson, *op cit*, pp. 227-8.