

Great Sappers

An Anthology

Ubique

MAJOR GENERAL C L WILKS CB CBE



Major General Carew Wilks read Engineering Science at Oxford University and was commissioned into the Royal Engineers in 1978, serving initially in Germany, the Falkland Islands, UK, and Canada. He commanded 5 Field Squadron and 25 Engineer Regiment, with operational tours in the Former Yugoslavia, the Middle East, Iraq, and Northern Ireland. He was Director of Army Infrastructure in Army HQ, Director of Energy Operations MNF-I and finally, Director Land Equipment in DE&S in 2011. After leaving the Army in 2013, he has held senior roles in the defence industry, firstly as Chief Operating Officer for NIMR Automotive, a defence vehicle manufacturer in the United Arab Emirates. After a brief period as military adviser with BAE Systems Land in 2017, in 2018, he was appointed Managing Director of General Dynamics Land Systems UK where he delivered the Ajax programme. He retired in 2023 and now works part time as Chairman of the Oxfordshire, Buckinghamshire and Chilterns Regional Defence and Security Cluster. He was President of the Institution of Royal Engineers from 2012 to 2017. An international target rifle shot, Major General Wilks represented both England and Combined Services.

UBIQUE QUO FAS ET GLORIA DUCUNT. The motto of the Corps of Royal Engineers is not merely an assertion; it is a statement of historical fact. For over three centuries, sappers have been present at the shaping of nations, the turning of campaigns, at the forefront of science and innovation and in building the modern world. The Great Sappers anthology chronicles those extraordinary past sappers whose achievements left an indelible mark on our national story, recording their stories and providing inspiration to our current generation. Such stories deserve to be known, not only throughout the Corps but by all who wish to understand how engineering minds, when allied with character and determination, can change the course of history.

The Great Sappers anthology is a collection of articles and essays published on the website of the Institution of Royal Engineers in cooperation with the Royal Engineers Historical Society. Great Sappers will be developed over the next year, with contributions encouraged from authors across the Corps family and will remain a live anthology open to further contributions thereafter. It will provide a record of the characters, the stories and the significant achievements of those sappers of any rank that achieved greatness through individual acts of brilliance or bravery, great accomplishments, significant engineering innovations, or through exceptional careers of leadership, statesmanship and strategic influence. Although many ended their careers at high rank, their greatness was often achieved earlier in their careers. Great Sappers will inform and inspire all those in the Corps as well as a wider audience of those interested

in military history, in the development of the science of military engineering and in our national story.

Why do past achievements and history matter to the Corps of today? The answer lies in the nature of the challenges that sappers have always faced. Whether bridging a river under fire, constructing a fortress against an advancing enemy in a distant land, laying a telegraph wire across a continent, surveying a country or building its infrastructure, Royal Engineers have always confronted challenges that demand a blend of technical mastery, resource management and moral resolve, alongside innovation and leadership. Although the specifics have changed across the centuries, the character of the problems endures. Field Marshal Lord Kitchener, whose early career was shaped entirely by his Royal Engineers service, learned the art of command through survey work in Palestine and campaigns across Egypt and Sudan before his transformation into a national leader of the first order. General Gordon brought engineering discipline and personal conviction to bear in circumstances where lesser men would have recoiled. In studying Great Sappers, we are not indulging in nostalgia but reading a manual of excellence and learning what worked. Such learning bridges the past to the present, for the future.

This anthology does not claim to be exhaustive. Three centuries of Royal Engineers history have produced a depth of talent that no single volume could contain. The Corps has produced strategists, inventors, administrators and explorers. The essays and articles gathered in Great Sappers are grouped around themes relating to both history and

engineering science. The chronicle begins, as the Corps itself begins, in the early eighteenth century. The Georgian Pioneers of military engineering lived before the Corps of Royal Engineers received its modern title in 1787, but the office that became Chief Royal Engineer, the establishment of professional engineer officers under the Board of Ordnance, the great Georgian fortresses, the defence of Gibraltar and the first triangulated survey of Britain are the foundations on which everything that followed is built. To understand the modern Corps, it is necessary to know these foundational figures – Brigadier Richards, Major General Armstrong, General Lord Heathfield, Major General Roy and others – and this anthology accordingly opens with them.

The story then moves outward in every direction. The Napoleonic and Crimean engineers – Lieutenant Colonel Fletcher at the Lines of Torres Vedras, General Sir John Fox Burgoyne across six decades of extraordinary active service, Field Marshall Sir Charles Pasley as the founder of the School of Military Engineering at Chatham – professionalized the Corps and gave it the intellectual habits that distinguish it still. The Victorian campaign engineers built and defended an empire from Quebec to the Hindu Kush, while the surveyors and cartographers of the Royal Engineers – Colonel Sir Henry James at the Ordnance Survey, Lieutenant Colonel Montgomerie in the Karakoram, Major General Sir Charles Wilson in Sinai and Palestine, and Colonel Mark Bell VC across Central Asia – produced mapping and reconnaissance to a precision the world had never seen.

Emphasis is placed in this collection on the sapper as inventor and scientist. The Royal Engineer who sees a problem and solves it has changed the conduct of war and the shape of the modern world. Sir Frederick Beaumont pioneered the practical tunnelling machine and produced the first Channel Tunnel survey. Sir William Abney founded photographic science. Major Peter Nissen designed, in a single week, a hut that housed two world wars. Captain William Livens devised a gas projector that went from concept to production in seven days. Sir John Norton-Griffiths raised the tunnelling company that fired the mines at Messines. Major General C H Foulkes built and led the Special Brigade that fought the chemical war on the Western Front. The armoured tracked vehicle that broke the deadlock of the trenches was, from first conception to first action, the work of a small group of Royal Engineers – Swinton, Capper, Elles. The momentum in tank strategy and its use for battlefield engineering was maintained between the wars by Lieutenant General Sir Giffard Martel, and then Major General Percy Hobart devised the special tanks that breached the defences on the Normandy landing beaches in the Second World War.

Sappers were surveyors of Empire, designers of fortifications and builders of civil infrastructure, including canals and prisons, irrigation systems and Indian railways, museums and concert halls, hospitals and public works. Colonel John By founded Ottawa, while building the Rideau Canal; Captain Francis Fowke designed the Royal Albert Hall; Sir Joshua Jebb modernized the prison system of the

United Kingdom; Sir Richard Strachey directed the great Indian railway and irrigation expansion of the 1860s and 1870s; Sir Douglas Galton applied sapper science to public health, hospital design and railway safety. These were not soldiers reluctantly doing civilian work. They were sappers applying the engineering habit of mind to whatever problem the nation set before them.

Statesmanship and senior command run through the anthology as a continuous thread. Field Marshal Lord Nicholson of Roundhay was the first sapper to hold the office of Chief of the General Staff. Lieutenant General Sir George Fowke was Engineer-in-Chief of the British Expeditionary Force in the Great War. The post-war and Cold War years produced a succession of sapper four-stars – Beach, Cooper, Stibbon, Jackson – whose collective service shaped the modern British Army. Alongside them sit the sapper statesmen: Gordon of Khartoum, Kitchener of the New Armies, and Glubb Pasha of the Arab Legion.

Gallantry is celebrated in its own group. Howard Elphinstone in the Crimea, Harry Prendergast in the Mutiny, John Chard at Rorke's Drift, Sapper William Hackett underground at Givenchy, Edward Mannock above the Western Front, and Lieutenant Claud Raymond in Burma in 1945 – six Victoria Crosses chosen from a longer list that illustrate the sapper's readiness, in every century of the Corps' history, to do what duty asks regardless of cost.

A final group is devoted to the sporting sappers – Marindin, founding father of association football; Renny-Tailyour, who played football and rugby for Scotland and cricket for Kent; the great Kent and England bowler Serjeant Colin Blythe; and the only Olympic gold medallist also to have won the Victoria Cross, Lieutenant General Sir Philip Neame. Competitive excellence runs alongside professional excellence in the life of the Corps.

For the serving officer and soldier reading this collection, the message is direct: you are the inheritors of an extraordinary tradition. The Great Sappers recorded here were not born great; they were shaped by training, by experience, by the habits of disciplined engineering thought and practical action that the Corps instils in every generation. What distinguishes the Great Sappers is not that they were given remarkable opportunities but that when the moment came, they were ready. Preparation met circumstance, and history was made. This article serves as an invitation to everyone in the Corps family to study our history more widely, seek out the inspiration from these stories, and contribute to this anthology.

This anthology is a living document. The Royal Engineers Historical Society and the Institution of Royal Engineers invite nominations, corrections, additions and contributed articles, so that the record of Sapper achievement may grow with each generation. Proposals may be submitted through the Institution of Royal Engineers website.

The sappers who built our Nation's defences, mapped its Empire, and led its armies deserve to be remembered. Study their stories. Learn from them. And then, in the finest tradition of the Corps, go forward – Ubique.

Great Sappers

THE seventy Royal Engineers that follow are organized under thirteen thematic chapters that span three centuries of Corps history. They illustrate, rather than exhaust, the contribution of the Sapper to British military history, to engineering and science, to the building of the modern world and to the conduct of national affairs.

PIONEERS OF THE GEORGIAN CORPS (1700–1793)

Founders, Fortifiers and the First Surveyors



Hon Brigadier Michael Richards (1673–1721)

Chief Engineer of England from 1714 until his death in 1721 and the senior figure in the engineering establishment under the Board of Ordnance. Richards directed the engineer service through the reign of George I, oversaw the fortification works at Portsmouth, Plymouth and Gibraltar, and laid the administrative foundations on which the later Corps of Royal Engineers would be built. He stands at the head of every modern list of Chief Royal Engineers.

Hon Major General John Armstrong (1674–1742)

Chief Engineer of Great Britain and Surveyor General of the Ordnance. Armstrong reformed the professional standing of the engineer service, regularized the establishment of officers, and oversaw the construction and repair of the major coastal fortifications during a critical period of European war. He carried the office through the long peace under Walpole and into the War of the Austrian Succession.

Lieutenant General Sir William Skinner (1699/1700–1780)

Chief Royal Engineer and the designer of Fort George at Ardersier, the masterpiece of British eighteenth-century military fortification. Built between 1748 and 1769 after the Jacobite rising, Fort George remains the most complete artillery fort of its period in Europe and is still in use as a military barracks. Skinner's career bridged the older Board of Ordnance tradition and the formal Corps that followed.

General Lord Heathfield (George Eliott) (1717–1790)

Defender of Gibraltar through the Great Siege of 1779–1783, one of the longest sieges in modern history. Eliott commanded the Rock against the combined forces of France and Spain for three years and seven months, conducted the celebrated sortie of November 1781 and devised the use of red-hot shot against the besiegers' floating batteries. Created Baron Heathfield of Gibraltar in recognition of one of the defining feats of Sapper arms.

General Sir William Green, 1st Baronet (1725–1811)

Chief Engineer at Gibraltar from 1761 and the architect of the fortifications and galleries hewn into the Rock that made the Great Siege defence possible. Green's underground galleries, embrasures and concealed batteries transformed Gibraltar from a vulnerable port into the most formidable fortress in the Mediterranean. His professional partnership with Eliott is one of the great commander-and-engineer stories of the eighteenth century.

Major General William Roy (1726–1790)

Conducted the first triangulated survey of Britain after the Jacobite rising of 1745, laying the geodetic foundations on which the Ordnance Survey would later be built. Commissioned a Practitioner Engineer of the Corps of Engineers in 1755, Roy also established, through the Hounslow Heath baseline of 1784, the geometric link between the observatories of Greenwich and Paris and so the precise scientific connection between Britain and continental Europe. His methods endure to this day.

THE NAPOLEONIC AND CRIMEAN ERA (1793–1856)

Sieges, Siegecraft and the Professionalization of the Corps



General Sir William Twiss (1745–1827)

Directed the construction of the Royal Military Canal across Romney Marsh and oversaw extensive coastal fortification works during the Napoleonic invasion crisis. Twiss commanded the engineer service in the Mediterranean, North America and at home over a career of more than half a century, demonstrating the strategic value of integrated terrain engineering at the highest level of national defence planning.

General Sir Charles Pasley (1780–1861)

Founded the School of Military Engineering at Chatham in 1812, transforming the professional education of British military engineers and establishing the intellectual foundations of the modern Corps. His writings on military policy, on demolitions and on the rules of engineer service shaped the doctrine of the Corps for a generation, and the institution he founded – today the Royal School of Military Engineering – remains the home of Sapper training.

Lieutenant Colonel Sir Richard Fletcher, 1st Baronet (1768–1813)

Wellington's Chief Engineer through the Peninsular War. Fletcher designed and constructed the Lines of Torres Vedras in 1809–1810, the defensive system that saved Portugal from Napoleon's marshals and turned the tide of the Peninsular campaign. He directed the sieges of Ciudad Rodrigo and Badajoz, was repeatedly wounded in the breaches, and was killed at the assault of San Sebastian. He remains one of the greatest siege engineers in British military history.

Major General Sir John Thomas Jones, 1st Baronet (1783–1843)

Served alongside Fletcher in the Peninsula and afterwards wrote the authoritative *Journals of the Sieges*, the foundational British work on the conduct of siege warfare in the Napoleonic period. Jones combined practical engineer command in the field with a literary and analytical mind that shaped the doctrine of the Corps for half a century after his death.

Field Marshal Sir John Fox Burgoyne, 1st Baronet (1782–1871)

A pivotal figure across the Peninsular War, the siege of San Sebastian and the Crimean campaign, and later Inspector General of Fortifications. Burgoyne was the foremost military engineer of his era, with over sixty years of active service from the Walcheren expedition of 1809 to the Indian Mutiny of 1857. He was the first Royal Engineer to be appointed Field Marshal.

General Sir Harry Jones (1791–1866)

Brother of Sir John Thomas Jones and Director of Engineers at the siege of Sebastopol during the Crimean War. Severely wounded at the Redan in 1855, Jones afterwards served as Governor of the Royal Military Academy at Sandhurst and was a leading reformer of the Corps in the years after the war. He carried the Burgoyne school of engineer thought into the second half of the nineteenth century.

BUILDERS OF EMPIRE – IMPERIAL CONSTRUCTION AND FRONTIER COMMAND (1815–1914)

The Sapper as Engineer of the Imperial Estate and Commander on its Frontiers

Lieutenant Colonel John By (1779–1836)

Superintended the construction of the Rideau Canal in Upper Canada between 1826 and 1832, opening a strategic water route from Montreal to Lake Ontario that secured



British North America after the War of 1812. In doing so he founded Bytown – renamed Ottawa in 1855 and now the capital of Canada. The most consequential single piece of Royal Engineer civil-military construction in the history of the Empire.

Field Marshal Sir John Simmons (1821–1903)

Inspector General of Fortifications, Governor of the Royal Military Academy at Woolwich, and a leading military diplomatist who served on the boundary commissions following the Russo-Turkish War of 1877–78. Simmons combined Sapper command with statecraft, and his appointment as Field Marshal in 1890 made him one of the very few Royal Engineers to hold that rank.

General Sir Alexander Taylor (1826–1912)

Commissioned into the Bengal Engineers in 1842 and transferred into the Royal Engineers on the unification of 1862. Engineer of the assault on Delhi during the Indian Mutiny of 1857 and afterwards the principal architect of military engineering reform in India. Taylor rose to be President of the Royal Indian Engineering College at Coopers Hill, and his career embodied the transition of the Indian establishment from Honourable East India Company service into the Royal Engineers.

Colonel Sir Colin Scott-Moncrieff (1836–1916)

Built the irrigation works of the lower Nile in Egypt during the British occupation and later served as Under-Secretary for Scotland. Scott-Moncrieff's barrages and canal repairs transformed Egyptian agriculture, made Egypt financially viable, and laid the engineering foundations of the modern Nile valley economy. A Sapper whose civil works changed the standard of living of a nation.

Major General Sir James 'Buster' Browne KCSI CB (1839–1896)

Commissioned into the Bengal Engineers in 1857 and transferred into the Royal Engineers on the unification of 1862. Built the Sind-Pishin State Railway through the difficult country of Baluchistan, including the Khojak Tunnel – at over two miles the longest railway tunnel in India, when it was completed in 1891. Browne founded the modern cantonment of Quetta on the North-West Frontier and afterwards served as Quartermaster General in India. One of the great Sapper engineers of the late-Victorian frontier.

General Sir Bindon Blood* (1842–1940)

The first Chief Royal Engineer from 1936 and a distinguished frontier commander on the North-West Frontier, in the Malakand Field Force of 1897 (with the young Winston Churchill on his staff) and in South Africa. Blood's Sapper training underpinned a career of operational excellence spanning the entire Victorian and Edwardian age. He lived to a remarkable ninety-seven and remained a totemic figure in the Corps until his death on the eve of the Second World War.

General Sir Charles Warren (1840–1927)

Following another sapper, Sir Charles Wilson, he led the Palestine Exploration Fund's survey of Jerusalem in 1867–1870, mapping the ancient city to a precision never before achieved. Warren commanded in Bechuanaland and at the relief of Ladysmith, served as Commissioner of the Metropolitan Police during the Whitechapel murders of 1888, and was instrumental in the early Boy Scout movement. A remarkable polymath whose Sapper education shaped a career of extraordinary breadth, and was one of the earliest archaeologists of the Holy Land.

Lieutenant General Sir Andrew Clarke (1824–1902)

Governor of the Straits Settlements from 1873 and the negotiator of the Treaty of Pangkor in 1874 which brought the Malay States under British protection – a diplomatic and strategic masterwork that shaped the future of South-East Asia. Clarke later served as Inspector General of Fortifications and Agent-General for Victoria.

Field Marshal Lord Napier of Magdala (1810–1890)

Commissioned into the Bengal Engineers in 1828 and transferred into the Royal Engineers in 1862. Commanded the Abyssinian Expedition of 1867–68, marching an Anglo-Indian force of thirteen thousand men over four hundred miles of mountainous country to storm the fortress of Magdala and release the British captives held there. Napier's logistic and engineering achievement in that campaign is unrivalled in the annals of nineteenth-century imperial warfare. He later served as Commander-in-Chief, India, and was appointed Field Marshal in 1883.

SAPPER STATESMEN AND NATIONAL LEADERS

Royal Engineers Who Shaped Geopolitics and Governance

**Major General Charles Gordon (1833–1885)**

Led Chinese Imperial forces in the Taiping Rebellion of the 1860s, governed Equatoria and Sudan, and became a national icon through his defence of Khartoum. A soldier whose Sapper training underpinned a life of extraordinary command and moral conviction, and whose death made

him the conscience of late-Victorian Britain. One of the most compelling figures in the history of the Corps.

Field Marshal Horatio Herbert Kitchener, 1st Earl**Kitchener of Khartoum (1850–1916)**

Rose through the Corps surveying Palestine and fighting in Egypt and the Sudan, recaptured Khartoum at the battle of Omdurman in 1898, and as Secretary of State for War in 1914 raised the largest volunteer army in British history. His face on a poster became the symbol of national mobilization, and his organizational genius built the armies that fought the Great War. The pre-eminent example of a Sapper who became a national leader.

Lieutenant General Sir John Bagot Glubb ('Glubb Pasha') (1897–1986)

Commissioned into the Royal Engineers in 1915 and wounded on the Western Front. Transferred to Iraq and then Transjordan, where he built and commanded the Arab Legion from 1939 to 1956, transforming it into the finest Arab fighting force of its era. He led it through the Second World War and the 1948 Arab–Israeli War. A Sapper whose career shaped the political geography of the modern Middle East.

SURVEYORS AND CARTOGRAPHERS

Sappers Who Mapped and Measured the World

**Colonel Sir Henry James (1803–1877)**

A controversial Director of the Ordnance Survey from 1854 to 1875 and a pioneer of photozincography, the forerunner of photolithography, which transformed the production and distribution of accurate maps. James's innovations took cartography from a craft into a modern science and placed Britain at the forefront of precision mapping for the rest of the century.

Lieutenant Colonel Thomas Montgomerie (1830–1878)

Commissioned into the Bengal Engineers in 1849 and transferred into the Royal Engineers in 1862. Surveyor of Kashmir, the Karakoram and the Western Himalaya, and the originator of the system that sent native explorers – the Pundits – disguised as Buddhist pilgrims into the closed territories of Tibet and Central Asia to take secret measurements. Montgomerie's surveys produced the first accurate maps of the highest mountains on earth, including the survey designation 'K2' which the world's second highest peak still bears.

Major General Sir Charles Wilson KCB KCMG FRS (1836–1905)

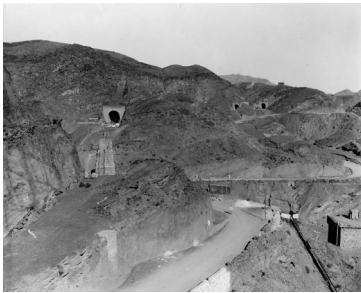
Surveyor of Sinai and Palestine for the Palestine Exploration Fund in 1864–69, including a detailed survey of Jerusalem (Wilson's Arch in the Western Wall bears his name). He was the Intelligence Officer for the Khartoum Relief Expedition and then commanded the Desert Column. He combined first-rank scholarship in biblical archaeology and topography with senior military command – one of the most accomplished Sapper scholars of the late Victorian age.

Colonel Mark Bell VC CB (1843–1906)

Awarded the Victoria Cross during the Ashanti War in February 1874 for repeatedly carrying ammunition forward to the firing line under intense fire on the road to Kumasi. Bell afterwards undertook the great overland reconnaissance from Peking across Central Asia to India in 1885–86, producing the strategic intelligence on which late-Victorian frontier policy was based, and surveyed the Russo-Chinese frontier. One of the most distinguished Sapper geographers of the Great Game.

ARCHITECTS OF THE REALM – CIVIL ENGINEERS OF THE UK AND EMPIRE

Sappers Who Built the Nation's Civil Estate



Lieutenant General Sir William Jervois (1821–1897)

Designer of the system of coastal fortifications – the 'Jervois forts' – that defended the harbours of the United Kingdom, Bermuda, Malta, Singapore and the Australian colonies in the second half of the nineteenth century. Jervois afterwards served as Governor of the Straits Settlements, South Australia and New Zealand. His defensive works defined the strategic geography of the late-Victorian Empire.

Captain Francis Fowke (1823–65)

Designed the Royal Albert Hall and the original buildings of the Victoria and Albert and Science Museums on Exhibition Road. A Sapper whose architectural legacy graces the heart of cultural London, Fowke also designed the National Gallery of Ireland and was the principal architectural force behind the South Kensington complex that defined Victorian cultural ambition. He died at forty-two.

Major General Henry Scott CB (1822–83)

Royal Engineer architect and inventor who took over the construction of the Royal Albert Hall after the death of his colleague Captain Francis Fowke in 1865, completing the building between 1867 and its opening by Queen Victoria in

March 1871. Scott also developed Scott's selenitic cement – a hydraulic mortar widely used in Victorian construction – and served as Director of the Royal Engineers Establishment at Chatham. A Sapper of architectural imagination and scientific innovation in equal measure.

Lieutenant Colonel Sir Joshua Jebb (1793–1863)

Surveyor General of Prisons from 1837 and the architect of the modern British prison system. Jebb designed Pentonville Prison (1842) – the model for over fifty similar institutions across the United Kingdom and the Empire – and reformed the discipline, sanitation and architecture of incarceration on Sapper engineering principles. His influence on penal practice shaped policy for a century.

Colonel Sir Edmund du Cane KCB KCMG (1830–1903)

Successor to Sir Joshua Jebb as Surveyor General of Prisons and Chairman of the Directors of Convict Prisons for the better part of three decades, from 1869 to 1895. du Cane designed and built Wormwood Scrubs Prison (1875–91), unified the previously separate convict and local prison systems into a single national service, and defined the structure of British penal administration for a century. A Royal Engineer of formidable administrative reach.

General Sir Arthur Cotton KCSI (1803–1899)

Commissioned into the Madras Engineers in 1819 and retired in 1860, two years before the unification of that Corps with the Royal Engineers. He is included in this anthology by editorial discretion in recognition of the regard in which he is held in the Sapper community as a Royal Engineer in spirit if not strictly in commission. Cotton built the great anicuts on the Godavari, Krishna and Cauvery rivers – combined irrigation, navigation and water-storage schemes that transformed the famine plains of the Madras presidency into one of the most agriculturally productive regions of the Empire. His name is revered in Andhra Pradesh to this day.

General Sir Richard Strachey (1817–1908)

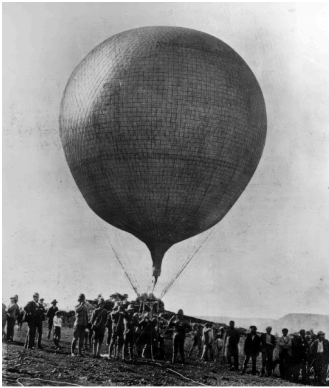
Commissioned into the Bombay Engineers in 1836 and transferred into the Royal Engineers in 1862. Surveyor of the Himalaya, head of the Public Works Department of India, and architect of the great Indian railway and irrigation expansion of the 1860s and 1870s. Strachey combined fieldwork in meteorology and physical geography with the administrative direction of a continental engineering programme, and afterwards served on the Council of India and as chairman of the East Indian Railway. He died in his ninety-first year.

Captain Sir Douglas Galton (1822–1899)

Pioneer of the application of Sapper engineering to public health, hospital design and railway safety. Galton served as Assistant Inspector General of Railways and as the principal engineering adviser to Florence Nightingale on the design of military and civilian hospitals. His Healthy Hospitals and Healthy Dwellings became standard works, and his influence on Victorian sanitary engineering was profound.

INVENTORS, INNOVATORS AND SCIENTISTS

Sappers Who Changed the Tools of War and Peace



Major General Sir Frederick Beaumont (1833–1899)

A man of 'remarkably inventive talent', he co-designed the Beaumont–Adams revolver with the gunmaker Robert Adams in the mid-1850s – a percussion sidearm adopted by the British Army in 1856 and used widely through the second half of the nineteenth century. More importantly for the engineering record, Beaumont pioneered the practical compressed-air tunnelling machine that conducted the Channel Tunnel survey of 1881–82, driving a heading of nearly two thousand metres under the Dover Strait – a feat of engineering imagination a century ahead of its physical realization.

Lieutenant General Sir William Abney (1843–1920)

A pioneer of photographic chemistry, astronomical spectroscopy and colour vision research. Abney's work on photographic emulsions, on the sensitivity of the eye, and on the chemistry of the photographic image laid foundations that endure in modern imaging science. A Sapper who combined senior military service with scientific contribution of the first order, recognized by the Royal Society and the Royal Photographic Society alike. He also invented the Abney Level.

Major Peter Nissen DSO (1871–1930)

Designed the Nissen Hut in April 1916 while serving as a Royal Engineer on the Western Front. Over one hundred thousand huts were produced before the Armistice, housing armies across every front; the design was used again in even greater numbers in the Second World War, and remains in service worldwide. One of the most recognizable military structures in history bears the name of a Sapper.

Captain William Livens (1889–1964)

Royal Engineer officer who invented the Livens Projector – a weapon that went from concept to production in a single week and became the standard British means of gas delivery in the First World War – and the Livens Flame Projector, used at the Somme in 1916. In the Second World War he developed petroleum warfare weapons including the flame fougasse. The archetypal Sapper inventor, driven by personal fury at the losses on the Western Front.

Colonel Sir John Norton-Griffiths, 1st Baronet (1871–1930)

Mining engineer, Member of Parliament and the raiser of the 2nd King Edward's Horse in 1914. In February 1915, on his own proposal to the War Office, he was transferred to the Royal Engineers with the substantive rank of Major and given the task of raising and commanding the new tunnelling companies that waged the underground war on the Western Front, including the mines fired at Messines Ridge in June 1917 – one of the largest planned explosions in history to that date, audible in Downing Street, which transformed the tactical situation overnight. Norton-Griffiths also led the destruction of the Romanian oilfields in 1916 to deny them to the advancing Central Powers.

Major General C H Foulkes CB CMG DSO (1875–1969)

Raised and commanded the Special Brigade Royal Engineers – the chemical warfare arm of the British Expeditionary Force – from 1915 to 1918, conducting offensive gas operations on the Western Front from Loos to the Hundred Days. Foulkes wrote the standard British history of the gas war (*Gas! The Story of the Special Brigade*, 1934) and remained an authority on chemical defence for the rest of his life.

TANK PIONEERS AND ARMoured WARFARE

Sappers Who Conceived, Built and Commanded the Tank



Major General Sir Ernest Swinton KBE CB DSO (1868–1951)

Commissioned into the Royal Engineers in 1888 and decorated in the Boer War. On the Western Front in 1914 he conceived the armoured tracked vehicle that would break the deadlock of the trenches, drove its development against institutional resistance, coined the word 'tank' as a security cover-name, and wrote the first tactical doctrine for its use. A Sapper whose idea changed the face of war.

Major General Sir John Capper KCB KCVO (1861–1955)

Royal Engineer pioneer of military aeronautics and, in 1917–18, commander of the Tank Corps in succession to Elles. Capper had earlier led the Army's Balloon Section and the Royal Engineer airship establishment, making him one of the few senior officers of the period to have commanded both the first British air arm and the first British armoured force.

General Sir Hugh Elles GBE KCB KCMG DSO (1880–1945)

First commander of the Tank Corps in France from 1916 and the commander who led from a tank – ‘Hilda’ – at the head of his force at the Battle of Cambrai in November 1917, the first mass tank attack in history. Elles afterwards served as Master General of the Ordnance and as Commander of Western Command in the Second World War. A Sapper who put his hand on the throttle of the new weapon and showed how it should be used.

Lieutenant General Sir Giffard Le Q Martel KBE KCB DSO MC (1889–1958)

Pioneer of the light armoured fighting vehicle and the author of the inter-war British thinking on mechanized warfare. Martel designed and built the first Martel one-man tankette in his own garage in 1925, commanded armoured formations in France in 1940, and led the British Military Mission in Moscow. His writings shaped the doctrine of armour for a generation.

Major General Sir Percy Hobart KBE CB DSO MC (1885–1957)

Devised the specialized armoured vehicles – ‘Hobart’s Funnies’ – that cracked open the Normandy beaches on D-Day. His 79th Armoured Division transformed the art of assault engineering and is widely credited with dramatically reducing Allied casualties on 6 June 1944. A Royal Engineer who became one of the great commanders of armour, brought back from forced retirement at the personal insistence of Winston Churchill.

**FIRST SAPPER CGS AND SENIOR COMMANDERS
OF THE GREAT WAR**

*Royal Engineers at the Summit of the Edwardian and First
World War Army*



Field Marshal William Nicholson, 1st Baron Nicholson of Roundhay GCB OM (1845–1918)

The first Royal Engineer to hold the office of Chief of the General Staff, serving from 1908 to 1912. His tenure professionalized the General Staff, oversaw the introduction of the Territorial Force, and prepared the Army for the war that came in 1914. Appointed Field Marshal in 1911 – the first Sapper to reach that rank since Burgoyne.

Lieutenant General Sir Aylmer Hunter-Weston KCB DSO (1864–1940)

Royal Engineer officer who commanded the 29th Division at the Gallipoli landings of April 1915 and afterwards VIII Corps on the Western Front. A controversial figure whose career nevertheless illustrates the Sapper’s regular passage from technical command into the highest reaches of operational command in the Great War.

Lieutenant General Sir George Fowke KCB KCMG (1864–1936)

Engineer-in-Chief of the British Expeditionary Force and afterwards Adjutant General. Fowke directed the vast engineering effort of the Western Front, from the trench systems and tunnelled dugouts to the railways and water supply that kept a continental army in the field and was one of the central administrative figures of the war.

**THE SECOND WORLD WAR – SENIOR SAPPERS
AND STRATEGISTS**

Royal Engineers in High Command, 1939–1945



Lieutenant General Sir William Dobbie GCMG KCB DSO (1879–1964)

Governor and Commander-in-Chief of Malta during the great siege of 1940–42. A Royal Engineer of deep personal faith and quiet professional steel, Dobbie held the island through the most intense bombing in the history of the Mediterranean theatre until his relief in 1942. His leadership of Malta’s civil and military defence is one of the great Sapper stories of the war.

General Brian Robertson, 1st Baron Robertson of Oakridge GCB GBE KCMG KCVO DSO MC (1896–1974)

Commissioned into the Royal Engineers in 1914. Chief of Staff and Deputy to Field Marshal Alexander in North Africa and Italy, and afterwards Military Governor and Commander-in-Chief of the British Zone of Germany from 1947 to 1949, directing the British contribution to the Berlin Airlift. A Sapper administrator and statesman whose post-war service shaped the structure of occupied Germany.

General Sir Frank Simpson* GBE KCB DSO (1899–1986)

Director of Military Operations under Field Marshal Alanbrooke in the central planning of the Second World War and, afterwards, Chief Royal Engineer. Simpson sat at the heart of the Combined Chiefs of Staff system and was one of Alanbrooke’s most trusted lieutenants in the strategic direction of the war from London.

General Sir Charles ‘Splosh’ Jones* GCB CSI CBE MC (1906–1988)

Chief Engineer Eighth Army during the Italian campaign of 1944–45, Director of Military Operations at the War Office from 1949 to 1952, Commander-in-Chief British Army of the Rhine 1958–60, and Chief Royal Engineer. ‘Splosh’ Jones was among the foremost Sapper operational commanders of his generation and a central figure in the British Army’s transition from imperial campaigning to the central NATO commitment of the early Cold War.

General Sir Charles Richardson* GCB CBE DSO (1908–1994)

Chief planner to Field Marshal Montgomery for Alamein, Sicily, Italy and the Normandy and Rhine campaigns, and afterwards Chief Royal Engineer. Richardson’s planning staffs translated the operational vision of ‘Monty’ into the detailed orders, traces and logistic schemes that delivered victory in the field. One of the outstanding Sapper staff officers of the twentieth century.

POST-WAR AND COLD WAR LEADERSHIP

Royal Engineers at the Top of the British Army, 1945–2000



General Sir Hugh Beach* GBE KCB MC (1923–2019)

Master General of the Ordnance from 1977 to 1981 and Chief Royal Engineer. Beach combined technical command of the Army’s equipment programme with a distinguished post-retirement career in defence policy, strategic studies and the ethics of nuclear weapons. One of the most influential Sapper thinkers of the late Cold War period.

General Sir George Cooper* GCB MC (1925–2020)

Adjutant General 1981–84 and Chief Royal Engineer. Cooper’s career spanned the transformation of the British Army from an imperial to a NATO-focused force, and he brought Sapper professionalism to the highest levels of Army administration during the difficult years of the early 1980s.

General Sir John Stibbon* KCB OBE (1935–2014)

Master General of the Ordnance and Chief Royal Engineer, and afterwards Black Rod of the House of Lords. A remarkable double career that took a Royal Engineer from operational command to the heart of the constitutional life of the nation, exemplifying the breadth of contribution the Corps can offer.

General Sir William Jackson GBE KCB MC (1917–1999)

Governor of Gibraltar from 1978 to 1982 – including the period of the Falklands War – and the official historian of British policy in the Second World War. Jackson combined senior operational command with scholarly achievement of the first order, producing a sequence of campaign histories that remain the standard works. A Sapper of the pen as well as the sword.

GALLANTRY UNDER FIRE – A SELECTION OF VICTORIA CROSS HOLDERS

Sappers Who Did What Duty Asked



Major General Sir Howard Elphinstone VC (1829–1890)

Awarded the Victoria Cross for conspicuous gallantry at the assault of the Redan, Sebastopol, on 18 June 1855, when he led a party in search and rescue of the wounded in the open before the Russian works. He afterwards served as governor and military tutor to the sons of Queen Victoria and was a leading figure in the late-Victorian Corps.

General Sir Harry North Prendergast VC GCB (1834–1913)

Commissioned into the Madras Engineers in 1854 and transferred into the Royal Engineers in 1862. Awarded the Victoria Cross during the Indian Mutiny in 1857 for repeated acts of conspicuous bravery in the field, including saving the life of a fellow officer under heavy fire. Prendergast went on to command the British expedition that captured Mandalay and annexed Upper Burma in 1885, ending the Konbaung dynasty and incorporating the country into the Indian Empire.

Colonel John Chard VC (1847–1897)

Commanded the defence of Rorke’s Drift on 22–23 January 1879, holding a garrison of 139 men against four thousand Zulu warriors. Awarded the Victoria Cross for the intelligence and tenacity of his command – one of the most celebrated actions in the annals of the Corps and one of the most famous citations in the entire history of the Victoria Cross.

Sapper William Hackett VC (1873–1916)

Royal Engineer Tunnelling Company sapper awarded a posthumous Victoria Cross for remaining underground in a collapsing tunnel near Givenchy in June 1916 to tend to a wounded comrade, refusing to be drawn to safety and dying with him when the rescue passage finally gave way. One of the most selfless acts in the annals of the Corps.

Lieutenant Colonel Sir Brett Cloutman VC MC (1891 – 1971)

Awarded the Victoria Cross for action at Pont-sur-Sambre on 6 November 1918 – the last Victoria Cross of the First World War. Cloutman swam alone across the Sambre under heavy fire, cut the demolition leads laid by the retreating Germans, and rendered the bridge safe for the advancing British forces. After the war he became Senior Official Referee of the Supreme Court and the first Standing Counsel to the Comptroller-General of Patents – one of the most distinguished post-war Sapper barristers.



Major Edward ‘Mick’ Mannock VC DSO MC* (1887 – 1918)**

Commissioned into the Royal Engineers Signal Service in 1916 before transferring to the Royal Flying Corps, where he became the highest-scoring British fighter ace of the First World War. Awarded a posthumous Victoria Cross in 1919 for sustained gallantry in air-to-air combat. The Sapper origins of his commissioning are sometimes overlooked; his courage in the air is not.

Lieutenant Claud Raymond VC (1923 – 1945)

Awarded a posthumous Victoria Cross during the Burma campaign in March 1945 for extraordinary personal courage in leading the assault on a Japanese position near Talaku, continuing to direct his men after being mortally wounded. Killed in action aged twenty-one – among the finest examples of junior Sapper leadership under fire.

SPORTING SAPPERS

Excellence on the Field of Play

Colonel Sir Francis Marindin KCMG (1838 – 1900)

Founding father of association football and four-time FA Cup finalist with the Royal Engineers, who won the Cup in 1875. Marindin served as President of the Football Association from 1874 to 1890 and refereed nine FA Cup Finals – a record that still stands. The Corps team he led to four finals between 1872 and 1878 was one of the earliest and finest sides in the history of the game.

Colonel Henry Renny-Tailyour (1849 – 1920)

A Royal Engineer of extraordinary sporting range: he played football for Scotland in the first international match in 1872, scored in the FA Cup Final of 1875 for the winning Royal Engineers side, played first-class cricket for Kent and represented Scotland at rugby union. The most versatile sporting Sapper in the history of the Corps.

Serjeant Colin Blythe (1879 – 1917)

One of the finest slow left-arm bowlers in the history of cricket. Blythe took 2,503 first-class wickets for Kent and 100 in nineteen Tests for England before enlisting in the Royal Engineers Kent Fortress Battalion at the outbreak of war. He was killed by shellfire at Passchendaele on 8 November 1917. A Sapper whose loss was mourned across the cricketer world.

Lieutenant General Sir Philip Neame VC KBE CB DSO (1888 – 1978)

Won the Victoria Cross at Neuve Chapelle in December 1914 for single-handedly holding a German bombing attack while he hurled grenades over a parapet. Ten years later, at the 1924 Paris Olympics, he won a gold medal in the running deer team shooting event – making him the only man in history to hold both the Victoria Cross and an Olympic gold medal. A Sapper whose life embodies the proud tradition that competitive excellence runs alongside, and reinforces, professional military mastery.