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A Forgotten Revolution?

Army Co-operation Command and Artillery Co-operation, 1940–1942

MATTHEW POWELL

Abstract: This article looks at the development of the Air Observation Post during the inter-war period and the Second World War. It places these developments within the context of the procedures that had emerged from the First World War. Further to this it analyses the role played in this process by Army Co-operation Command and its commander, Air Marshal Sir Arthur Barratt, who it has been claimed previously did all he could to prevent the development of the Air Observation Post concept. Evidence will show Barratt's actions in a new light especially against his experiences in the Battle of France.

THIS ARTICLE ASSESSES the role of the Royal Air Force's (RAF) Army Co-operation Command in the development of artillery observation in Britain between 1940 and 1942. It provides the historical context by exploring the artillery procedures in use during the First World War. These methods changed little by the outbreak of the Second World War in 1939,¹ and failed in the fluid, mobile warfare the British Expeditionary Force (BEF) faced during the German offensive in France in 1940.² The article then analyzes the

¹ Hilary Saunders, *Per Ardua: The Rise of British Air Power 1911–1939* (New York and Toronto: Oxford University Press, 1944), 256–7; Shelford Bidwell and Dominick Graham, *Fire-Power: The British Army Weapons and Theories of War 1904–1945* (Barnsley: Pen and Sword Military Classics 2004 [George Allen and Unwin, 1982]), 150.

² H.J. Parham and E.M.G. Belfield, *Unarmed Into Battle: The Story of the Air Observation Post*, 2nd ed. (Chippenham: Picton Publishing, 1986), 5–6. John Buckley,

work undertaken by the newly created Army Co-operation Command in response to that failure, and particularly examines the part played by its commander, Air Marshal Sir Arthur “Ugly” Barratt. Historians have misinterpreted his role as deliberately obstructionist. This is too simplistic an explanation of his actions and motives. It fails to take into account his experience as an artillery officer in the First World War, and as the Royal Air Force commander in France in 1940, which made him at once an advocate of closer inter-service cooperation and a sceptic about hasty solutions.³

THE FIRST WORLD WAR

The First World War considerably changed artillery ranging and spotting procedures. Both sound ranging and flash spotting involved locating enemy artillery batteries when the guns were fired.⁴ Sound ranging used microphones to detect the sound, while flash spotting identified the location of the batteries through the flash emitted through firing. These changes were brought about by the advent of mass armies, the industrial scale high explosive munitions combined with the use of aircraft creating a revolution in military affairs.⁵ The ingenuity required to combine air and land forces was great, but the outcome, if successful, would make the whole greater than the sum of its parts. With the distances between the guns increasing, judging the fall of shot became more difficult. These distances also required the artillery to develop techniques for “indirect fire,” that is to engage targets unseen by the battery commander.⁶ The Royal Artillery had no experience using this weapon at the operational

“The Air War in France,” in Brian Bond and Michael D. Taylor, eds., *The Battle of France and Flanders, 1940: Sixty Years On* (Barnsley: Leo Cooper, 2001), 122.

³ Parham and Belfield, *Unarmed Into Battle*, 21. Peter Mead, *The Eye in the Air: A History of Air Observation and Reconnaissance for the Army 1785–1945* (London: Her Majesty’s Stationery Office, 1983), 163.

⁴ Bidwell and Graham, *Fire-Power*, 109.

⁵ Jonathan Bailey has described this combination as the first and only true revolution in military affairs. See Jonathan B.A. Bailey, “Deep Battle 1914–1941: The Birth of the Modern Style of War,” *Field Artillery Journal* (July–August 1998): 21–7. There is still a fierce debate between historians as to whether the developments in artillery, aircraft and the scale on which it was used constitutes a revolution in military affairs. One of the best counter-arguments to Bailey’s claims is made by Bidwell and Graham.

⁶ The Royal Artillery “paid lip service to concealment” and the idea of indirect fire. Bidwell and Graham, *Fire-Power*, 21.

level as such a use was never contemplated.⁷ Several methods were developed in order to assist artillery batteries correct their fall of shot as quickly as possible and increase the efficiency of the guns.⁸

Artillery co-operation with aircraft developed quickly as the conditions of static trench warfare allowed artillery-spotting techniques to advance at a more rapid pace than if the conflict had been a mobile war.⁹ One of the first major developments that took place was the creation and refinement of the “clock code” system.¹⁰ Using this system, a pilot of the Royal Flying Corps (RFC), the forerunner to the RAF, was able to correct the guns’ fall of shot by passing to the artillery battery commander by wireless the details of how far the shell impacts were from the target. The pilot would correct the shooting by pointing out how far away and in what direction the artillery shells had landed. The distance would be communicated using numbers and the direction using the picture of a clock face. The target was placed in the middle of the clock face and shells that fell beyond the target and on a straight line to the target would be corrected with a call of 12, if it fell short on the same line the call would be six, at 90 degrees left of the target nine and 90 degrees right three. Any other direction would be corrected by using the hour on the clock with which it corresponded.

This system functioned perfectly well throughout the First World War and was the basic system that the RAF went to war with in 1939 during shoots against impromptu targets. During the First World War, aircraft conducted artillery reconnaissance in relative safety behind their own lines. They were able to align themselves with the battery and target in a timely fashion and allowed this type of co-operation to flourish. Due to the RFC being under army command, aircrew were able to mix and socialize with the gunners they were supporting, increasing mutual understanding and efficiency. When

⁷ Jonathan B.A. Bailey, *The First World War and the Birth of the Modern Style of Warfare* (London: Strategic and Combat Studies Institute, 1996), 7–9. Bidwell and Graham, *Fire-Power*, 19–21.

⁸ Jonathan B.A. Bailey, *Field Artillery and Firepower* (Oxford: Military Press, 1989), 5.

⁹ David Ian Hall, *Strategy for Victory: The Development of British Tactical Air Power, 1919–1943* (Westport, Connecticut and London: Praeger Security International, 2009), 4. Peter Simkins, *Air Fighting 1914–1918: The Struggle for Air Superiority over the Western Front* (London: Imperial War Museum, 1978), 11.

¹⁰ Ralph Barker, *A Brief History of the Royal Flying Corps in World War I* (London: Constable & Co., 2002), 63.

unfamiliar formations were working together, however, that efficiency fell away.¹¹

In 1915, a new technique was tried using the kite balloon. Hydrogen-filled balloons allowed spotters to remain in the air for extended periods as compared to aircraft of the day. Enemy artillery batteries were able to remain silent whilst enemy aircraft were in the vicinity overhead, but they did not have that advantage when balloons were stationed around that section of the line. The balloons were, however, vulnerable to long-range shelling and had to be taken down in the event of an attack. Vulnerability to both ground and air fire meant that observers carried parachutes, a luxury that had not been afforded to pilots. The RFC troops in the balloon could communicate with the battery via a telephone link, unavailable to aircraft, and corrections were made using the “clock code” system. By 1916, this co-operation improved with the introduction of a relatively lightweight wireless telegraphy (w/t) transmitter, which facilitated communications between air and ground. Another improvement in ground-air communication was the Central Wireless Station “established in late 1916 ... These provided a logical solution to the problem of directing attack aircraft against targets encountered by corps [that is, artillery spotting] machines.”¹² Because of developments in wireless technology, a number of aircraft could be controlled on any given length of front. This enabled “any observer ... to communicate with any battery via a telephone exchange and rapidly engage any target that he could identify in pre-arranged zones of the front.”¹³

The return to fluid battles in late 1918 had very little effect upon the methods used by the RAF for conducting artillery observation because the techniques had been so thoroughly developed and practised during the period of static trench warfare. David Jordan has highlighted that at the Third Battle of the Aisne in May–June 1918, “the very fact that artillery work was nothing more than routine by this point implies that the RAF had mastered this duty.”¹⁴ They were assisted by the flash spotting and sound ranging techniques developed by the Royal Artillery. These techniques

¹¹ Barker, *A Brief History of the Royal Flying Corps*, 85.

¹² Barker, *A Brief History of the Royal Flying Corps*, 85, 89, 91, 142; David Jordan, “The Army Co-operation Missions of the Royal Flying Corps/Royal Air Force 1914–1918,” PhD Thesis, University of Birmingham, 1997, 315.

¹³ Mead, *The Eye in the Air*, 100. Bidwell and Graham, *Fire-Power*, 102.

¹⁴ Jordan, “Army Co-operation Missions of the Royal Flying Corps/Royal Air

allowed counter-battery work to continue even when German artillery batteries were camouflaged or the weather prevented flying. The major problem that the RAF encountered during the Allied advance in 1918 was that, due to the relative speed of the advance, the German guns could simply not be located.¹⁵ This meant that while the techniques themselves were sound, they could not be as widely applied as before.

THE AIR OBSERVATION POST

For the most part, interwar training for artillery observation continued to use procedures similar to those of 1917.¹⁶ Peacetime conditions imposed constraints, notably as a result of the lack of sufficient artillery ammunition: “miniature ranges ... were used in squadrons to introduce pilots to artillery procedure but could not teach artillery observation.”¹⁷

The system of correcting artillery fire for an impromptu shoot remained unchanged until 1938. One difficulty, according to Shelford Bidwell and Dominick Graham, was that this system “still required specially trained Royal Air Force Officers using a special procedure flying in slow aircraft in enemy air space and vertically, or thereabouts, over the target.”¹⁸ A less perilous approach, the Air Observation Post (AIR OP) concept, was developed in 1935 by Captain H.C. Bazely, Royal Artillery, who was secretary of the Royal Artillery Flying Club. In the words of Bidwell and Graham:

Bazely’s idea was to provide batteries or brigades of the Royal Artillery with the same sort of small, low-powered aircraft that the officers of the flying club flew for pleasure, able to take off from a meadow or a dirt strip close to the gun positions. The aircraft was to be merely a mount or a flying platform for artillery officers, who would use ordinary artillery procedures for ranging a battery. They would not fly over

Force,” 279.

¹⁵ Jordan, “Army Co-operation Missions of the Royal Flying Corps/Royal Air Force,” 198–199, 310.

¹⁶ Mead, *The Eye in the Air*, 149.

¹⁷ Mead, *The Eye in the Air*, 149.

¹⁸ Bidwell and Graham, *Fire-Power*, 262.

enemy territory, but over their own guns or near them, gaining enough height to targets on ground dead to ground OPs.¹⁹

The Air Ministry opposed modifying the clock code system as they believed it was adequate to meet the future needs of the army. They felt that light aircraft could no longer remain in action close to artillery units, as had been the case in the First World War and that artillery officers could not be trained to the necessary standard of airmanship. The Air Council feared introducing a new and untried procedure with the growing tensions in Europe at this time. The War Office was unimpressed with the Air Council's attitude and pushed for more to be done. The Air Ministry agreed to trials by 22 [Army Co-operation] Group and the School of Artillery in December 1938. These and further trials, showed that light aircraft could observe fire with the "clock code" system. Supermarine Spitfires conducted mock attacks and the Taylorcraft light aircraft observing the artillery fire demonstrated the agility to evade these modern fighters.²⁰ There was, however, no training for pilots in registering targets for the artillery. If an artillery officer required an appraisal of a prospective target the request had to be sent up the command chain via an air liaison officer. When the information on the target finally came back to the artillery battery, it was usually out of date.²¹ There was pressure from within the War Office to establish a Flying Observation Post (FLYING OP) and to begin flying training for gunner officers, and thus overcome RAF aircrews' lack of knowledge of suitable targets. A FLYING OP, operating behind the Allied front for protection by friendly anti-aircraft guns, was to work in conjunction with the Ground Observation Post (GROUND OP) in establishing targets to be engaged.

The first of these FLYING OPS was established in February 1940 "to determine in the light of practical experience obtained under war conditions the possibilities and limitations ... the most suitable type of aircraft and the most suitable organization." The tests were to be conducted in three parts, an initial training period, then a training

¹⁹ Bidwell and Graham, *Fire-Power*, 262.

²⁰ Parham and Belfield, *Unarmed Into Battle*, 14. Bidwell and Graham, *Fire-Power*, 262–263.

²¹ Darrell Knight, *Artillery Flyers at War: A History of the 664, 665, and 666 'Air Observation Post' Squadrons of the Royal Canadian Air Force* (Bennington: Vermont: Merriam Press, 2010), 27.

period with the French, and finally a test in the French Army area including shoots against German targets. At this time, the term Air Observation Post was adopted. The observer aircraft, “Air OP Flight (D Flight),” went to France on 19 April 1940 and then began the test programme. Arrangements for the final – combat – phase were completed on 9 May 1940,²² but the following day the Germans invaded France and the Low Countries.²³ The French artillery designated for the trials was forced to return to their formations leaving the AIR OP Flight waiting for the campaign to stabilize. When it was clear that this would not happen, the observer aircraft returned to England.²⁴ The development of the AIR OP had been started too late to have any effect on the Battle of France or to gain any operational experience with which to develop the concept. The fault for the delay can to a certain degree be attributed to the Air Council, which was reluctant to alter existing doctrine and slow to set up the AIR OP.

ARMY CO-OPERATION COMMAND

The RAF’s new Army Co-operation Command, created on 1 December 1940, became responsible for D Flight. It had up to six aircraft on strength, which, aside from a single Stinson Voyager, included Taylorcraft Plus machines.²⁵ One of the first and most pressing problems the new command had to address was the development of artillery cooperation policy in concert with the army. David Hall broached the major issue for both services after the defeat in France: “Who should control aircraft on the battlefield?” – and what those aircraft should do.²⁶ “Advocates of the Air Observation Post were faced with the greatest challenges,” in the words of Darrell Knight: “The most pressing question being asked was, ‘how much risk was

²² Parham and Belfield, *Unarmed Into Battle*, 15–6.

²³ Karl-Heinz Freiser, *The Blitzkrieg Legend: The 1940 Campaign in the West* (Annapolis: Maryland, Naval Institute Press, 2005), 79.

²⁴ Parham and Belfield, *Unarmed Into Battle*, 16.

²⁵ Parham and Belfield, *Unarmed Into Battle*, 15. Army Co-operation Command at this time consisted of several squadrons of Lysander aircraft.

²⁶ David Hall, “Lessons Not Learned: The Struggle between the Royal Air Force and Army for the Tactical Control of Aircraft, and the Post-mortem on the defeat of the British Expeditionary Force in France in 1940,” in Gary Sheffield and Geoffrey Till, eds., *The Challenges of High Command: The British Experience* (Basingstoke and New York: Palgrave Macmillan, 2003), 113.

too much for an airborne OP pilot to survive while flying at low level in the face of enemy ground formation, or in a sky filled with enemy fighters?"²⁷

There had been serious problems with the use of slow and obsolescent Westland Lysander aircraft to fulfil that role during the fighting in France. The few attempts that had been made to conduct air shoots resulted in the destruction of the aircraft or it being driven off by enemy fighters.²⁸ As a result, most artillery observation during the Battle of France was done by GROUND OP units.²⁹ Between the defeat in France and the creation of Army Co-operation Command, the army, while preparing anti-invasion measures, attempted to develop an air observation policy. That there was very little enthusiasm in the RAF is hardly surprising as the service was preoccupied with fighting the Battle of Britain. Still, the air force clearly understood that air observation for artillery fire was a vital necessity for land warfare.³⁰

One of the first steps to changing artillery co-operation policy was a letter from the director of military co-operation, Air Commodore Victor Goddard, to Barratt at Army Co-operation Command. Not only was Barratt one of the senior officers most experienced in army co-operation, he had begun his military career in the artillery. He was therefore exceptionally well qualified to develop artillery procedure as well as larger army co-operation issues.³¹ In this letter, Goddard stated that the Air Staff were against the formation of "special air units for artillery observation or reconnaissance, unless it can be clearly shown that there is an urgent requirement for such units which cannot be met by Army Co-operations squadrons."³² To allow Army Co-operation squadrons an opportunity to fulfil this role, Goddard argued that artillery co-operation policy should be modified and re-stated, even if this required the development of a new aircraft. Goddard wanted the aircraft of the AIR OP to "act as an elevated observation post [that] was to be capable of flying off and landing on

²⁷ Knight, *Artillery Flyers at War*, 32.

²⁸ Parham and Belfield, *Unarmed Into Battle*, 17.

²⁹ Knight, *Artillery Flyers at War*, 32.

³⁰ Parham and Belfield, *Unarmed Into Battle*, 18.

³¹ <<http://www.kcl.ac.uk/lhcma/locreg/BARRATT.html>>, accessed 25 April 2013.

³² The UK National Archives [TNA] AIR 39/47, Letter from Air Commodore Goddard, Director of Military Co-operation to Barratt regarding Artillery Co-operation Policy, 8 December 1940.

a position close to the guns with which it would be co-operating, and was to be piloted by a gunner officer competent to perform a shoot.”³³

Lieutenant-Colonel J.D. Woodall, the senior army staff officer at Army Co-operation Command, requested a report on what organizational form the AIR OP should take if it were developed. He also wanted the report to address the role of Army Co-operation squadrons in artillery work if the AIR OP was or was not developed. The report, completed on 18 December 1940, gave the School of Artillery’s view that the AIR OP had not truly represented “that for which it was originally intended” because of the different meanings ascribed to the term “Observation Post” by the gunner and layman. The school wished to further emphasize that “the Air OP is, and has always been, intended to carry out a role entirely similar but supplementary to that of the normal Artillery OP on the ground.”³⁴ The AIR OP should be developed on the basis of one per artillery regiment and should contain one officer pilot of the Royal Artillery and three other ranks. The role of Army Co-operation squadrons fell into four distinct areas, only two of which have relevance to this paper. These would be reconnaissance to supplement what could be seen by GROUND OPS and constantly observe the areas where the hostile batteries were located while active operations were in progress.³⁵

The School of Artillery believed that the role of army co-operation squadrons faced very little change regardless of whether the AIR OP was fully developed. The officers of army co-operation aircraft, however, required additional training in land operations to ensure they thoroughly understood army requirements and operating methods; in short to make certain that air crew spoke the same language as the people they were supporting on the ground. A certain number should specialize in artillery work and attend the School of Artillery. In this way, the School of Artillery sought to allow aircraft to have tactical control over the fire of artillery batteries. The school further advised that a multi-seat aircraft should be employed to accommodate an artillery officer who would conduct the shoot and thus obviate the need for artillery officers learning to fly. Artillery

³³ TNA AIR 39/47, Letter from Air Commodore Goddard, 8 December 1940.

³⁴ TNA AIR 39/47, Report on Artillery Co-operation, 18 December 1940.

³⁵ The four areas were the observation of the forward zone, constant observation of the hostile battery area while operations were in progress, occasional observation further over enemy lines and to produce photographs on which to base future fire plans. TNA AIR 39/47, Report on Artillery Co-operation, 18 December 1940.

officers, the school also recommended, should be seconded to army co-operation squadrons specifically for artillery work.³⁶

Number 70 Group, a training group, and 71 Group, the operational formation of Army Co-operation Command, agreed that the AIR OP performed a necessary service and should be allocated on the scale of one per artillery regiment. The groups also felt that any changes in the fire procedure that shortened the time aircraft spent performing that role “is an asset.” One of the ideas put forward to effect this recommendation was the adoption of artillery methods of fire control.³⁷ The co-operative spirit evident in the report of 18 December 1940 is surprising in view of the strained relations between the army and RAF in the wake of the Battle of France.³⁸ The officer appointed by the army to conduct its investigation of that defeat was General William Bartholomew, renowned for his anti-RAF feelings and a hatred of combined service solutions. He approached the investigation with the conviction that the army’s tactical doctrine during the battle had been sound. It was the RAF and a lack of the correct type of air support that had led to the disaster on the continent.³⁹ By contrast, the agreement on air-land cooperation in artillery work between the School of Artillery and the officers of 70 and 71 Groups is an example of the good relations that existed between lower formations.

In January 1941, Barratt wrote to the under-secretary of State for Air describing the best way to co-operate with the Royal Artillery: “I consider that in order to get a true and undistorted picture of this problem, it is first desirable to set out the problem as the Army sees it, and to show in this picture what they conceive to be their requirements.”⁴⁰ Again, the desire to see the problem from a view that would almost certainly be contradictory to the RAF shows that Barratt and his command were willing to adopt a different approach and attitude in co-operating with at least one part of the army. In an appendix to this letter the School of Artillery’s opinion was

³⁶ TNA AIR 39/47, Report on Artillery Co-operation, 18 December 1940.

³⁷ TNA AIR 39/47, The Future of Artillery Co-operation Replies from Nos. 70 and 17 Groups, 18 December 1940.

³⁸ For more information on the army’s reaction to the Battle of France see TNA CAB 106/220, Bartholomew Committee Final Report. Hall, pp.55–9.

³⁹ Alistair Byford, “The Battle of France, May 1940: Enduring, Combined and Joint Lessons,” *Air Power Review* 11, no.2 (Summer 2006): 68.

⁴⁰ TNA AIR 39/47, Letter from Barratt to Under-Secretary of State for Air regarding co-operation with the Royal Artillery, 29 January 1941.

again put forward, outlining the role that aircraft should play in artillery spotting. The school argued that with the change in the tempo of warfare the old methods would simply not produce the required results. It is “no longer possible for an aircraft carrying out artillery reconnaissance to patrol methodically over territory occupied by the enemy.” The way to adapt to these new conditions was to have high observation posts from which it would be possible to see much more of the battlefield and, as a result, be able to direct the fire of several artillery batteries.⁴¹ In the case of operations in Britain against a German invasion, the vulnerable aircraft conducting the reconnaissance for the artillery would come under the protection of an umbrella of aircraft from Fighter Command.⁴² Nevertheless, Barratt voiced his concerns about the ability of the AIR OP to operate in the face of enemy action: “the Air OP must be entirely vulnerable to any enemy fighters which cares to shoot it down.”⁴³ Barratt’s frequently expressed concern over the safety of the pilots conducting shoots as an AIR OP using the gunner system can partly be explained through his experiences during the Battle of France. He had had to send aircrews to their deaths by ordering unsuitable Fairey Battle aircraft to attack temporary German pontoon bridges across the Meuse River after the Germans had crossed and been able to organize effective anti-aircraft defences.⁴⁴

The communications system recommended for use in aircraft conducting artillery co-operation was also the subject of much discussion. One of the major issues was whether to use wireless telegraphy or radio telephony. One of the overriding factors that influenced this decision was the simplicity of training: “The time factor and the constant flow of casualties will prevent any possibility of producing a class of highly skilled specialists.” The main features of the air observers’ training emphasized artillery gunnery procedures and the tactical knowledge of flying required to get maximum value out of his observation. To simplify the training as much as possible

⁴¹ TNA AIR 39/47, Appendix A to Letter from Barratt to Under-Secretary of State for Air regarding co-operation with the Royal Artillery, 29 January 1941, Report on Artillery Requirements in Air Co-operation as they affect Royal Air Force Commitments.

⁴² TNA AIR 39/47, Letter from Army Co-operation Command to Headquarters No. 71 Group, Artillery Reconnaissance – Policy and Training 20 March 1941.

⁴³ TNA AIR 39/47, Appendix A, 29 January 1941.

⁴⁴ Hall, *Strategy for Victory*, 51.

special communications procedures were to be abolished. The use of radio, in contrast to wireless telegraphy, did not require “such officers acquiring a fairly high standard of morse [code], and maintaining a constant handiness in the manipulation of the Artillery Code.” The recommendation was for an artillery officer “acting as his own signaller and transmitting orders by two-way R/T.”⁴⁵ Later, in February 1941, Barratt argued that the aircraft currently available for artillery co-operation (Lysanders) could not perform the role expected under the new proposals, especially in the face of “even moderate enemy opposition” and that the squadrons must be re-equipped with a fighter aircraft in order to be able to fully carry out artillery observation.⁴⁶

POLICY DEVELOPMENT

In response to a letter from No.71 Group regarding the development of policy and training for the artillery observation role, Army Co-operation Command stated they felt that “the case against the Air OP would seem probably conclusive.”⁴⁷ A further reply in late March to No.71 Group’s letter argued that working in an anti-invasion role artillery co-operation aircraft were to use a “flash-spotting” technique, provided the topography was already known. With anti-invasion measures implemented in the summer of 1940, it must be assumed that the majority of the topography over which these operations were conducted would already be known due to familiarity with the potential landing areas. There was also confirmation that the current procedure was still to be used in these circumstances.⁴⁸

Further trials of a new artillery procedure were conducted in March 1941 when the aircraft observed and corrected the fall of shot as it flew over the target. A single-seat fighter was best suited to this role, which required flying over enemy lines, and for this reason

⁴⁵ TNA AIR 39/47, Memorandum regarding Artillery/Air Co-operation. 6 February 1941.

⁴⁶ TNA AIR 39/47, Memorandum on Artillery Reconnaissance, February 1941.

⁴⁷ TNA AIR 39/47, Memorandum in reply to a Letter from No. 71 Group to Army Co-operation Command. Letter dated 14 February 1941. Memorandum dated 17 March 1941.

⁴⁸ TNA AIR 39/47, Letter to No. 71 Group from Army Co-operation Command, Artillery Reconnaissance – Policy and Training, 20 March 1941.

a Hawker Hurricane carried out the trials. The first test, which used the old reconnaissance procedure, was designed to “find out if there was any difficulty in positioning a low wing monoplane while making the observations.” In the words of the report, “there was none.”⁴⁹ The second shoot took into account the tactical situation that might be faced by aircraft in this role. During this shoot the initial ranging salvos were timed to arrive at the target at the same time as the aircraft.⁵⁰ The procedure was altered slightly: the order to fire was “answered by two salvos instead of three, since it was considered to be too difficult to make three observations during one run over the target.” The final shoot simulated the observation of long-range fire by a delay of 30 seconds between the order to fire and the firing of the guns. Thus the pilot had to time his run more accurately to allow for both the delay in the guns firing and the time required for the aircraft to reach the target. The major conclusion reached from these trials was that the Hurricane was not suitable for prolonged artillery reconnaissance shoots because the pilot, having to keep a lookout for enemy aircraft while operating his own high performance machine, was not able to give his attention to the ground for more than a few seconds.⁵¹

During a conference held at the headquarters of Army Co-operation Command it was suggested the “clock code” system be abolished and replaced by the normal artillery procedure.⁵² The pilot would correct shots by ordering the battery to add, drop, or adjust left or right in divisions of one hundred yards. A trial held in April 1941, on similar lines to the one in March but using Lysander aircraft, showed that with suitable weather conditions artillery reconnaissance could be conducted without penetrating enemy territory, and that with two-way radio communications, the artillery method of correcting fire was quicker than using the “clock code.” An impromptu shoot could also be conducted with an unaassigned battery using the artillery

⁴⁹ TNA AIR 39/47, Artillery Reconnaissance in a Single Seater Fighter Type, March 1941.

⁵⁰ TNA AIR 39/47, Artillery Reconnaissance in a, Mar 1941; TNA AIR 39/47, Letter from the Under Secretary of State for Air to Barratt, 5 April 1941.

⁵¹ TNA AIR 39/47, Artillery Reconnaissance in a Single Seater Fighter Type, March 1941.

⁵² TNA AIR 39/47, Conference at Headquarters Army Co-operation Command on Artillery Reconnaissance, Procedure, Orthodox Artillery Co-operation, 9 April 1941.

method.⁵³ The pilots were “unanimous [in their opinion] that this method of directing fire to fall on the targets, is simpler and quicker than the clock code method of observing the fall of the rounds.” The Lysander was also more effective in this role than the Hurricane due to “its excellent visibility, its small turning circle, and its ability to operate from improvised advanced landing grounds, and the fact that it has its own tail protection.”⁵⁴

Barratt responded sceptically. He considered “that body of experience gained in the late war and since has all pointed to the advantages of the ‘Clock Code’ system.”⁵⁵ This viewpoint was reinforced by the senior artillery officer of Eastern Command, Brigadier Duncan, although he believed that the AIR OP had a useful function supplementing the information gained through normal artillery reconnaissance, including the land OP.⁵⁶ Barratt noted that with highly trained pilots it had always been possible to shoot a battery from the air using the artillery method. Barratt’s belief in the “clock code” system stemmed not from conservatism, but more from fear of conclusions drawn from brief experiments being widely applied among air crew who by the nature of wartime circumstances could not be highly trained.⁵⁷ When Barratt had to account to the under secretary of state for air for the lack of efficiency in air cooperation with artillery he wrote that it “has been due to the propagation of rumour as to other and better methods than those shown in AP1176 [The RAF Manual of Army Co-operation].”⁵⁸

Further trials were conducted using the artillery method during April 1941 and reached similarly positive conclusions “Artillery methods of ranging by corrections to line and range are simpler, quicker, and more efficient than any method based on the ‘clock code.’ They lend themselves more readily to observation from a low altitude behind our own lines, and are more in accordance with the realities of modern air fighting and AA [anti-aircraft] defence.”

⁵³ TNA AIR 39/47, Artillery Co-operation Trials – Part I, April, 1941.

⁵⁴ TNA AIR 39/47, Artillery Co-operation Trails – Part II, April 1941.

⁵⁵ TNA AIR 39/47, Letter from Headquarters Army Co-operation Command to Headquarters No. 70 Group, Artillery Reconnaissance Trials, 12 April 1941.

⁵⁶ TNA AIR 39/47, Note for Commander-in-Chief on Brigadier Duncan’s visit, 14 April 1941.

⁵⁷ TNA AIR 39/47, Army Co-operation Command to No. 70 Group.

⁵⁸ TNA AIR 39/47, Letter from Barratt to Under Secretary of State for Air, 14 April 1941.

Further, these methods “for air observation [would] result in a simplification of training problems for both to the Royal Artillery and RAF.”⁵⁹ Concerns remained as high up as the Air Ministry that the modified procedure had not been adequately proved, and that there should be further, exhaustive trials.⁶⁰ These concerns were reinforced by instructions for artillery training issued by the chief of the general staff (CGS): “The procedure to be used during this summer [1941] is that laid down in AP 1176. Units of Home Forces will not carry out experimental shooting with modified procedures.”⁶¹

Problems with the old “clock code” system in the fighting in Libya meanwhile echoed those in France in 1940.⁶² Barratt retorted that the “clock code” system was not at fault, but that the aircraft employed in North Africa, as in France, were operating in the face of intense enemy opposition. He too was unconvinced by the trials in March and April 1941; they had been too few and were skewed in favour of a positive result by the School of Artillery.⁶³ These views might be interpreted as simply blocking a new development that had been shown to work in order to preserve the autonomy of the RAF. Yet that conclusion would ignore the close cooperation of Barrett’s command with the army in the trials.⁶⁴ Barratt in fact meant what he said about the need for more trials. With the success of these extended trials, Barratt was then convinced that pilots were able to conduct a shoot and that training in this new method could be done quickly. The new procedure was to be effective from 15 June 1941.⁶⁵

The work for Barratt in this area was not finished with the adoption of the new procedure. The trials showed that the new procedure worked most efficiently with two-way radio communications. This system used two radios sets, the Army No.11 Set on the ground and, in the Tomahawk Army Co-operation aircraft, an Army No.19 Set.⁶⁶

⁵⁹ TNA AIR 39/47, Report from Headquarters No. 70 Group to Army Co-operation Command, 15 April 1941.

⁶⁰ TNA AIR 39/47, Letter from Air Ministry to J.D. Woodall, 26 April 1941.

⁶¹ TNA AIR 39/47, Draft Copy of instruction an Artillery Reconnaissance training, April 1941.

⁶² TNA AIR 39/47, Letter from CGS on Artillery Reconnaissance, 5 May 1941.

⁶³ TNA AIR 39/47, Letter from Barratt to Major-General Otto Lund, GHQ Home Forces, in response from letter from CGS on Artillery Reconnaissance, 10 May 1941.

⁶⁴ TNA AIR 39/47, Barratt to Lund, 10 May 1941.

⁶⁵ TNA AIR 39/47, Minutes of Meetings held at the School of Artillery, Larkhill, 21 June 1941.

⁶⁶ TNA AIR 39/48, Letter from Barratt to the Under-Secretary of State for Air

Barratt later argued in a letter to the Under-Secretary of State for Air that the major problem in attempting to use the two-way radios was in the allotment of suitable frequencies on the artillery radio net. “[T]his promising suggestion should not be turned down because of the frequency difficulty,” and the War Office should be pressed on the matter.⁶⁷ The director of telecommunications wrote to Barratt assuring him that the War Office saw no difficulty in “allotting suitable frequencies to Squadrons for Artillery Co-operation.”⁶⁸

The School of Artillery still experienced problems in conducting training exercises in the new procedure because of the unavailability of aircraft. The problem was overcome “by the good will of the School of Army Co-operation.”⁶⁹ Army Co-operation Command responded to an appeal from the School of Artillery by assigning No.225 Squadron for these exercises.⁷⁰ During a one-week practice camp using the new procedure in early 1942 the pilots and artillery officers lived together as they had done during the First World War which improved the camaraderie and co-operation between the services.⁷¹

CONCLUSION

The procedure for artillery reconnaissance first developed during the First World War where there was little movement no longer suited the needs of modern warfare. In the earlier conflict the relatively stable front lines allowed a system to develop, but it was only fully effective in those particular conditions. The British forces very quickly discovered this difficulty during their first major land combat of the Second World War, the Battle for France in 1940. The attitudes of both the British Army and the RAF to co-operation during the interwar period had done little to improve the situation

regarding Artillery Co-operation, 15 August 1941.

⁶⁷ TNA AIR 39/48, Letter from Barratt to the Under-Secretary of State for Air, 3 September 1941.

⁶⁸ TNA AIR 39/48, Letter from the Director of Telecommunications to Barratt, 9 October 1941.

⁶⁹ TNA AIR 39/48, Letter from the Senior Air Staff Officer, Army Co-operation Command to Headquarters, No. 36 Wing, 24 October 1941.

⁷⁰ TNA AIR 39/48, Letter from Headquarters No. 36 Wing to Senior Air Staff Officer, Army Co-operation Command, 10 October 1941.

⁷¹ TNA AIR 39/48, Letter from Army Co-operation Command to 32, 34, 35 and 36 Wings regarding Artillery Practice Camp, 26 March 1942.

before the BEF was despatched to France. The movement of the AIR OP to France in February 1940 to gain experience conducting a potentially different form of artillery reconnaissance occurred too late and did not provide any real guidance in the wake of the disastrous campaign.

This left those charged with the responsibility of modifying the existing procedure with only the experience of the First World War to guide them and on which to base their expectations. Much co-operation between the School of Artillery and Nos. 70 and 71 Groups of Army Co-operation Command occurred, despite the general feeling of animosity between the services.⁷² This co-operation was the most that had been seen between the army and RAF since the formation of the RAF as an independent force in 1918. Historians have interpreted Barratt's move to block the adoption of the new procedure during 1941 as a simple block of the AIR OP concept which prevented co-operation with the army in this area. As this article demonstrates, however, Barratt's objections were more complex than a simple rejection of an army idea. He was the senior RAF officer with the most experience in army co-operation work and could bring additional expertise as a former artillery officer. His caution in adopting new methods was derived from his need for the affirmation of the results already achieved through more rigorous testing and trials in to confirm the results. The trials also established the suitability of specialist observation aircraft for this role. The additional testing would expose the procedure and those responsible for carrying it out to more stress and thus ensure a greater degree of authenticity in the results. Trials of this nature would also confirm whether the procedure could be implemented with ease by the majority of pilots whose responsibility would be increased from observing the fall of shot to conducting shoots, potentially in the face of enemy opposition. Barratt's major concern with the new system appears to be its increased complexity and he was rightly concerned after his experiences in France that pilots would be unable to conduct the shoot while also watching for enemy fighter attacks.

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⁷² Hall, *Strategy for Victory*, 89–103.

ABOUT THE AUTHOR

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