

1 Organisation

In many respects, the importance of communications to British military operations on the Western Front is revealed by the immense organisational transformation that took place during the course of the war. As the scale and intensity of the fighting increased, and as the BEF grew in both size and complexity, so too were there corresponding changes to the communications establishment. This was particularly the case with regards to the Signal Service, aptly described by Field Marshal Sir Douglas Haig as ‘the nervous system to the whole vast organism of our Army’, which grew from an establishment of just below 2,400 officers and men in 1914 to a force consisting of nearly 42,000 at the signing of the armistice.¹ This chapter charts the development of the BEF’s communications machinery, from its humble composition upon the outbreak of the war through to its maturation in 1918. In the process, it highlights the scale of the BEF’s communications effort, as it expanded from an initial body comprising just 29 signal units in 1914 to a force encompassing 443 signal units by the war’s end.² However, in order to make sense of these developments, it will first be necessary to examine the state of the British Army’s communications system immediately prior to the war, and assess the extent to which it was geared for the scale and intensity of the war that lay ahead.

Pre-War Developments

The origins of the Signal Service can be traced back to the formation of the first professional signal unit in the British Army, C Telegraph Troop,

¹ Field Marshal Sir Douglas Haig’s Final Despatch, 21 March 1919, in Lieutenant-Colonel J. H. Boraston (ed.), *Sir Douglas Haig’s Despatches* (London: Dent, 1920), 334. In terms of relative growth, the Signal Service constituted 1.03 per cent of the BEF in August 1914 and 3.1 per cent of the BEF in November 1918. See Major Paul W. Evans, ‘Strategic Signal Communication: A Study of Signal Communication as Applied to Large Field Forces, Based upon the Operations of the German Signal Corps During the March on Paris in 1914’, *Signal Corps Bulletin*, 82 (1935), 55–6.

² War Office, *Statistics of the Military Effort of the British Empire, 1914–1920* (London: HMSO, 1922), 170–1.

R.E., in 1870.³ In 1880, the first *Manual of Instruction in Army Signalling* was issued and four years later, C Troop was merged with the 22nd and 34th Telegraph Companies attached to the General Post Office (GPO) and renamed the Telegraph Battalion, R.E.⁴ Despite seeing action in a number of the British Army's colonial campaigns during the late nineteenth century, including the Nile Expedition of 1884–5 and the Ashanti Campaign in 1895–6, the Telegraph Battalion's biggest challenge occurred during the Second South African, or Boer, War (1899–1902).⁵ Up until then, communication practice had often been rudimentary and extemporised, in part a reflection of the limited scale of the army's colonial campaigns and its relatively ill-equipped and technically inefficient opponents. The conflict in South Africa, however, provided the British Army with its first taste of a more modern style of war against an adversary equipped with some of the most up-to-date French and German armaments.⁶ Subsequently, the army suffered from uncoordinated and clumsy signal organisation and practice, particularly during the first half of the war. The defective transmission of information throughout the Battle of Spion Kop (23–4 January 1900), for example, confirmed 'how inherently unreliable and subject to accidents' British communication arrangements were.⁷ Issues of interoperability were a particular

³ This consisted originally of 2 officers and 133 other ranks, commanded by Captain Montague Lambert. See Major-General R. F. H. Nalder, *The Royal Corps of Signals: A History of Its Antecedents and Development, 1800–1955* (London: Royal Signals Institution, 1958), 21. In 1871, the adjutant of C Troop was Lieutenant (later Field Marshal Lord) Horatio Herbert Kitchener. See Cliff Lord and Graham Watson, *The Royal Corps of Signals: Unit Histories of the Corps (1920–2001) and Its Antecedents* (Solihull: Helion, 2004), 16.

⁴ 'Proceedings of the Committee on Telegraph Troop and Companies, Royal Engineers, According to the Recommendations of the Royal Engineers Committee 1880', undated, WO33/36, TNA; Lord and Watson, *Royal Corps of Signals*, 17.

⁵ 'Report on Army Telegraphs, Nile Expedition 1884–1885', undated, WO33/47, TNA; Major C. F. C. Beresford, R.E., 'The Field Telegraph: Its Use in the War and Its Employment in the Late Expeditions in the Soudan and South Africa', *Journal of the Royal United Service Institution*, 30 (1886), 573–601; Nalder, *Royal Corps of Signals*, 26–32. For a discussion of the employment of military telegraph units in earlier campaigns, see: Major A. W. Mackworth, 'The Field Telegraph Corps in Egypt', *Royal Engineers Journal*, 12 (1882), 269–72; and, Lieutenant-Colonel A. C. Hamilton, R.E., 'Our Field Telegraph: Its Work in Recent Campaigns, and Its Present Organisation', *Journal of the Royal United Service Institution*, 28 (1884), 329–55.

⁶ Edward Spiers, 'The Late Victorian Army 1868–1914', in David Chandler and Ian F. W. Beckett (eds.), *The Oxford History of the British Army* (Oxford: Oxford University Press, 1996), 187–210; Spencer Jones, *From Boer War to World War: Tactical Reform of the British Army, 1902–1914* (Norman: University of Oklahoma Press, 2012), 17–36.

⁷ Colonel Hubert du Cane (trans.), *The War in South Africa: The Advance to Pretoria after Paardeberg, the Upper Tugela Campaign, etc. Prepared in the Historical Section of the Great General Staff, Berlin* (London: John Murray, 1906), 169. See, also, Captain F. S. Morgan, 'The Development of Communication and Command', *Journal of the Royal United Service Institution*, 76 (1931), 132–4.

concern. In July 1900, a report by Lieutenant-Colonel Tom O'Leary, the Director of Army Signalling noted that, because many signallers within the Royal Artillery were instructed in semaphore only, heliographs and signalling lamps could not be used by infantry units wishing to communicate with their artillery batteries.⁸ On the whole, post-war reports concurred that the means of signalling available was thought to be 'poor' and 'insufficient' at worse, and merely 'satisfactory' at best.⁹ Although by the end of the war there were 24 officers and 2,424 men responsible for maintaining a little more than 9,300 miles of cable in South Africa, there were strong calls from officers within the Telegraph Battalion for 'a careful analysis of the varying conditions met with on active service', so as to produce an organisation of much greater flexibility and efficiency.¹⁰

Many of these problems were again exposed during army manoeuvres in the years immediately following the end of the war. Major Edmund Godfrey-Faussett, commanding 2nd Telegraph Company, complained that the 1904 summer training exercises had been hampered by a severe shortage of equipment and draught horses. As a consequence, communications among the various headquarters could not be adequately maintained since telegraph cable could not be laid fast enough.¹¹ In light of the disastrous experiences of the Second South African War and of the ongoing problems encountered during yearly army manoeuvres, in March 1905 a War Office committee was set up to review the state of the army's telegraph service. Chaired by Major-General Sir Elliott Wood, the army's chief engineer, the committee's aim was to increase the field telegraphic establishment, since

the role in field telegraphy in war has entirely changed. It is now used as a means of communication, not only between the field army and its communications, but also between units which are actually engaged in battle; this much enhances its value, and it is a matter of the highest importance that we should possess sufficient telegraphic establishments to admit of a general being in constant communication with the component parts of his force.¹²

The Telegraph Battalion was subsequently abolished and three telegraph companies formed, one for each army corps and 'K' Telegraph Company

⁸ 'Report on Signalling Rendered to the Field-Marshal Commanding-in-Chief by the Director of Signalling, Army Headquarters', July 1900, WO108/256, TNA.

⁹ 'Signalling Equipment: Extracts from Reports by Officers Commanding Units in South Africa during 1899–1901', undated, WO108/278, TNA.

¹⁰ Lord and Watson, *Royal Corps of Signals*, 18; Major E. G. Godfrey-Faussett, 'Studies on the Use of Field Telegraphs in South Africa', *Royal Engineers Journal*, 8 (1908), 24.

¹¹ 'Report on Summer Training, 1904', undated, WO32/6799, TNA.

¹² 'Report of the Wood Committee on Army Telegraph Units, March 1905', WO32/6799, TNA.

for the lines of communication. From 1907, a telegraph company was added to each infantry division of the newly created expeditionary force. Two airline and two cable telegraph companies were formed for army communications, three cable sections for the Cavalry Division and two experimental wireless companies created. Two telegraph companies were also provided for work on the lines of communication.¹³

The Wood Committee was the first of several committees set up between 1905 and 1914 to review and amend the army's signal organisation. Many of the recommendations of these committees, however, were met with considerable opposition from the General Staff, which considered some of the proposals to be too far-reaching.¹⁴ One of the clearest examples of this conflict of interests occurred in 1906–7, following the report of a committee presided over by Field-Marshal Sir Evelyn Wood.¹⁵ Observing the lessons of the Russo-Japanese War of 1904–5, the committee recommended that all means of communication within the British Army should be placed under the control of one overriding authority. The committee also strongly recommended that this 'Communication Service' should take over infantry and artillery signalling as far forward as battalion and battery headquarters.¹⁶ The committee's proposals did not sit well with the General Staff, which voiced its disapproval in January 1907:

The Committee have assumed that the Manchurian Campaign should be taken as a guide to the employment of Engineers in our probable campaigns. This is not accepted by the General Staff as a correct assumption, because the conditions... rendered the Engineer work both in attack and defence quite abnormal... Brigade level of communications should not be done by the Royal Engineers... The Infantry are perfectly capable of doing this themselves.¹⁷

Because of the objections of the General Staff, the committee's proposals were not implemented. Although the issue of communications was at least receiving some attention, it appears that the General Staff was reluctant to provide the army with anything more than an absolute bare minimum of signal organisation.

¹³ In 1912 these were amalgamated into 'K' Telegraph Company. See Nalder, *Royal Corps of Signals*, 50–1; Lord and Watson, *Royal Corps of Signals*, 18.

¹⁴ Priestley, *Work of the Royal Engineers*, 5.

¹⁵ Ian F. W. Beckett, 'Wood, Sir (Henry) Evelyn (1838–1919)', *Oxford Dictionary of National Biography*, www.oxforddnb.com/view/article/37000 [accessed 18 December 2015].

¹⁶ 'Report of the Committee Appointed to Inquire into the Organisation of the Corps of Royal Engineers together with Evidence and Appendices, 1906', WO32/6805, TNA.

¹⁷ 'Criticism on R.E. Committee (Sir E. Wood): Employment in the Field and War Organisation', 7 January 1907, WO32/6805, TNA.

However, the increasing complexity of modern warfare, as demonstrated by the Russo-Japanese War, created a growing interest in, and appreciation for, communications.¹⁸ As Lieutenant-Colonel Bernard Dietz, CO 7th Dragoon Guards, observed in January 1908, ‘the increased range and great accuracy of modern artillery, machine guns and the magazine rifle have made the transmission of information during field operations more difficult than in the past’.¹⁹ Indeed, as the 1909 *Field Service Regulations* made clear: ‘The constant maintenance of communication between the various parts of an army is of urgent importance; it is on this to a great extent that the possibility of co-operation depends’.²⁰ The issue of whether or not the army should possess one organisation solely responsible for all its communication needs was one of increasing importance, especially since the defects of the present service were becoming ever more noticeable during yearly army manoeuvres.²¹ For example, Captain D. H. Blundell, who commanded a small experimental communication company in 2 Division during the 1906 army exercises, noted afterwards:

So long as the telegraphs and the telephones and the Communication Company worked under separate control... co-operation was hard to arrive at... because neither officer in charge knew exactly what the other was doing... To get the best work out of a Communication Company, it must be working *with* the telegraphs; and to ensure this, all methods of communication within a division should be under one control.²²

Eventually, in April 1909 a War Office committee met to consider whether it was desirable to coordinate all methods of communication in the field in one organisation. Chaired by Brigadier-General (later General Sir) Archibald Murray,²³ the Director of Military Training, the committee had as its primary concern that ‘while in certain portions of the field there may be overlapping of work and waste of communication

¹⁸ Anon., ‘The Service of Communication in the Light of the Experience of the Russo-Japanese War’, *Journal of the Royal United Services Institution*, 52 (1908), 968–70; Anon., ‘Communication on the Battlefield. Translated by Permission from La Revue d’Infanterie’, *Journal of the Royal United Services Institution*, 53 (1909), 357–69; Jones, *From Boer War to World War*, 153.

¹⁹ ‘Memorandum on Signalling by Means of Discs’, January 1908, History of Military Signalling, 908.2, Royal Signals Museum Archive (RSMA), Blandford.

²⁰ *Field Service Regulations Part I*, 22.

²¹ Captain R. C. Hammond, ‘Communication in the Field’, *Royal Engineers Journal*, 7 (1908), 139–52.

²² Quoted in Bat.-Colonel J. E. Capper, ‘Information on the Battlefield’, *Royal Engineers Journal*, 6 (1907), 34.

²³ J. E. Edmonds, ‘Murray, Sir Archibald James (1860–1945)’, rev. Martin Bunton, *Oxford Dictionary of National Biography*, www.oxforddnb.com/view/article/35155 [accessed 18 December 2015].

personnel, in other directions the communication service may be so inadequate as to cause a complete breakdown'.²⁴ The committee argued that the creation of one overriding signal organisation would ensure that all methods of communication, whether telegraph, telephone, wireless, visual or despatch rider, would be used to their best advantage and that their 'economical and scientific employment' would be met. The major question, however, was where this new organisation was going to originate. The committee considered four possible alternatives.

The first proposal called for the formation of an entirely new corps. A separate 'Corps of Signals' would provide the army with all its communication needs. However, there were already objections within the military over the ever-increasing number of new corps being created. Adjutant General Sir Ian Hamilton, in a letter dated 20 April 1909, outlined his misgivings over the possible establishment of a Corps of Signals stating, 'If a separate Corps were formed it might add to the already complicated organisation of our army'.²⁵ There were also concerns raised over the difficulties affecting the promotion of officers and, perhaps more importantly, problems over economy and finance. In the end, as a result of financial constraints and administrative difficulties, the committee found the idea of raising a separate corps of signals to be impractical.²⁶

The second alternative the committee considered was the creation of signal companies from a selection of the most suitable officers and men in any branch of the army. In essence, this would be an improvised corps of sorts. The acceptance of this proposal, however, rested on the necessity for the officers and troops selected to receive Royal Engineer pay. Since Royal Engineers soldiers were some of the highest paid in the British Army, problems of precedent and economy forced the committee to rule out this second proposal.²⁷

The third alternative was to provide signal personnel on a non-regular basis. While this was certainly the most economical of the proposals considered, it would not provide the army with a communication service fitting of its size and importance. There was also an additional problem of

²⁴ 'Committee on Coordination of Methods of Communication and Schools of Telegraphy and Signalling', April 1909, WO33/3003, TNA.

²⁵ 'Remarks of A. G. on Report of Committee on Coordination of Methods of Communication in the Field', 20 April 1909, WO32/6942, TNA.

²⁶ 'Committee on Coordination of Methods of Communication and Schools of Telegraphy and Signalling', April 1909, WO33/3003, TNA.

²⁷ For army pay scales, see *Field Service Pocket Book: 1914* (Reprinted, with Amendments, 1916) (London: HMSO, 1917), 179.

the length of training and service of troops of the Territorial Force.²⁸ The committee agreed that troops selected would require at least three years' training to be of 'the higher standard essential for the personnel of Signal Companies'. Overall, however, the proposal was thought not to be an adequate solution to the problem.²⁹

The fourth alternative discussed by the committee was the provision of a limited 'Signal Service' with personnel drawn from a communication branch of an already existing corps. It was agreed that the most suitable established corps would be the Royal Engineers as it already had a pool of highly trained personnel. This, in turn, would prove less costly than forming an entirely new corps. It was decided, therefore, that the Signal Service should be formed as a separate branch of the Royal Engineers.³⁰ However, the committee upheld the General Staff's earlier decision that signalling within infantry battalions, cavalry regiments and the artillery should remain the responsibility of those units and not the Signal Service. It was felt that the duties of Signal Service personnel 'will be firstly and mainly communication, to which their role as fighting men will be subsidiary only', while regimental signallers were recognised as 'soldiers first and their duties as signallers secondary'. Intercommunication within the artillery, in particular, was to remain the responsibility of the artillery signallers chiefly because artillery messages were deemed 'generally of a highly technical character'.³¹ Consequently, the responsibility of the Signal Service would end at the headquarters of infantry battalions and cavalry regiments; the communication requirements of those units were to be fulfilled by signallers provided, trained and controlled by those respective arms, while artillery communications were to remain outside the Signal Service's jurisdiction.³² This was to prove a major organisational stumbling block during the first half of the war, exposing a significant and highly vulnerable weakness within the army's communications system.³³

²⁸ On the pre-war Territorial Force, see K. W. Mitchinson, *England's Last Hope: The Territorial Force, 1908–14* (London: Palgrave, 2008); and, Timothy Bowman and Mark Connelly, *The Edwardian Army: Recruiting, Training, and Deploying the British Army, 1902–1914* (Oxford: Oxford University Press, 2012), 106–46.

²⁹ 'Committee on Coordination of Methods of Communication and Schools of Telegraphy and Signalling', April 1909, WO33/3003, TNA.

³⁰ *Ibid.*; Nalder, *Royal Corps of Signals*, 50.

³¹ 'Committee on Coordination of Methods of Communication and Schools of Telegraphy and Signalling', April 1909, WO33/3003, TNA.

³² Priestley, *Work of the Royal Engineers*, 5–6.

³³ Despite the lessons and organisational changes that occurred during the First World War, the Royal Corps of Signals (established in 1920) found itself in a similar predicament during the course of the Second World War, when it also had no official jurisdiction over communications at regimental and battery levels. See Simon Godfrey,

The structure and responsibilities of the Signal Service as laid out by the Murray Committee in 1909 remained virtually unchanged in August 1914. However, it was not until 1912, as a result of the recommendations of a further committee which met in 1911,³⁴ that the Signal Service was officially recognised and its activities regularised by means of Army Order 309.³⁵ With the formal recognition of the Signal Service, the old telegraph units were abolished and the term 'telegraph' replaced by 'signal', which was now the recognised term when reference was made to communications in the army.³⁶

Control and Direction

Upon the outbreak of the war, within the War Office in London there existed neither a Director of Signals nor one branch that was solely responsible for the direction and coordination of the Signal Service. Instead, responsibility was divided between the various members of the Army Council. Organisation and training fell under the jurisdiction of the Chief of the Imperial General Staff (CIGS), via the Director of Staff Duties and Director of Military Training, respectively. The Adjutant-General dealt with all matters relating to personnel, while the Quartermaster-General was responsible for the design, manufacture and provision of signalling equipment. The former was coordinated by the Director of Staff Duties, while the Director of Fortifications and Works supervised the latter, with assistance from the Royal Engineers Committee.³⁷

In 1916, the position of Director of Military Training was abolished and most of his responsibilities passed to S.D.4, a branch under the director of staff duties.³⁸ Coordination of signal training at home and abroad was handled jointly by S.D.4(d), a section which consisted simply of one GSO3,³⁹ and the Royal Engineers training and special

British Army Communications in the Second World War: Lifting the Fog of Battle (London: Bloomsbury, 2013), 3.

³⁴ 'Report of the Committee on Coordination of Methods of Communication and Schools of Telegraphy and Signalling', undated [1911], WO32/6942, TNA; Priestley, *Work of the Royal Engineers*, 5.

³⁵ 'Army Order 309, Reorganisation of the Intercommunication Services of the Expeditionary Force for War', November 1911, WO123/53, TNA.

³⁶ 'Report of the Inter-Departmental Committee on Postal and Telegraph Services, 1911', WO32/11396, TNA; Nalder, *Royal Corps of Signals*, 51.

³⁷ Nalder, *Royal Corps of Signals*, 75.

³⁸ Charles Messenger, *Call to Arms: The British Army 1914-18* (London: Weidenfeld & Nicolson, 2005), 340.

³⁹ Captain J. S. Yule, R.E. (GSO3), assisted by a Superintending Clerk and seven additional clerks. H. C. Perrott (comp.), *The War Office List: 1917* (London: HMSO, 1917), 76.

services. In the continuing absence of a senior Signal Service representative at the War Office, the Commandant of the Signal Service Training Centre, Colonel (later Brigadier-General) Reginald Boys, was consulted on an ad hoc basis.⁴⁰ These arrangements persisted until February 1918 when, upon the express wishes of the BEF's Director of Army Signals, a separate signals branch, S.D.6, was formed, at last giving the Signal Service 'adequate weight and representation at the War Office'.⁴¹ Headed by Lieutenant-Colonel Llewelyn Evans,⁴² and assisted by one GSO2 and four clerks, S.D.6 was responsible for coordinating and prioritising signal training, personnel and equipment throughout all theatres of war.⁴³ Although a marked improvement compared to the previous War Office arrangements, it was a far cry from the Signal Directorate established in January 1941, which, by the end of the Second World War, consisted of 65 staff officers, working in 11 branches and headed by an experienced signal officer, Major-General Geoffrey Rawson.⁴⁴

The lack of suitable control and direction of the Signal Service's activities at the War Office was replicated to a similar degree in the field, and was particularly problematic during the first half of the war. Although a *Manual of Army Signal Service – War* did exist, not only was it under revision when the war broke out, but it also did not anticipate the enormous scale of the challenges the Signal Service was about to face.⁴⁵ Upon mobilisation, the BEF's Signal Service numbered 75 officers and

⁴⁰ This situation seemed to mirror a trend within the War Office as a whole during this period. Upon entering the War Office as the new CIGS, General Sir William Robertson told Haig: 'I found things here even in a greater state of muddle and chaos than I had feared, and it will take me some time to get them right'. General Sir William Robertson to General Sir Douglas Haig, 26 December 1915, cited in David R. Woodward (ed.), *The Military Correspondence of Field-Marshal Sir William Robertson, Chief of the Imperial General Staff, December 1915-February 1918* (Army Records Society: Bodley Head, 1989), 23. See, also, Sir William Robertson, *Soldiers and Statesmen 1914–1918*, Vol. 1 (London: Cassell, 1926), 164–90.

⁴¹ Priestley, *Work of the Royal Engineers*, 300.

⁴² Prior to the war, Evans had commanded the R.E. Wireless Company based at Aldershot, taking part in the early experiments in wireless communication between aircraft and the ground. See Walter Raleigh, *The War in the Air*, Vol. 1: *The Part Played in the Great War by the Royal Air Force* (Oxford: Clarendon Press, 1922), 224.

⁴³ Captain B. J. M. Bebb, R.E. was the GSO2. J. R. Wade (comp.), *The War Office List: 1918* (London: HMSO, 1918), 87.

⁴⁴ Rawson had been AD Signals XII Corps (Salonika) during the First World War. Between 1932 and 1936 he was Chief Instructor, School of Signals, and in 1944 he was appointed Colonel Commandant of the Royal Corps of Signals, a post he held until 1950. See: Lord and Watson, *Royal Corps of Signals*, 322–3; Nalder, *Royal Corps of Signals*, 76, 214, 268.

⁴⁵ *Manual of Army Signal Service – War (Provisional): 1914* (London: HMSO, 1914).

Table 1.1 *Signal Service Establishment, BEF, August 1914*

Unit and No. of Personnel	Allotted to	No. of Units in the BEF	Total No. of Personnel
'L' Signal Company (5 Officers, 263 Men)	Inspector General of Communications HQ (Lines of Communication)	1	5 Officers and 263 Men
GHQ Signal Company (5 Officers, 75 Men)	GHQ	1	5 Officers and 75 Men
'Q' Wireless Section (2 Officers, 66 Men)	GHQ	1	2 Officers and 63 Men
Army Corps HQ Signal Company (4 Officers, 63 Men)	Army Corps HQ	2	8 Officers and 126 Men
Airline Section (1 Officer, 57 Men)	Distributed to GHQ and Army Corps HQ as may be required	5	5 Officers and 285 Men
Cable Section (1 Officer, 35 Men)		8	8 Officers and 280 Men
Divisional Signal Company (5 Officers, 157 Men)	Infantry Division	6	30 Officers and 942 Men
Signal Squadron (8 Officers, 198 Men)	Cavalry Division	1	8 Officers and 198 Men
Signal Troop (1 Officer, 23 Men)	Cavalry Brigade	3	3 Officers and 69 Men
Signal Troop (1 Officer, 42 Men)	Independent Cavalry Brigade	1	1 Officer and 42 Men
Grand Total		29	75 Officers and 2,346 Men

Source: Compiled from Priestley, *Work of the Royal Engineers*, 11; and, *Field Service Pocket Book*: 1914, 60–2.

2,346 other ranks, comprising 29 units in all (Table 1.1).⁴⁶ The control and administration of these units were the responsibility of Colonel (later Lieutenant-General Sir) John Fowler, who held the post of Director of Army Signals at GHQ throughout the war.⁴⁷ As well as advising the commander-in-chief on all matters pertaining to the Signal Service and

⁴⁶ The signal units of the Territorial Force provided a further 103 officers and 2,893 other ranks, which comprised 14 divisional telegraph companies; five army wireless telegraph companies; five army cable telegraph companies; and, five army airline telegraph companies. See Priestley, *Work of the Royal Engineers*, 11–12.

⁴⁷ Fowler was promoted to brigadier-general in October 1914 and to major-general in January 1917.

to communications throughout the BEF in general,⁴⁸ Fowler's main duties included the 'organisation and maintenance of all means of intercommunication, including visual, electrical, and mechanical, and despatch riders in the theatre of operations', and the 'administration and distribution of the signal troops, and for the employment of those not allotted to subordinate commands'.⁴⁹ To help carry out these responsibilities, however, Fowler was afforded an extremely slender staff, consisting initially of only one staff officer and three clerks, which made it virtually impossible for him to exert complete control over the activities of such a diverse array of signal units.⁵⁰ This problem was exacerbated by the fact that Fowler had no representative of a similar appointment to himself – in other words, a chief signal officer – at corps, and later army, headquarters. Consequently, although Fowler could issue 'all orders regarding the technical employment of the signal personnel, and for the regulation of signal traffic',⁵¹ the lack of an effective central chain of command within the Signal Service meant that most signal companies tended to work independently of one another and under the direction of their own headquarters' staffs.⁵² Since the officers commanding signal companies were responsible not only for commanding their companies but also for advising their staffs, the vast increase in both the scale of the fighting and the size and complexity of the BEF from 1915 meant that close supervision of subordinate signal units during the first half of the war was rarely exercised, resulting in clumsy, ad hoc and uncoordinated signal administration.⁵³

The key turning point for improved control and coordination of the Signal Service's activities in the field occurred in 1916: first, in February with the appointment of Deputy Directors of Army Signals (DD Signals), with the rank of colonel, at army headquarters; and, second, in November, with the appointment of Assistant Directors of Army Signals (AD Signals), with the rank of lieutenant-colonel, at corps headquarters. The chief justification for the creation of these new posts was 'to free the Officers Commanding Army and Corps Headquarters Signal Companies from their executive duties in connection with their units, and to enable

⁴⁸ *Manual of Army Signal Service – War*, 11. ⁴⁹ *Field Service Pocket Book: 1914*, 28.

⁵⁰ Not only did the size of Fowler's staff remain the same for the first two years of the war, crucially it also lacked a liaison officer until 1916. See Priestley, *Work of the Royal Engineers*, 340.

⁵¹ Major G. R. N. Collins, *Military Organization and Administration* (London: Hugh Rees, 1918), 352.

⁵² Nalder, *Royal Corps of Signals*, 77.

⁵³ Colonel R. S. Curtis, 'The Work of Signal Units in War', *Royal Engineers Journal*, 18 (1913), 270; *Manual of Army Signal Service – War*, 16; Priestley, *Work of the Royal Engineers*, 92.

them to deal with the larger questions affecting the general scheme of inter-communication throughout their respective areas'.⁵⁴ Thus, there now existed a chief signal officer at each army and corps headquarters in addition to the officers commanding the army and corps signal companies.⁵⁵ These were to prove inspired appointments, since not only did they gradually improve the coordination and overall efficiency of the Signal Service, but they also helped mend the somewhat strained relationship between the Signal Service and the General Staff.⁵⁶

Indeed, the DD Signals were accountable to the army commander, through the General Staff, for the efficiency of the methods of communication within the army area, the training of signal units and personnel, and were responsible for the provision of signal stores and their distribution. They had to cultivate good working relationships with the army staff on the one hand and with the AD Signals on the other. The importance of the relationship between the DD Signals and the army staff was particularly emphasised in a memorandum by Godfrey-Faussett, now DD Signals Fifth Army, in early 1918. He stressed that 'it is much more important for his [DD Signals] office to be close to the "G" Staff Office than the Signal Office, and when important operations are in progress he should be in and out of the "G" Office every 2 or 3 hours'.⁵⁷ As Table 1.2 shows, given that nearly all the DD Signals appointed in early 1916 retained their posts until the end of the war, it may be deduced that the working relationships between them and the army staff were almost certainly productive – a reflection of the overall improvement in signal-staff relations and coordination during the last two years of the war, which greatly facilitated the overall performance of the BEF's communications system.

Though specific to the corps level of command, the duties and responsibilities of the AD Signals were almost identical to those of the DD Signals. Besides maintaining close contact with commanders and staffs of all formations within the corps, the AD Signals were responsible for the planning and supervision of the general scheme of communications

⁵⁴ 'Signal Service – Officers', 25 February 1916, AWM25/463/1, Australian War Memorial (AWM), Canberra.

⁵⁵ In late 1917, a Deputy Assistant Director of Army Signals (DAD Signals) was added to the staff of the dd signals, with the rank of major. Priestley, *Work of the Royal Engineers*, 192–3, 253, 337.

⁵⁶ Nalder, *Royal Corps of Signals*, 109; Paul Harris, 'The Men Who Planned the War' 137, 140–1.

⁵⁷ 'Organisation of the Signals of an Army When Holding a Sector of Line (Siege Warfare)', 3 March 1918, Organisation and Work of Signals in WW1 – Papers on Various Subjects, M1599, Royal Engineers Museum Archive (REMA), Gillingham.

Table 1.2 *DD Signals, BEF, 1916–1918*

	First Army	Second Army	Third Army	Fourth Army	Reserve/Fifth Army
1916					
February	Edmund Godfrey-Faussett	Arthur Hildebrand	William Newbigging	Robert Earle	
May					Lionel Sadleir-Jackson
June	Herbert Moore				Edmund Godfrey-Faussett
1918					
May					Frederick Iles
October		Hubert Clementi-Smith			

Note: All colonels, with the exception of Sadleir-Jackson, who was a major at the time.

Source: Compiled from Major A. F. Becke (Comp.), *History of the Great War: Order of Battle of Divisions, Part 4* (London: HMSO, 1945), 71–111; and, Nalder, *Royal Corps of Signals*, 503–80. It should be noted that there existed from the beginning of the war a DD Signals (Lines of Communication). This position was held by Major (later Major-General) Ernest Turner.

within the corps area, as well as with neighbouring corps; the preparation and issuing of general and technical signal instructions; control over the issue of signal stores; the formation and supervision of the Corps Signal School; and the selection and recommendation of signal officer appointments.⁵⁸ However, unlike the DD Signals, who were afforded the assistance of a GSO2 and two clerks, the AD Signals had no staff of their own, having to borrow from the corps signal company as a result.⁵⁹ As Appendix 1 shows, there was a higher turnover of AD Signals than DD Signals, though the degree of continuity varied considerably. Although only two of the AD Signals originally appointed in November 1916 (Danielsen and Harrison) retained their positions within the same corps until the armistice, seven (Stevenson, Bald, Walsh, Mair, Dobbs, Yeats-Brown and Smith) served as AD Signals in two corps, while one (Carey) served as AD Signals with three different corps. Overall, the permanent establishment of AD Signals from 1916 onwards should be viewed not only as an important milestone in the development and increased status of the Signal Service, but also as a significant indicator of the growing

⁵⁸ 'Allocation of Duties to Officers – Corps Signals', 2 January 1918, RG9-III-C-5/4443/7/6, Library and Archives Canada (LAC), Ottawa.

⁵⁹ Nalder, *Royal Corps of Signals*, 85.

importance of corps in the planning and execution of the BEF's operations. As Andy Simpson has argued: 'From 1916 onwards, corps was the highest level of command... concerned with the detail of operations and success was crucially dependent on the planning of corps staffs'.⁶⁰

Aside from the Director of Army Signals, DD Signals and AD Signals, the signal unit of each formation down to, but not including, infantry battalion headquarters was commanded by a Signal Service officer. Typically, the OC GHQ Signal Company and the OC Army Signal Company were afforded the rank of major, while the OC Corps Signal Company and OC Divisional Signal Company were appointed majors or captains.⁶¹ The principal duties of these officers were largely administrative in nature and included 'the co-ordination and supervision of the Signal work not only of the Signal Service, but also of all Artillery, Infantry and other units under the command of his GOC'.⁶² However, as an American observer reported in 1917, the OC divisional signal company was also instructed to 'keep in the closest communication with the [divisional] General Staff... and be prepared to proffer advice as to communications'.⁶³ As such, most of the administrative details and arrangements concerning the divisional signal company, such as signal office routine, the provision of stores and writing the company war diary, were carried out by the OC divisional signal company's second in command, typically a captain or a lieutenant.⁶⁴ In all of the duties, pre-war doctrine dictated that the provision and maintenance of communication between two headquarters were the responsibility of the higher commander and organisation.⁶⁵ However, it was also stressed that this did not lessen the responsibility of a subordinate commander in keeping his superior 'regularly informed of the progress of events and of important changes in the situation as they occur'.⁶⁶

Arguably the most important, yet equally the most challenging, position within the Signal Service's chain of command was that of the brigade signalling officer. Since he commanded one of the four sections

⁶⁰ Simpson, *Directing Operations*, 226.

⁶¹ 'Signal Service – Officers', 25 February 1916, AWM25/463/1, AWM.

⁶² 'Signal Service – Summary of Instructions', 31 December 1916, AWM25/425/47, AWM.

⁶³ 'Detailed Instructions for the Headquarters Staff of a Division', undated [late 1917], AEF General Staff Library Files, RG120/279/35, National Archives and Records Administration (NARA), Maryland.

⁶⁴ 'Divisional Signal Company: Allocation of Duties to Officers', undated [early 1918], AWM25/425/3, AWM.

⁶⁵ 'Report of a Conference of General Staff Officers at the Staff College, 15th to 18th January, 1912', 16, WO279/45, TNA; Collins, *Military Organization*, 353.

⁶⁶ *Field Service Regulations Part I*, 22.



Plate 1.1 Interior of the New Zealand signal office, 1 August 1917
(Henry Armytage Sanders: Alexander Turnbull Library, Wellington,
1/2-012884-G)

that comprised the divisional signal company, he owed his allegiance to the OC divisional signal company. However, because he spent the majority of his time at brigade headquarters, it was crucial that he also lived on good terms with the brigadier-general and his staff.⁶⁷ Typically a subaltern, the brigade signal officer had the principal task of providing and maintaining communications with neighbouring brigades and, crucially, between brigade and battalion headquarters.⁶⁸ Officially, it was at the latter headquarters where the brigade signal officer's, and thus the Signal Service's, jurisdiction ended. Yet, as one signal officer observed after the

⁶⁷ J. B. Scrivenor, *Brigade Signals* (Oxford: Basil Blackwell, 1932), 48–50; Austin Patrick Corcoran, *The Daredevil of the Army: A Motorcycle Despatch Rider and 'Buzzer' in the British Army during the First World War* (first published 1919; new ed., Milton Keynes: Leonaur, 2011), 61.

⁶⁸ 'Notes on Signal Communication within a Division When Holding a Defensive Line', April 1915, AWM27/311/32, AWM; 'Lectures: 47th Canadian Infantry Battalion', undated [1917], Sir Arthur Currie Papers, MG30, E100/35/161, LAC.

war, 'it was also clearly laid down that the brigade signalling officer was responsible for the supervision and coordination of all communications in the brigade area, which of course included the battalion areas, though the battalion signalling officers were not under his direct control'.⁶⁹ The *Trench Standing Orders* of the 124th Infantry Brigade in late 1915 also stipulated quite clearly that the 'Brigade Signalling Officer is responsible for communications within the battalions'.⁷⁰ In light of the fact that the battalion signal officer could refuse to carry out a verbal order or instruction by the brigade signal officer on the grounds that he was answerable only to the battalion commander, the importance of getting his battalion counterpart 'to do what you wanted them to do without any friction' was impressed upon the brigade signal officer. In this respect, cohesion of personnel and the efficient working of communications forward of brigade headquarters 'were not the result of the organisation, but depended on the ability of all concerned to pull together amicably'.⁷¹ One brigade signal officer, for example, recalled how in early 1917 he was 'most flattered at being addressed as "Sir" one day by two Battalion Signal Officers!'⁷²

Indeed, one of the major organisational concerns for the Signal Service was also where the BEF's communications system was at its most vulnerable – the battalion level.⁷³ Because of the ruling made by the General Staff before the war, communications forward of battalion headquarters were to remain the responsibility of the regimental signallers, not the Signal Service. In 1914, an infantry battalion's signal section was made up of a sergeant and 16 men, typically under the nominal supervision of the battalion adjutant.⁷⁴ Some, more fortunate, battalions managed to retain a signal officer, usually of subaltern rank, though such a position had been officially abolished before the war. Communications within these battalions were generally more efficient and better organised than in those battalions that could not spare an

⁶⁹ Scrivenor, *Brigade Signals*, 49.

⁷⁰ 'Trench Standing Orders, 1915–16. 124th Infantry Brigade', in Stephen Bull (comp.), *An Officer's Manual of the Western Front 1914–1918* (London: Conway, 2008), 80.

⁷¹ Scrivenor, *Brigade Signals*, 50.

⁷² Archibald Gordon MacGregor and Anna Welti (ed.), *Signals from the Great War: The Experiences of a Signals Officer on the Western Front as Told through His War Diaries 1917–1919* (Brighton: Reveille Press, 2014), 34.

⁷³ Anon., 'Trench Signaling [sic] Becomes a Fine Art: British Officer Writes of Difficulties Overcome on the Western Front', *New York Times*, 12 August 1917, 5.

⁷⁴ *Field Service Manual, 1914 Infantry Battalion, Expeditionary Force* (London, HMSO, 1914), 8–9; Chris McCarthy, 'Queen of the Battlefield: The Development of Command, Organisation and Tactics in the British Infantry Battalion during the Great War', in Sheffield and Todman (eds.), *Command and Control on the Western Front*, 173.

officer to focus exclusively on communications. However, since in the vast majority of cases the adjutant assumed responsibility for the battalion signallers, not only could he not devote enough attention to the task, since he had an array of other duties to perform, but he also knew very little about the practicalities of signalling.⁷⁵ It was not until December 1917 that the post of battalion signal officer was officially reinstated, though by that time most battalions had found it necessary to appoint an unofficial signal officer.⁷⁶ According to John Staniforth, the battalion signal officer was 'responsible for maintaining communication at all times from his Bn. Hdqrs. to the Brigade, to the component companies of his battalion, and to the units on either flank, and to establish the necessary stations accordingly'.⁷⁷ Since such officers were under strict instructions to 'devote the whole of [their] attention to [their] lines' and to 'work in the closest cooperation with the Brigade Signal Officer', they were not 'to undertake any other duties whatsoever'.⁷⁸

Unsurprisingly, given the lack of adequate coordination and supervision during the first half of the war, the state of battalion communications quickly deteriorated.⁷⁹ The high number of casualties amongst regimental signallers,⁸⁰ as well as the decision in early 1915 to extend cable communications beyond battalion headquarters and up to the frontline trenches, a task that was beyond the ability of the typical regimental signaller who was trained almost exclusively in visual methods of communication, further exacerbated the state of affairs within battalion signals.⁸¹ Consequently, as early as December 1914 it was noted that 'duties are being thrown on Divisional Signal Companies which are not included in any manuals, but which require to be recognised'.⁸² Essentially, the Signal Service was compelled to step in to coordinate and supervise the provision and maintenance of communications right up to the frontline. Although it was never officially sanctioned by the high command, largely as a result of objections raised concerning practicality

⁷⁵ 'Organisation of Battalion Signallers', 18 January 1916, Guards Division Signal Company War Diary, WO95/1205, TNA.

⁷⁶ Priestley, *Work of the Royal Engineers*, 15, 146.

⁷⁷ J. H. M. Staniforth and Richard S. Grayson (ed.), *At War with the 16th Irish Division 1914–1918: The Staniforth Letters* (Barnsley: Pen and Sword, 2012), 34.

⁷⁸ Major-General H. A. Williams to 1st ANZAC Corps, 30 April 1916, AWM25/425/26, AWM.

⁷⁹ 'Communication within a Battalion in the Trenches', 25 December 1914, 5 Division War Diary, WO95/1510, TNA.

⁸⁰ Major F. S. Garwood (OC 7 Division Signal Company), diary entry, 8 November 1914, Garwood Papers 91/23/1, Imperial War Museum (IWM), London.

⁸¹ Priestley, *Work of the Royal Engineers*, 146.

⁸² 'Director of Army Signals. Circular Memorandum No. 29', December 1914, Director of Army Signals War Diary, WO95/57, TNA.

and economy, gradually 'commanders of divisional signal companies acquired through their brigade signal officers a definite measure of control over battalion communications'.⁸³ As one brigade signal officer noted after the war, since he 'exercised general supervision' over the regimental signallers, he practically 'ran his own Signals show forward of Bde. H.Q.'.⁸⁴ This tacit acknowledgement of Signal Service control was strengthened further by the fact that battalion signallers received their equipment directly from the Signal Service's stores and that the training of regimental signallers became the responsibility of the OC divisional signal company, initially via classes arranged at brigade level, and from 1916 under the more centralised direction of the Divisional Signal Schools.⁸⁵ Thus, gradually Signal Service equipment and methods permeated down to the lowest levels of the BEF, giving the Signal Service far greater control and direction over the communications system than had been the case in 1914.

Specialist Communications

The growing demand for greater and more efficient communications from 1915 onwards meant that not only was the BEF's communications system extended to support the functions of a whole range of specialist arms and formations, but also new organisational structures were created to enable the effective use of some of the more innovative means of communication that were developed and employed during the course of the war. With regards to the former, the three most significant arms were undoubtedly the artillery, the Royal Flying Corps (RFC) and the Tank Corps. In the case of the latter, the growing importance of wireless communication necessitated profound changes to the way in which it was controlled and coordinated. All provided unique challenges for the BEF's communications establishment to contend with, particularly for the Signal Service, which was increasingly called upon to extend the scope of its jurisdiction into areas that had either been excluded from its remit at the start of the war, or into areas that were entirely novel.

With the commencement of trench warfare, the increasing dominance of artillery over the battlefield, coupled with the insatiable needs of the arm, brought about some of the most fundamental changes to signal

⁸³ Nalder, *Royal Corps of Signals*, 97.

⁸⁴ MacGregor and Welti (ed.), *Signals from the Great War*, 34, 115.

⁸⁵ 'Organisation of Battalion Signallers', 18 January 1916, Guards Division Signal Company War Diary, WO95/1205, TNA; Scrivenor, *Brigade Signals*, 49; Priestley, *Work of the Royal Engineers*, 45, 133.

practice and organisation.⁸⁶ At first, however, the General Staff's pre-war decision to separate artillery communications from the Signal Service's sphere of influence had a detrimental impact upon the efficiency of artillery signals. Artillery–infantry cooperation, for instance, was very ad hoc, relying largely upon a primitive system of liaison during the first months of the war. Although this worked reasonably well during the initial period of mobility, it quickly became apparent with the onset of trench warfare that drastic reorganisation was required. Hampered by inadequate numbers of personnel and by the fact that most artillery signallers in 1914 lacked suitable training in handling telephones and laying and repairing lines,⁸⁷ it soon became standard practice for the Signal Service to lay the initial telephone lines of a newly arrived artillery unit. Although the artillery signallers would operate the line thereafter, often the Signal Service was called upon to repair faults and resolve any technical problems that occurred.⁸⁸ In this way, the Signal Service gained its first foothold in the realm of artillery communications, a process that was further extended in April 1915 when a small signal office detachment for the Commander Royal Artillery (CRA) was added to the divisional signal company, and a cable detachment created for the sole purpose of laying artillery lines. Although artillery brigade signal officers, who were drawn from the Royal Artillery, were made responsible for all communications within their area, including the links between observation posts and their batteries, and for liaison with the infantry,⁸⁹ the OC divisional signal company, via his brigade signalling officer and representative with the CRA, gradually assumed control over all lines in the brigade area.⁹⁰

Throughout 1916, the increasing demands by the artillery and its associated services – anti-aircraft batteries, flash-spotting, sound ranging, kite balloons and trench mortar batteries – became too much for the Signal Service to meet adequately under the restrictions of the existing organisation. Not only were the majority of cable circuits in forward areas required for the artillery, but they were becoming increasingly complex. Thus, during the winter of 1916–17 the decision was made to transfer all

⁸⁶ On the significance of artillery at the tactical and operational levels, see Bailey, *First World War*; and, Marble, *The Infantry Cannot Do with a Gun Less*.

⁸⁷ 'Further Notes on Artillery in the Present War', November 1914, AIR1/2251/209/54/19, TNA.

⁸⁸ See, for example, 4 Division Signal Company War Diary, 4 October 1914, WO95/1471, TNA.

⁸⁹ 'Notes on Signal Communication within a Division When Holding a Defensive Line', April 1915, AWM27/311/32, AWM.

⁹⁰ Priestley, *Work of the Royal Engineers*, 57.



Plate 1.2 A New Zealand battery receiving communications on a field telephone, Beaussart, France, 23 May 1918 (Henry Armytage Sanders: Alexander Turnbull Library, Wellington, 1/2-013220-G)

artillery signallers into the Signal Service and to give the latter complete control over all artillery communications down to, but not including, battery level.⁹¹ Five new units were added to the Signal Service's establishment just in time for the opening of the 1917 campaign (Table 1.3), remedying one of the greatest organisational shortcomings in the BEF's communications system.

In contrast to the artillery, from the outset of the war the planning, direction and control of the ground communications of the RFC, along with its related branches, the anti-aircraft and kite balloon sections and field survey companies, was the responsibility of the GHQ and army signal companies. While the RFC was responsible for air-to-ground communications, the headquarters of RFC brigades, wings and squadrons were connected via a 'self-contained and self-sufficient' exchange system, which formed part of the larger Signal Service network, though RFC operators manned the telephone switchboards and operated the

⁹¹ Nalder, *Royal Corps of Signals*, 118–19; 'History of the Development and Work of the Directorate of Organisation. August, 1914–December, 1918', 494, WO162/6, TNA.

Table 1.3 *New Signal Units, Winter 1916–17*

Unit	Allotted To	No. of Personnel
Signal Construction Company	1 per Army	3 Officers and 116 Men
Area Signal Detachment	8 per Army	1 Officer and 15 Men
Corps Heavy Artillery Section	1 per Corps	1 Officer and 36 Men
Heavy Artillery Group, Sig. Section	1 per Group	1 Officer and 36 Men
RFA Brigade Signal Sub-section	1 per Brigade	1 Officer and 19 Men

Source: Taken from Priestley, *Work of the Royal Engineers*, 160.

telegraph instruments.⁹² The formation of the RAF on 1 April 1918,⁹³ however, necessitated much tighter control and administration of what was to become known as Air Formation Signals, a task that was given to the newly appointed AD Signals, RAF, Lieutenant-Colonel (later Colonel) Jacob Waley-Cohen.⁹⁴ In addition, the Independent Force – the RAF's strategic bombing component – was afforded an AD Signals in July and an establishment of 7 officers and 229 men to oversee its ground communications system.⁹⁵ By the end of the war, 80 RAF ground stations were in operation, linked via an intricate wireless system.⁹⁶

The organisation of communications for the Tank Corps⁹⁷ was particularly unique, since it was impossible to allocate a permanent system of telegraph and telephone lines to link tank formation headquarters to the rest of the BEF until it was known where and when an offensive would take place.⁹⁸ Both on the Somme in the autumn of 1916 and at Arras in April 1917, tank formation headquarters were simply

⁹² Ibid., 188, 295; Lord and Watson, *Royal Corps of Signals*, 310; 'Lessons from Recent Operations', undated, Cambrai Lessons, WO158/316, TNA.

⁹³ Peter Gray, 'The Air Ministry and the Formation of the Royal Air Force', in Gary Sheffield and Peter Gray (eds.), *Changing War: The Hundred Days Campaign and the Birth of the Royal Air Force, 1918* (London: Bloomsbury, 2013), 135–48.

⁹⁴ Commissioned into the Queen's Westminster Rifle Volunteers in 1893, Waley-Cohen had served as a signal officer in the Second South African War and as OC 18th Infantry Brigade Signal Section, 1915–18. Nalder, *Royal Corps of Signals*, 580.

⁹⁵ Priestley, *Work of the Royal Engineers*, 295–6; Nalder, *Royal Corps of Signals*, 153.

⁹⁶ 'Wireless Telegraphy in the RAF from the Outbreak of the War by Colonel A. M. Grenfell', 1918, AIR1/109/15/27, TNA.

⁹⁷ Known until July 1917 as the Heavy Branch Machine Gun Corps. J. P. Harris, *Men, Ideas, and Tanks: British Military Thought and Armoured Forces, 1903–1939* (Manchester: Manchester University Press, 1995), 57.

⁹⁸ For additional context on tank communications, see Brian N. Hall, 'The Development of Tank Communications in the British Expeditionary Force, 1916–1918', in Alaric Searle (ed.), *Genesis, Employment, Aftermath: First World War Tanks and the New Warfare, 1900–1945* (Solihull: Helion, 2015), 136–62.

connected to the lines already provided, operated and maintained by the infantry signal companies.⁹⁹ Tank units had only a very small number of linesmen to maintain and repair their own lines, and as a result faults were commonplace and communication between headquarters severely impaired.¹⁰⁰ Consequently, beginning in May 1917 three tank brigade signal companies, each consisting of a mixture of tank and Signal Service personnel, were formed in order to facilitate communications for and between Tank Corps, brigade and battalion headquarters.¹⁰¹ Although that was a notable improvement, one of the principal lessons to emerge from the Battle of Cambrai in November was the necessity for even closer liaison between the Tank Corps and the Signal Service.¹⁰² Thus, in late 1917 Lieutenant-Colonel John Molesworth was appointed AD Signals, Tank Corps, a move that led to improved signal training and tighter Tank Corps–Signal Service coordination, the first notable fruition of which was the creation of the 4th Tank Brigade Signal Company, the first to consist entirely of Signal Service personnel.¹⁰³

Finally, technological advances also led to the formation of specialist organisations tasked with coordinating newer methods of communication, the most noteworthy of which was wireless. In January 1915, ‘Q’ Wireless Section at GHQ was expanded into the GHQ Wireless Company and a separate wireless headquarters was established, responsible for the activities of both wireless communication and intelligence. In September, a wireless officer was attached to each army headquarters, charged with advising the OC Army Signal Company on all wireless-related matters and responsible for arranging experiments with new and existing wireless equipment, and for overseeing the training of wireless operators. This training arrangement persisted until the creation of the Wireless Depot at Abbeville and the Central Wireless School, based at Montreuil, in April 1916.¹⁰⁴ Two months prior to the school’s opening,

⁹⁹ Priestley, *Work of the Royal Engineers*, 245–6.

¹⁰⁰ See, for example, ‘Summary of Tank Operations 1st Brigade, Heavy Branch. 9th April–3rd May 1917’, 17 May 1917, Tank Corps War Diary, WO95/91, TNA.

¹⁰¹ J. F. C. Fuller, *Tanks in the Great War 1914–1918* (New York: E. P. Dutton, 1920), 180.

¹⁰² ‘IV Corps Report on Telephone and Telegraph Communications During Operations Commencing 20th November 1917’, undated, WO158/383, TNA.

¹⁰³ Fuller, *Tanks in the Great War*, 182; Priestley, *Work of the Royal Engineers*, 246; Becke, *Order of Battle of Divisions*, 268; *Instructions for the Training of the Tank Corps in France* (Tank Corps Headquarters, December 1917), 24.

¹⁰⁴ Priestley, *Work of the Royal Engineers*, 161–2. The chief wireless instructor at GHQ was Major Rupert Stanley, previously Professor of Electrical Engineering at Queen’s University, Belfast. Brian Austin, *Schonland: Scientist and Soldier: From Lightning on the Veld to Nuclear Power at Harwell: the Life of Field Marshal Montgomery’s Scientific Adviser* (London: IOP Press, 2001), 48; Major Rupert Stanley, WO339/10841, TNA.

the OC Wireless, GHQ, Lieutenant-Colonel Lyster Blandy,¹⁰⁵ was officially charged with coordinating all wireless throughout the BEF, and in July, 'in view of the increasing importance of wireless telegraphy as a means of communication in the field',¹⁰⁶ army wireless companies were formed. Although these wireless companies were independent of the army signal companies, because they were under the control of the OC Wireless, GHQ, they composed sections for each corps and sub-sections for each division, thus representing an important step in the decentralisation of wireless in the BEF.¹⁰⁷

This process of decentralisation was furthered in June 1917 when the post of OC Wireless, GHQ, was abolished and coordination of the BEF's wireless activities transferred to the newly created AD Signals, Wireless, who served on the Director of Army Signals' staff.¹⁰⁸ Thereafter, GHQ's wireless activities were limited to the Wireless Observation Groups, whose primary function was to intercept German wireless communication, a formation which was subsequently duplicated and passed to army control.¹⁰⁹ Meanwhile, the wireless sections and sub-sections in each army, corps and division were absorbed into the respective signal companies, ending the semi-autonomy and separation of wireless from the Signal Service,¹¹⁰ and sparking greater interest in wireless communication within divisional signal companies and brigade signal sections.¹¹¹

Growth of the Communications Establishment

The exponential growth of the BEF, from six infantry divisions and one cavalry division totalling approximately 150,000 men in 1914, to a peak force of 66 divisions numbering more than two million men in 1918,¹¹² generated a dramatic increase in the communication needs of the army. This in turn necessitated a substantial growth in the size of the Signal Service as it sought to provide communications 'on an immense and

¹⁰⁵ 'Colonel/Air Commodore L. F. Blandy, CB, DSO', *Royal Engineers Journal*, 78 (1964), 340.

¹⁰⁶ 'General Staff Circular No. 21. Wireless Telegraphy', 23 September 1916, AWM25/425/3, AWM.

¹⁰⁷ Nalder, *Royal Corps of Signals*, 121. ¹⁰⁸ Priestley, *Work of the Royal Engineers*, 164.

¹⁰⁹ Beach, *Haig's Intelligence*, 160–1.

¹¹⁰ 'O.B./242', 17 June 1917, AWM25/425/3, AWM.

¹¹¹ 'General Report on Wireless Telegraph Communication in the Canadian Corps, Feb. 1915–Dec. 1918', 16 April 1919, RG9-III-D-3/5058/968, LAC.

¹¹² Richard Bryson, 'The Once and Future Army', in Brian Bond et al., *Look to Your Front: Studies in the First World War by the British Commission for Military History* (Staplehurst: Spellmount, 1999), 28.

elaborate scale'.¹¹³ The most dramatic areas of expansion occurred within the GHQ and Lines of Communication ('L') signal companies. In 1914, GHQ Signal Company consisted of 5 officers and 75 other ranks, while 'L' Signal Company numbered 5 officers and 263 other ranks. They also constituted three airline and six cable sections, totalling an additional 9 officers and 381 other ranks. By October 1916, GHQ Signal Company alone had expanded to 6 officers and 129 other ranks, and in April 1918 numbered 13 officers and 315 men.¹¹⁴ In 1918, the two signal companies were amalgamated into the GHQ Signal Battalion, which totalled 40 officers and 1,784 other ranks. Combined with the five telegraph construction and six railway telegraph companies that worked behind the army areas, the grand total working on the lines of communication at the end of the war amounted to an incredible 73 officers and 3,232 other ranks (Figure 1.1).¹¹⁵

Upon their creation in late 1914, the army signal companies each consisted of 7 officers and 142 other ranks. By 1916, this number had increased to 10 officers and 224 men, and by the end of the war an army signal company boasted 15 officers and 340 other ranks. During this period of growth a wireless section, consisting initially of 1 officer and 23 other ranks, had been added in 1917, the army artillery sub-sections taken over in the same year, and a wireless observation group and light railway signal company, totalling 3 officers and 116 men, established in 1918. In addition, one signal construction company, three motor airline and two cable sections had been added by 1918, and an army signal school of four officers and 10 NCO instructors established (Figure 1.2).¹¹⁶ Taken as a whole, and notwithstanding corps and divisional signal units and artillery signal sub-sections, by the end of the war a DD Signals commanded approximately 32 officers and 815 other ranks.¹¹⁷

A corps signal company at the beginning of the war consisted of just 4 officers and 63 other ranks, which included 18 motorcycle despatch riders and 20 signal office staff.¹¹⁸ Although gradual increases to the number of personnel were made during the first half of the war, it was not until 1917 that major changes in corps signal company organisation occurred. Again, this was in many respects a reflection of the growing

¹¹³ General Sir Douglas Haig's Official Despatch, 23 December 1916, in Boraston (ed.), *Sir Douglas Haig's Despatches*, 56.

¹¹⁴ 'History of the Development and Work of the Directorate of Organisation. August, 1914–December, 1918', 487, WO162/6, TNA.

¹¹⁵ Priestley, *Work of the Royal Engineers*, 340–2.

¹¹⁶ *Ibid.*, 337–40; Collins, *Military Organization*, 355–6.

¹¹⁷ Nalder, *Royal Corps of Signals*, 84. ¹¹⁸ *Field Service Pocket Book. 1914*, 61.

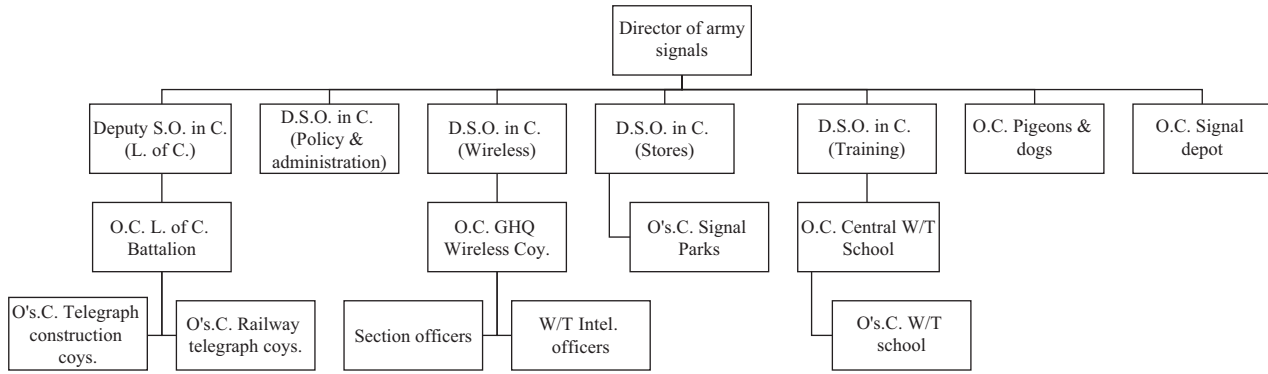


Figure 1.1 Signal Service organisation (GHQ), November 1918

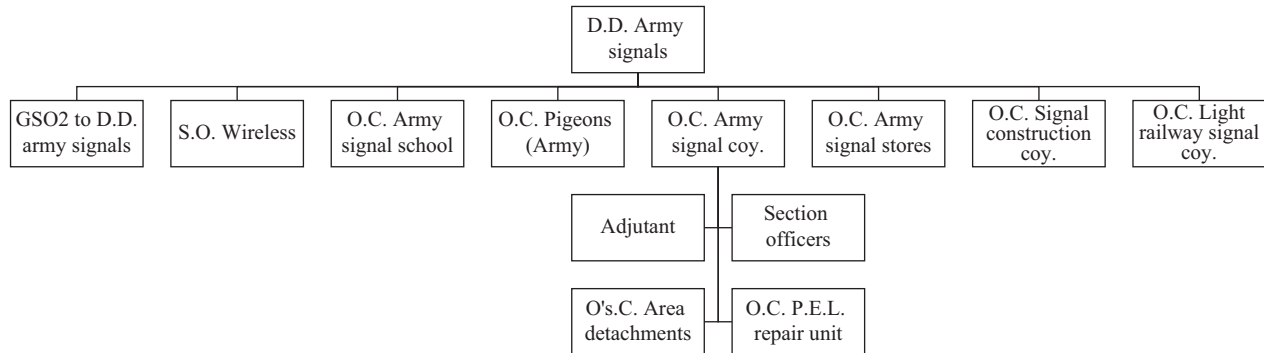


Figure 1.2 Signal Service organisation (Army), November 1918

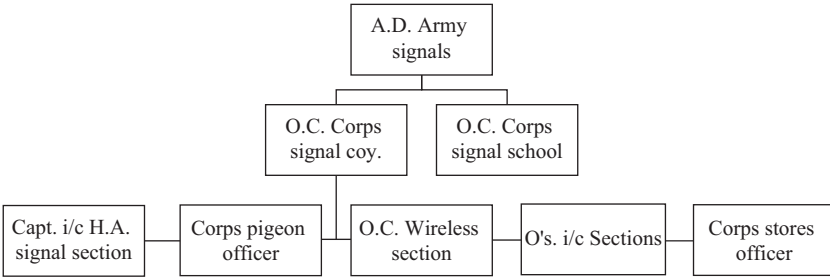


Figure 1.3 Signal Service organisation (Corps), November 1918

importance of the role and responsibilities of corps during the war.¹¹⁹ Not only was a Wireless Section, consisting of 3 NCOs and 24 men, added to the corps signal company, but a Corps Heavy Artillery Signal Section, comprising 1 officer and 36 other ranks, was also created. In addition, corps signal schools were established in the same year, comprising 1 officer and 5 NCO instructors. Arguably the most important development, however, was the creation of permanent area signal detachments, each initially comprising 1 officer and 8 men (8 per army), responsible for ensuring continuity in line construction, maintenance and operation when reliefs took place.¹²⁰ Thus, at the end of the war a corps signal company numbered 8 officers and 191 other ranks, in addition to two motor airline and two cable sections (Figure 1.3).¹²¹ The exception to this, however, was the Canadian Corps, which, by virtue of its larger size, possessed four cable sections in 1918.¹²²

In 1914, a divisional signal company consisted of a headquarters and four sections.¹²³ No. 1 Section was made up of three cable detachments, each possessing 10 miles of cable and capable of establishing three telegraph offices ('base', 'intermediate' and 'travelling'),¹²⁴ as well as the staff which manned the divisional signal office. Also possessing four mounted orderlies, eight cyclists and nine motorcycle despatch riders, No. 1 Section had the primary responsibility of establishing communications between divisional and brigade headquarters, and between

¹¹⁹ Simpson, *Directing Operations*, passim. ¹²⁰ Nalder, *Royal Corps of Signals*, 84, 110.

¹²¹ Priestley, *Work of the Royal Engineers*, 336–7.

¹²² Brigadier-General Sir J. E. Edmonds, *Military Operations, France and Belgium, 1918*, Vol. V (London: HMSO, 1947), appendix III, 624; Shane B. Schreiber, *Shock Army of the British Empire: The Canadian Corps in the Last 100 Days of the Great War* (Westport, CT: Praeger, 1997), 20–2.

¹²³ *Manual of Army Signal Service – War*, 22.

¹²⁴ Colonel F. J. Davies, C.B., 'The Communications of a Division in the Field', *Journal of the Royal United Service Institution*, 53 (1909), 888.

neighbouring divisions.¹²⁵ Sections 2, 3 and 4 were each allocated to the infantry brigades, charged principally with connecting brigade and battalion headquarters to one another, and each comprising 1 officer and 26 other ranks. In all, the divisional signal company totalled 5 officers and 170 other ranks. By 1918, this number had expanded to 15 officers and 400 other ranks.¹²⁶ In the process, a fourth cable detachment had been added in 1915 for the purpose of laying artillery communications, before the headquarters of the Royal Artillery Signal Section and the field brigade artillery sub-sections were absorbed in early 1917. Finally, in 1918 No. 5 (Machine Gun) Section was added, which consisted of 1 officer and 20 other ranks drawn largely from the Machine Gun Corps, and the personnel within the divisional signal company headquarters increased from 1 officer and 44 men in 1914 to 3 officers and 173 men in 1918 (Figure 1.4).¹²⁷ On paper, the establishment of the infantry brigade signal section remained largely unchanged until the last year of the war, when a second officer and three 'pigeoneers' were added. In reality, the creation of 'brigade pools' in 1917, which consisted of eight specially trained signallers drawn from each battalion in the brigade, significantly reinforced the brigade signal section's manpower, though there was never a shortage of complaints about the inadequate number of sufficiently trained reinforcements amongst forward signal units.¹²⁸

Finally, with regards to cavalry communications, in 1914 the Cavalry Division was served by a signal squadron, organised into four troops: 'A' Troop consisted of two wagon wireless detachments responsible for communication with GHQ; 'B' Troop was made up of two cable detachments, having 28 miles of cable in total, and employed to facilitate communication between cavalry division headquarters and the wireless stations of the squadron, or to connect the former to the civil telegraph system; 'C' Troop consisted of one wagon and three pack wireless detachments, charged with establishing communications between cavalry division and brigade headquarters; and, 'D' Troop, which comprised 12 mounted men, 28 cyclists, 6 motorcycle despatch riders and two motorcars, was responsible for an array of communication duties throughout the division. The signal troop of a cavalry brigade consisted of an officer and 23 other ranks capable of laying and operating 7.5 miles of cable, with eight portable telephones, and augmented by a wireless detachment comprising two pack sets. Its primary responsibilities were communication within the brigade and connecting with the permanent

¹²⁵ *Field Service Pocket Book: 1914*, 60; Curtis, 'Work of Signal Units in War', 268.

¹²⁶ Priestley, *Work of the Royal Engineers*, 334–5. ¹²⁷ Nalder, *Royal Corps of Signals*, 83.

¹²⁸ Priestley, *Work of the Royal Engineers*, 146, 296–9; Scrivenor, *Brigade Signals*, 86.

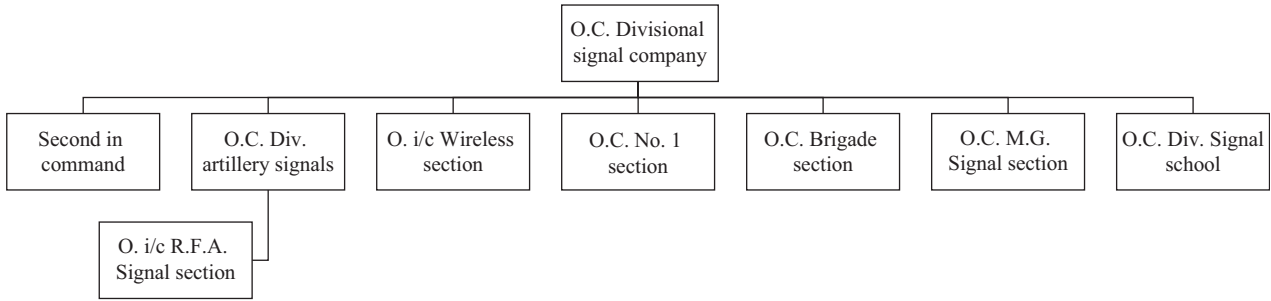


Figure 1.4 Signal Service organisation (Division), November 1918

telecommunications network of the country.¹²⁹ When the Cavalry Corps was formed in October 1914,¹³⁰ a signal squadron consisting of 4 officers and 101 men was added, though little change occurred thereafter in the size of the squadron, or indeed in the cavalry communications establishment as a whole, until 1918, when the most notable addition was the Cavalry Wireless Squadron, comprising 3 officers and 136 men, which replaced the wireless troops of the divisional signal squadron.¹³¹

Signal Research, Design and Supply

The enlargement of the BEF's communications establishment resulted inevitably in the huge demand for signal equipment. Throughout the war, responsibility for the supply of signal stores rested with F.W.9, a branch of the Director of Fortifications and Works. Headed by Major Algernon Dumaresq, the chief electrical engineer, and with the help of just two officers and six other ranks in August 1914, F.W.9 grew to comprise 12 officers and 34 subordinates by the end of the war. However, the pressure of the job took its toll on Dumaresq, who died suddenly in his office in May 1917.¹³² His successor, Lieutenant-Colonel Edwin Seaman, also succumbed to a similar fate, dying of a stroke in May 1919.¹³³ Throughout this period, F.W.9 was assisted by the Chief Inspector of R. E. Stores at Woolwich, Captain (later Colonel) Frederick Robertson, whose staff grew from 4 officers and 165 other ranks upon mobilisation, to 30 officers and 1,620 subordinates by October 1918. The stores F.W.9 supplied the BEF included 11,000 telegraph sets, 120,000 telephone instruments, 100,000 signalling lamps and 600,000 miles of telephone cable. It was also responsible for supplying wireless sets to the RFC.¹³⁴

In September 1916 a Signals Experimental Establishment was set up on Woolwich Common, under the initial command of Chief Experimental Officer Colonel Arthur Bagnold.¹³⁵ As the precursor of

¹²⁹ *Field Service Pocket Book: 1914*, 60; Curtis, 'Work of Signal Units in War', 268; *Manual of Army Signal Service – War*, 20; Collins, *Military Organization*, 356–7.

¹³⁰ Becke (Comp.), *Order of Battle of Divisions*, 123.

¹³¹ Priestley, *Work of the Royal Engineers*, 332, 343; Nalder, *Royal Corps of Signals*, 83.

¹³² Brigadier-General W. Baker Brown, 'Hints from History (Part II). The Supply of Engineer Stores and Equipment', *Royal Engineers Journal*, 56 (1942), 282–3.

¹³³ Anon., 'Memoir: Col. E. C. Seaman', *Royal Engineers Journal*, 30 (1919), 139–42.

¹³⁴ Major-General H. L. Pritchard (ed.), *History of the Corps of Royal Engineers*, Vol. V: *the Home Front, France, Flanders and Italy in the First World War* (Chatham: Institution of Royal Engineers, 1952), 82–4.

¹³⁵ 'Obituary Notices: Arthur Henry Bagnold', *Monthly Notices of the Royal Astronomical Society*, 104 (1944), 86; W. B. B., 'Memoir: Colonel A. H. Bagnold', *Royal Engineers Journal*, 58 (1944), 131–2.

the Signals Research and Development Establishment, it employed 17 officers and 267 other ranks, and was charged with designing, adapting and testing specialist signalling equipment that could not be obtained from other sources. Also in 1916, at the request of the Director of Army Signals a Signal Service Committee was established and a separate branch of the War Office, F.W.7, was subsequently formed, responsible for coordinating the activities of the many contractors, departments and organisations involved in signal equipment research, design and experimentation. These included, amongst others, the Munitions and Inventions Committee, the Marconi Company, the GPO, the RFC Wireless Telegraphy School and the R.E. Wireless Training Centre.¹³⁶

The system of supply on the Western Front was, from the outset, firmly under Signal Service control.¹³⁷ All signalling equipment was held at a Signal Park, which opened at the Advanced Base at Amiens in mid-August 1914 under the administration of the DD Signals, Lines of Communication.¹³⁸ In light of the BEF's situation, however, the park was relocated at the end of the month to Le Mans, where it remained until the end of the year, when it was moved to its final location at Le Havre. A second park was opened at Calais later in the war and smaller parks established within army areas shortly before the war's end.¹³⁹ Strict control of signal stores meant that all requests had to receive approval from the office of the Director of Army Signals before being sanctioned. Naturally, priority was given to requests made by signal units either about to take part in a large-scale offensive, or residing in a sector of the front that was facing an imminent enemy attack.¹⁴⁰ Maintenance of signal equipment, meanwhile, was the responsibility of individual signal companies, although each army also set up repair workshops. In February 1917, official Signal Repair Workshops were built at Le Havre, dealing mainly with equipment too badly damaged for the army workshops to repair. Although personnel from 'L' Signal

¹³⁶ Nalder, *Royal Corps of Signals*, 86–7; Pritchard (ed.), *History of the Corps of Royal Engineers*, 83; Baker Brown, 'Hints from History, Part II', 283; Lieutenant-Colonel A. G. T. Cusins, R.E., 'Development of Army Wireless During the War: Lecture Delivered before the Wireless Section of the (London Wireless) Institution, 3 April, 1919', *Journal of the Institution of Electrical Engineers*, 59 (1921), 766–7, Sir Henry Norman Papers, 01/15/3, IWM.

¹³⁷ *Manual of Army Signal Service – War*, 37.

¹³⁸ 'Director of Army Signals, Circular Memorandum No. 10', 19 August 1914, Director of Army Signals War Diary, WO95/57, TNA.

¹³⁹ Priestley, *Work of the Royal Engineers*, 49–50.

¹⁴⁰ See, for example, 'Director of Army Signals, Circular Memorandum No. 220', 19 December 1917, Director of Army Signals War Diary, WO95/57, TNA.

Company supervised the workshops, the majority of the technical maintenance workers were German POWs.¹⁴¹

Overall, the growth in both the size and complexity of the BEF's communications establishment conformed to the overall pattern of expansion experienced by the army as a whole during the course of the war. In 1914, the Signal Service was marked by its diminutive size and the absence of a central chain of command, as well as being handicapped by restrictions imposed upon its sphere of influence, most notably within the artillery and infantry battalions. Humble, ad hoc and inadequate coordination and supervision during the first half of the war, however, gradually gave way to a far larger, more influential and more proficient organisation, though it was not until 1916–17, first with the appointments of DD Signals and AD Signals for armies and corps, and second with the absorption of artillery communications into the Signal Service's jurisdiction, that the control, direction, scale and provision of the BEF's communications machinery began to mature. Even then, problems remained, most notably at the strategic level with the inadequate control and direction exercised by the War Office until the establishment of S.D.6 in early 1918. Nevertheless, through an evolutionary process of trial and error, by the end of the war the BEF had in the Signal Service an organisation more than capable of meeting the insatiable communication needs of the army.

¹⁴¹ Priestley, *Work of the Royal Engineers*, 295. For more information on the BEF's use of German labour companies, see Heather Jones, *Violence against Prisoners of War in the First World War: Britain, France and Germany, 1914–1920* (Cambridge: Cambridge University Press, 2011), 137–40.