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The RSI Journal is published biannually, and printed copies are distributed free to all Regular and Reserve Royal Signals Officers and Warrant Officers; and to the Retired Corps by subscription. subscriptions@royalsignals.org. should be the first port of call for enquiries. Alternatively, PDF copies of all editions of the RSI Journal published since 2010, including the most recent edition, can be downloaded from royalsignals.org/rsi/the-journal/ This can link can be saved for easy access for PC, Mac, IOS or Android, and home screens. Saving it to the home screen on hand held devices allows for easy consumption of this publication whilst on the move and it is highly recommended.

EDITORIAL

In this edition of the RSI Journal, as is appropriate in the anniversary year of the Battle of the Somme, we feature World War One communications, with contributions from two noted authors, as well as our now customary articles on cyber and regular features on personal recollections, book reviews and domestic matters.

Key among the latter are the advances being made under Project Boyle, which is looking at the future role, posture, and organisation of the Corps, and our Chairman provides an update. Our attendance at the Remembrance Day Parade at the London Cenotaph continues to attract interest, and the RSA Secretary is very keen to encourage everyone who wants to join in to let her know – her contact details are at the back page of the Journal.

The annual RSI Dinner held in London in November was once more a conclusive success, and underlined how alive and well are the efforts of the RSI in bringing together the serving, retired and Reserve members of our Corps as well our colleagues in industry, academia and the Civil Service.

As befits the modern age, and the Corps position as the Army lead in IT, our readers are reminded that it is now easier than ever to access the Journal on-line, through your laptop, tablet, i-Phone or Android device. The Corps SO1 for Digital Communications and Publications explains just how in his note on page 1w.

The Journal continues to reach all ranks in the Corps, as well as the retired community, and is sent in bulk to all units, so that just about everyone is accessible to whoever wishes to have an article printed in the Journal. Details of how to submit articles are to be found elsewhere in this Journal. The Editor reserves the right to make changes as layout and content dictates, and copyright will rest with the RSI Journal.

The Editor and the RHQ staff wish everyone a very Merry Christmas, as well as a healthy and prosperous New Year in 2017.

Best Wishes,
Tom

THE ROYAL CORPS OF SIGNALS

THE FUTURE OF THE ROYAL CORPS OF SIGNALS

A Notice by the Chairman of the Royal Signals Institution, Brigadier Michael Lithgow CBE

A fully digitalised Defence will require skills and competencies that enables information manoeuvre to take place across the entire spectrum. This ability to operate, dominate, fight in and defend the digital space is a mission critical activity today. Project Boyle has been examining the implications of this requirement for Royal Signals. It has run a series of workshops to gather input and insight from 3* to Sergeant. There has been remarkable agreement on 3 key points:

- The Corps has the largest, organised, concentration of technology qualified and experienced people capable of delivering a large proportion of this task for the Army and Defence

- Royal Signals will need to re-structure in terms of its skills and competencies

- There is over-whelming agreement from the Army that it should do so and that this should be at the core of the Royal Signals mission and tasks

The degree of change that now needs to take place is very significant and will have to be undertaken whilst delivering business as usual. The Corps must be capable of living, fighting and defending the digital space. It must continue to provide high availability secured infrastructure, resilient to attack in non-benign environments as a pre-requisite for defence activities. It will need to support in a much more agile manner the needs of defence in making sense of large data sets to support the myriad of defence functions from planning and operations through to logistics and intelligence. This will require people able to create algorithms to exploit the data and design of applications to make use of the data. The Corps will need to be able to rapidly create ecosystems of different users and communities to solve problems, create answers, focus capability. Overlaying these high level functions will be the hands-on expertise to defend and protect from the strategic to the tactical level the digital space.

Whilst the focus has been on the technology skills and competencies, these discussions have been within the context of being to operate and deliver across a wide spectrum of operational environments but remembering that our first duty to ensure continuous information manoeuvre.

To complete this evolution of the Corps from infrastructure focused to a more balanced set of skills and competencies 6 themes were identified by Project Boyle:

- Defined set of competencies matched to needs of Defence

- Developed and delivered in a more appropriate and flexible way rather than 'up-front' at the beginning of a military career. The concept of continuous professional development

- Change of culture and relationship with the remainder of defence. A Corps that has empathy with and an innate ability to understand and predict the needs of defence. Bold and capable of exploiting technology

- Recruitment and retention of the very best people, creating cognitive diversity throughout the Corps

- Enhanced working relationships across the Defence technology arena and with Industry, including R&D

- Resourcing of the change programme with visionary leadership

The future of the Corps will be based upon mastery and ownership of this new digital world, it will be at the heart of information manoeuvre, it will become itself a weapon platform that will make the difference in a changing, challenging and the increasingly asymmetric digital environment.

AUTUMN GUEST NIGHT

The Corps Autumn Guest Night was held in the Headquarter Officers Mess, Royal Signals on 6th October, under the presidency of Major General J Crackett CB TD, Director, Reserves.

Officers Dining Out	Officers Dining In		
		Tp Commanders Course 95	Tp Commanders Course 96
Col Graham Addley	Capt Steven Burton	2Lt Tom Angus	Capt Richard Atkinson
Lt Col Terry Crane	Capt John Hardy	2Lt Tom Blennerhassett	2Lt Edwin Burlton
Lt Col John Duckworth	Capt Suresh Limbu	2Lt Phillip Blight	2Lt James Cauldwell
Lt Col Phil Osment	Capt Chris Moore	2Lt Charlotte Bratby	2Lt Harriet Doyle
Maj Rob Clifford	Capt Phil McLeish	2Lt Lyndon Bunnett	2Lt Ben Everton
Maj Tony Barry	Capt Neil Port	2Lt Rebecca Cooper	2Lt Luke Fundell-Williamson
	Capt Steven Pritchard	2Lt Patrick Highet	2Lt Oliver Hall
	Capt Autar Shrestha	2Lt Stuart Learmond	2Lt Alex Hope
	Capt Matthew Stowell	2Lt Stephen Lovatt	2Lt Howard Horler
	Capt Ian Wells	2LT Anna Mulderrig	2Lt Will Johnston
	Capt Paul Wright	2Lt George Paxton	2Lt Richard Leach
		2Lt Tom Rowlands	2Lt Ivan Livingstone
		2Lt Adhip Sherchan	2Lt Tim Nixey
		2Lt Alan Spaven	2Lt Robert Smith
		2Lt Jack Whiting	2Lt Simon Walton
			2Lt Steve Wyndham-Smith

ROYAL SIGNALS INSTITUTION LECTURE

Tuesday 8 November 2016 saw a lecture by General Sir Richard Barrons KCB CBE on 'Revolution or Defeat: Warfare in the Information Age'. This proved to be one of the most popular RSI events to date with over 200 squeezing into the Blandford Cinema. General Barrons is a former Commander of Joint Force Command and retired in April this year. He has recently appeared at RUSI and in the media where his views on the UK's defence posture and the strategic horizon have proved to be unsettling to many.

His lecture began with an overview of the enduring nature of conflict and how the assumptions made about traditional expeditionary character of previous campaigns were now changing. Asymmetric warfare, the UK's vulnerability in terms of resources and now the new vulnerabilities exposed by the 'internet of things' all combined to present a threat-filled environment. Even the traditional understanding of conventional, high intensity kinetic warfare needed re-evaluation as new systems ranging from main battle tanks to exo-atmospheric missile systems challenged previous doctrine.

National priorities would require close examination against a backdrop of a changed strategic context. The Westphalian model of a rules-based International Order was no longer absolute and there were several burgeoning crises on the near horizon. General Richard outlined a number of areas where previously stable models were under attack. These ranged from increased human migration, a shifting economic centre of gravity, the rise of the Asia, increased cyber-attack and the nature of terrorism. The Information Age was seeing the onset of fundamental change and this included the military

with a need to consider 'Full Spectrum Effects'. The US Government was already focusing on new technologies and accompanying concepts in order to regain military pre-eminence. All the promise of automation and artificial intelligence offered much but effective control mechanisms would be essential. He pointed out that any technology we have is likely to be available to adversaries and that therefore any longer term mitigation of technological threats is likely to be more important than short term technological advantage.

All in all this was a heady mix and very well-received. Some very searching questions were asked by the audience and credit is due to the younger element who engaged fully with the subject. The evening was rounded off with a hot supper in the next door CESSAC Café and continued discussion.

General Sir Richard Barrons makes a point.

THE ROYAL SIGNALS INSTITUTION ANNUAL LONDON LECTURE

The Master of Signals and Chairman of the RSI with prizewinners

On 17 November some 230 senior officers and their colleagues from industry, academia and the Civil Service attended the annual RSI London Lecture and Dinner, once again held in the impressive surroundings of the Institute of Directors, Pall Mall London. After welcoming the guests, the speaker for the evening, Lieutenant General Sir James Everard KCB CBE, was introduced by the Chairman of the RSI, Brigadier Mike Lithgow.

Sir James was commissioned into the 17/21st Lancers in 1983, and served in Germany and the US National Training Centre before attending the Army Command and Staff Course in 1992. He deployed to Bosnia as Chief of Staff of 4th Armoured Brigade, and then served as Squadron Leader with the Queen's Royal Lancers in Germany and Canada before deploying to Kosovo as MA to the Commander ARRC.

From 2000 to 2002 he commanded the Queens Royal Lancers in Germany, Cyprus and Kosovo, and then spent two years focused on Iraq and Afghanistan as DACOS J5 at PJHQ, followed by the Higher Command and Staff Course in 2005. After a six month deployment to the Pentagon as CDS Liaison Officer to the Chairman of the Joint Chiefs of Staff, he assumed command of 20 Armoured Brigade, an appointment he held from 2005 to 2007, serving in Germany and Iraq.

He became Director Commitments at HQLF in January 2008, prior to assuming command of 3rd (UK) Division from July 2009 to April 2011. He then spent two years as ACGS before promotion to Lieutenant General, and assumption of the post as DCDS (Military Strategy and Operations). He became the Commander Field Army in November 2015, and next year will become DSACEUR at SHAPE in the rank of General.

Mr Geordie Thompson, ex-Corps Band, prepares for the dinner calls

Brigadier Ian Cameron Mowat and Major John Barrett assess the bill of fare

Lieutenant General Everard addresses the audience

In a wide ranging address, Sir James covered many aspects of Defence operations and strategy, and brought out the importance of timely information to commanders at all levels. He underlined the need to look ahead to the likely pattern of future conflicts, and the importance of the work of Project Boyle in assessing and scoping the future role of Royal Signals.

The address was warmly received by the audience, and elicited some detailed after-dinner questions, to which he gave direct and informative responses, with the Master of Signals providing supporting detail.

The RSI award winners are listed on the following page.

Secretaries RSI !

The Master sums up

Royal Signals Institution Awards for 2016

The Master of Signals, Lieutenant General NAW Pope CBE presented awards as follows:

The Silver Medal

For outstanding professional achievement by a member of the Corps.

Lieutenant Colonel P Rose

For his efforts in developing the IS plan for Exercise Griffin Strike, the highest priority Defence exercise in 2016.

Staff Sergeant KDD Hart

For assuring operational communications to deployed Falcon users, and contributions towards the joint French/UK Op AZOTIZE.

Sergeant D Hendra

For leading a national UK intelligence effort monitoring a high profile threat stream and ensuring multi-agency co-ordination.

Sergeant SJ Patterson

For performance as a leading cyber practitioner working across the MOD and development of intricate cyber capabilities.

Sergeant RH Richardson

For his role in providing close communication support during civil unrest and the conduct of flawless tactical operations to preserve sensitive material.

The Master of Signals Award

For special contribution or service to the Corps

Lieutenant Colonel K Bell MBE

For recruiting high profile expertise from the IT industry to support 254 Signal Squadron, thus earning three star approbation for the unit's achievements and efforts.

Warrant Officer Class Two P Fox

For his all-round performance in a Defence Critical Infrastructure to deliver an exceptional array of capabilities, far beyond expectation.

Sergeant T Pun

For his work on Op TORAL, particularly for the closure of Camp Souter and the establishment of the Kabul Compound main British hub, involving an IS rebuild and reconfiguration of strategic communications.

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THE CORPS AT THE CENOTAPH – REMEMBRANCE DAY 2016

This year the Corps once more featured at the Remembrance Day Parade at the Cenotaph in Whitehall, with a bigger contingent than ever, our parade being led by Major General John Stokoe. total of 48 veterans were on parade, and we aspire to more next year.

Anyone interesting in taking part in an event which should appear on everyone's bucket list should contact the RSA Secretary, Mrs Caroline Addison. The following photographs are representative of many taken at the event.

MUSEUM VOLUNTEER DINNER

The Museum held their Annual Volunteer Dinner in the Officer's Mess on 24th November. The Museum relies heavily on its volunteers and this is one way that they show their appreciation. There were over 65 guests including many from the Board of Trustees, led by the new Chairman Brigadier (Retd) Ted Flint.

Weekend volunteers help to keep the Museum and shop open at weekends and ensure its ongoing viability. Weekday volunteers provide expertise and assistance for projects inside the museum - on business, curatorial and Archive projects. If you can spare a little time and would like to help, please call Dave Walker on 01258 455 748.

Serving an ex-corps are well represented. Former RSm and long time volunteer Harry Hawke with serving Cpl Christy Proudfoot.

Volunteer Co-ordinator Dave Walker BEM opens proceedings, with, to his right, Chairman of Trustees Brigadier (Retd) Ted Flint and his wife Gillian.

The ladies from the Comms Cafe in the museum.

Where's Wally?

THE RSI LONDON SEMINAR

By Lieutenant Colonel Phil Osment, Director RSI

The RSI held its annual seminar on 1st December in the RUSI, in Whitehall. The primary output of the day was a presentation of the findings of the various Project BOYLE workshops which had been held throughout the year. This sought to analyse the challenges of operating in the 21st Century, and what the Corps would have to do to successfully complete its mission. These workshops had representation from across the RSI 3RI community: the Regular (ranging in rank from staff sergeant to brigadier), the Reserve and the Retired, accompanied by generous support from industry and our corporate partners. This was reflected in the composition of the Seminar audience who had the opportunity to challenge conclusions reached and to advance alternative views for the way forward.

We were fortunate in having the Master of Signals, Lieutenant General Nick Pope, open the Seminar with his perception of the context of BOYLE and its role in helping him define his future vision for the Corps. He outlined how he hoped to release this in the Spring once other general staff work had been completed, including the imminent release of the 'Army 2020 Refined' staff direction within the next few days. He gave a comprehensive analysis of the factors that had shaped both Defence and the Corps. This ranged from perennial issues surrounding funding, the requirement to maintain some aspects of existing capability but also the introduction of new concepts such as the Strike Brigade, interoperability challenges with American and other Allies, delivery of training and addressing long standing issues concerning infrastructure.

The RSI Chairman, Brigadier Mike Lithgow, and Major General Bill Robins followed with their report on Project BOYLE. The Chairman identified three common themes from the previous workshops: an acceptance and acknowledgement that the Corps represented the largest concentration of technically qualified individuals within Defence; that the Corps was not well structured to meet and deliver change; that there was an overriding urgency to change and that visionary leadership would be needed to deliver it.

The Chairman introduces the seminar.

General Robins described the six main themes that had emerged from previous workshops. Theme 1 was encapsulated in the term 'Competences', Theme 2 as 'Education, Training and Professional Development', Theme 3 'Culture and Relationships', Theme 4 'Marketing and Communication', Theme 5 'External Changes Which Could Help This' and Theme 6, 'Making Change Happen'. The audience then raised questions, observations and comments upon the issues raised within these themes and these will be reflected in the final version of the BOYLE report to be delivered later in December.

Brig Greg Wilson, Head of Capability Strategy Development, Information Directorate, gave an engrossing address on the importance of information on the battlefield and the overwhelming need to win the information space and the achievement of information superiority. The Army Vison was expressed as 'Information is valued, exploited and protected as a critical Army asset to maximise advantage in a trusted Single Information Environment'. He observed how his own experience while on operations on HERRICK had resulted in something closer to a single information environment where open architectures, interoperability and information exploitation had reached new levels because of an operational imperative. To regain this, we needed to re-examine interoperability, information exploitation (and the need for common services), the ability to influence and research and development.

The Army's ability to conduct Information manouevre had to be underpinned by doctrine, and a new Army Information sub strategy would be released in Q1 2017. Brig Stephen Potter and his team then addressed the challenges, contributions and roles of the Reserve. It was pointed out that the Reserve had considerable experience in adapting and implementing change throughout their recent history. Army 2020 had resulted in more change and not all had been beneficial. There had been some very positive developments however including an encouraging improvement in recruiting and a sea-change in the attitudes of the Regular component who now actively sought to integrate the Reserve.

Lack of space precludes a full report of the points delivered but it was evident that the Reserve were an essential part of the UK Defence capability and brought with them an additional war fighting capacity, a link to Civil Society and access to skills and experience not readily found within the Regular component. The specialists' contribution presented a particular set of challenges including a difficulty in responding at short notice, limited capacity, the problems in building capacity teams, supporting what they built and matching demand to resource. Other challenges which particularly faced CEMA specialists included their terms and conditions of service, rank/insignia/pay issues. integration and trust, career paths and recruitment.

Finally, the Seminar considered how to take forward project BOYLE led by Brig Greg Wilson and the Corps Colonel, Col Simon Hutchinson. Using the BOYLE themes as a framework, current work strands and changes were outlined including a proposed competency framework to

Really? the Chairman and Major General Robins.

provide the training and skills demanded by new systems coming into service such as MORPHEUS, NSOIT(D), TRINITY and CEMA.

Agnostic recruiting and changes to training delivery were being examined as were improvements to education, follow on training and professional development. The Culture and Ethos theme required greater emphasis on links to the Joint environment, PAG, industry and the 3RI community. Marketing and communications was seeing the development and delivery of a new branding approach and a new digital presence. External changes were centred around Army 2020 Refined and MARBLE ARCH work. The 'Making Change Happen' Theme would require visionary leadership and RHQ would be setting up a small RHQ Change Team by February 2017.

Next steps would await the outcome of MARBLE ARCH but the production of a vision for the Corps would be delivered by the Master of Signals and his supporting staff. A Working Group would be established for the R SIGNALS Change Programme and this would involve establishing a lead for each of the BOYLE themes, A brief would be delivered to the Corps in March 2017 on the Vision and Plan and there would be a routine review of their implementation and delivery by the Corps Council and Master's Council.

The Seminar was opportunity for the Master of Signals to present a copy of 'Zeitgeist', a print depicting the Corps' role in BAOR during the Cold War, to Major General Bill Robins in recognition of his outstanding service to the Corps throughout his adult life, 55 years and counting!

The Master presents the print to Major General Robins.

THE SPECIAL RESERVE

October 2013 saw the Ministry of Defence set up a new kind of Reserve unit, the Cyber Reserve. Our anonymous author is a serving officer in the Joint Cyber Unit (Reserve), and provides some insight into the way the new unit is being set up. Recruits are being sought!

Globally governments and military have an increasing dependence on cyber – the people, hardware and software that supports the flow and management of information.

This increasing dependence is providing adversaries with new and more exploitable opportunities. The UK Armed Forces depend on computer networks, both at home and on operations around the world. The MOD is working hard and investing to counter the rapidly developing threats to those networks from cybercrime, espionage terrorism and warfare, including making commitments of £145 million over five years on specific cyber defence improvements.

Back in 2011 the UK Government released the Future Reserves 2020 Paper which recognised that a Cyber Reserve was needed to defend against this growth of the cyber threat. It stated that "Defence will need to engage additional civilian experts" recognising that "this may involve outreach to skills in IT firms".

It was not until October 2013 that Cyber Reserve recruitment started in earnest, with the then Defence Secretary Philip Hammond announcing that applicants were being accepted. He said: "The Cyber Reserves will be an essential part of ensuring we defend our national security in cyberspace. This is an exciting opportunity for Internet experts in industry to put their skills to good use for the nation, protecting our vital computer systems and capabilities."

With these high expectations, the new Reserve unit needed the support of senior military and the single Services to be a success, especially as the unit was looking to recruit people for their cyber-cognitive or thinking abilities, and recognised that physical fitness is not an essential requirement in every case to be able to conduct operations in cyberspace.

The single Services embraced the need for flexibility in the eligibility criteria in order to attract those who could not have been considered previously or may not have volunteered in the past. It meant that the Cyber Reserve has been able, and continues to be able to recruit on a case by case basis, including many who would have been excluded under the previous rules. The Unit has been able to accept the "best of the best" based on their talents, skills and expertise to meet cyber threats, often gained through cutting-edge cyber experience outside.

Following the Defence Secretary's announcement, interest in joining the Cyber Reserve has been extremely positive, both in quality and quantity of applications received. Recruits have come all walks of life, with the unit attracting a wide spectrum of society, from Service leavers, academia, Government departments, the private sector and individuals with backgrounds you might not normally associate with cyber. A common theme across applications has been the motivation to help promote UK security and opportunity to work in a new and challenging area with experiences beyond their "day job".

Once recruited, a Cyber Reserve undergoes a bespoke and streamlined package of courses designed to prepare them for their arrival into the Defence Joint Cyber and Assurance Units, whilst also recognising that they already professional experts in their field. The training allows

them to meet their new colleagues, whilst providing the Defence context to their new Cyber Reservist roles to enable them to take up their post far earlier that traditional Reservist training allows.

The value of Cyber Reserves was recognised by the Vice Chief of Defence Staff during a visit to new recruits. He said "Bletchley Park and the Y service are examples of the strong traditions of Reserves coming to the fore in time of national need. Success was achieved because the military harnessed this wealth of talent and experience. This remains the approach for the Cyber Reserves, and your broad church of experience and expertise will help turn the puzzles that cyber presents into solutions."

Today the Cyber Reservists are working alongside their regular colleagues, supporting Defence cyber security. They are taking part in training, exercises and operations helping to assure the safety of critical computer networks, information systems and data by drawing upon the unique skill, experience and expertise that they employ on a day to day basis in civilian life. The recruits also get the opportunity to partake in wiser service life experiences, such as adventurous training, travel and overseas exercises.

The SO1 of the Joint Cyber Unit (Reserve), Lt Col Michael White reported: "I have been impressed by the level of motivation shown by the recruits during their first real extended exposure to military life. Many have said that they want to give something back to society and specifically see cyber as being an area where the UK, including the military, is under threat. This is their area, and where they feel they can provide support. Another common thread is that they applied to the Joint Cyber Unit (Reserve) because they felt that no other reserve units would have been able to make best use of their skills.

Service in Cyber Reserve offers a great opportunity for Service leavers and those who have never served in the Armed Forces alike. We are still taking expressions of interest and applications as we always looking to recruit high calibre individuals with the suitable levels of knowledge, skills, experience and aptitude."

The next two years will see the Joint Cyber Unit (Reserve) fully operational, with personnel recruited, trained and operating alongside regular and civilian colleagues in cyber and information assurance units. The creation of the Cyber Reserve also supports the wider work the Ministry of Defence is doing to recruit more reserves through Future Reserves 2020.

Those interested should visit www.gov.uk and search for "Cyber Reserve".

THERE'S SOMETHING IN THE WAY YOU WALK

What may have to happen for the defenders to keep with cyber attackers

By John Mitchell, Chairman of the BCS Risk Management and Assurance Specialist Group

Introduction

Security threats come in three main forms: unauthorised access, denial of service and unauthorised modification. The UK Computer Misuse Act dealt with the first and last, but had nothing to say about the second, which is unfortunate, as this is the easiest of the threats to initiate, and with today's Internet of Things (See Winter 2015 Journal), possibly the most damaging.

The American FBI recently stated that up to 700 million devices had been subverted with a Trojan which could be remotely initiated for a distributed denial of service attack (DDos). Firewalls give some protection against this type of attack, but can be overwhelmed by the sheer number of pings received. As no access is gained and nothing is modified it would appear as if this type of cyber-attack slips through a crack in the legislation. Even if it did not, the UK legislation would be pretty toothless in bringing to account an attacker from another jurisdiction.

This is one of the problems faced by a cyber-defender. The attack can be launched from anywhere: on-world, or even off-world via satellites. Brute force attacks may be crude, but they need very little skill and are difficult to defend against. If you control your electricity supply via the Internet, then a DDos attack may prevent you from controlling it. The critical national infrastructure may be up and running, but without a controlling hand.

Pre-defined Privileges

The way you walk may be a more reliable authenticator that you are you, than many of the other authentication methods. The growth of biosciences for authentication is one of the many innovations to counter cyber security threats. In simplistic terms, the cyber threat of impersonation relies on the fact that users have pre-defined privileges that are activated once the user is authenticated by the computer. So the sequence is: identification, authentication and privilege allocation.

Traditionally, the authentication mechanism has been something known (password), something possessed (token) or something you are (fingerprint). A mix of all three can provide to or three factor authentication. The downside is that the more complicated the mechanism, the more onerous it becomes for the user. So something unique and what is part of you may be the way to go.

There are several downsides to this approach, however. What if you do not carry the required attribute? I know a few people who have fingers, but no associated prints. And you may need a special piece of kit to take the necessary reading which raises the cost and needs to be available at all access points. Even the humble password requires a keypad.

So the way you walk, or your gait, may well be a good way of identifying you in a crowd and thus a great policing tool, but is not so useful if you want to log in to your email in a hotel room. Signatures are coming back into fashion, but only if you can write on a device that can measure the pressure and velocity of your handwriting. Another piece of kit.

In the recent science fiction series "Humans" the synths (robots) recognise another synth because they shared data when meeting each other. But when they came across synths which did not share data they were led to believe that the non-sharing synths were human, because a non-sharing synth would simply say that they were human, and as synths cannot lie, this was taken at face value even when all the signs of non-humanity were being broadcast. So a reasonably sophisticated authentication process is trumped by some built-in logic that has greater precedence than the huge amount of data screaming "this is a synth I see before me".

It Comes Down to Pulses

This leads me to the main challenge faced by cyber security.

No matter how sophisticated the authentication mechanism, it ultimately comes down to a series of electronic pulses being matched against a similar pre-recorded sequence.

Air traffic control systems not only rely on radar to acquire an aircraft, but also on the aircraft identifying itself with a transponder transmission. Without the latter we would simply have an unidentified flying object. If the aircraft sends a forged signature however, then we have no identification process to identify the forgery.

Naval submarines are tracked around the world by their sound signatures. Each navy maintains an authentication database to identify friend and foe alike and then spend millions trying to disguise the signatures of their own submarines, knowing that the other side are doing just the same. Keeping the signature database current is a continuous occupation with huge repercussions if it is not.

Two Types of Mischief

All identification/authentication pairings rely on a simple match the field exemplar. In the second example we change the exemplar to match the incoming stream.

So, returning to how you walk: a camera records your gait which is converted by an algorithm into an electronic signature. Hence if at this stage we could replace your gait signature with another, the identification attribute is still you. So in the future, when that recorded gait is picked up in crowd, it will identify you even though the recorded gait is that of another person. Nicely framed.

Which means that we must have a verifiable process to ensure that the exemplar used in any given process can be relied upon. The second issue of forging the data stream is where most cyber security has been directed. Multi-factor authentication makes it difficult to forge the data stream, but also makes it difficult for the user.

It's About Humans

Despite technological innovations, the actual security battle is fought human to human. One designs and builds an attack mechanism while the other does the same on the defensive side. Each enhancement on the attack side has to be analysed, deconstructed and neutralised by the defence. The time lag between threat identification and neutralisation is the key to success or failure. Even a few nanoseconds may to too long where cyber war is the prelude to or a component of a kinetic war.

So human intelligence needs to be complemented by cyber. We really do need artificial intelligence security officers. But how much latitude should we give them? Should it be the authority to launch a counter-attack, or even a pre-emptive strike, to neutralise a potential threat before it takes place? How do Asimov's "laws of robotics" work when we have cyber versus cyber activity, rather than cyber versus human? Security innovation needs to take account of its wider implications. The difference between a killer app and a killer may be only a line of code away.

I'll be back.

THE PIPES AND DRUMS OF THE ROYAL CORPS OF SIGNALS

WO1 (FofS) Niall Anderson

At the 4th November War Memorial in Veneto, Italy.

WO1 (FofS) Niall Anderson is currently Regimental Operations Foreman of Signals at 14th Signal Regiment (Electronic Warfare). He learned to play the bagpipes as youngster and carried it on when he was in Phase 2 Training at Blandford in 1998.

Over the years he has frequently performed with the band and individually throughout the UK and abroad at a wide variety of events, and is one of the longest serving members of the Pipes and Drums.

Piping within the Corps has a long and proud tradition, and the high standards always set through history have been maintained by the current members of the Pipes and Drums of the Royal Corps of Signals. As we reach the end of another busy year a look back highlights how much has been achieved and also gives much reason for optimism.

Band members have once again shown their adaptability and versatility in supporting a wide range of events and tasks. This has included performing individually, as a small group or a full band at events throughout the Corps such as dinner nights, open days and parades. This activity is essential for maintaining the high profile of the Pipes and Drums, and allows members to gain valuable experience of performing in public. There have also been a number of activities which promote the Corps externally, and of particular note was the deployment to Italy to support the Italian Army International Patrols Competition in Veneto which was a resounding success and resulted in an invite to return next year.

The Pipes and Drums follow an inclusive model, made up of all ranks and open to all Regular and Reserve personnel. Members are currently rank ranged from Signaller to Captain, with the Regular element being mainly based at Stafford and the Reserves all serving in Scotland with 32nd Signal Regiment. There are also a number of pipers and drummers serving in other units throughout the Corps across the UK who will come together frequently for training and performances as well as supporting their own unit.

Recruitment is essential to assuring the future of the Pipes and Drums. New members who have piped or drummed before at any level are always welcome to join and develop further, as are learners who are starting from the very beginning. Training is delivered through a variety of in house tuition and courses at the Army School of Bagpiping and Highland Drumming in Edinburgh, and the Corps has built strong enduring links with the School over the years. Band members will attend the Class 3, 2 and 1 Piping or Drumming courses and further development will continue when they return to the Pipes and Drums on completion of each. For those who achieve Class 1 status there is the also opportunity to attend the Pipe Major or Drum Major course. Several members have already followed this route, including Captain J Scott – Director of Bagpipe Music R SIGNALS and Sgt (PM) T Coleman – Corps Pipe Major who have reached the pinnacle of piping within the Corps and are guiding lights to the younger members who seek to emulate them. Currently there are 2 individuals progressing with their development in Edinburgh, LCpl M Black and Sig T Anderson.

LCpl M Black (Pipe Major Course) and Sig T Anderson (Class 3 Piper Course)

Ensuring that the Reservist element is also developing at pace with the wider Pipes and Drums, SSgt (PM) Steven Bell has recently taken on the 32nd Signal Regiment Pipe Major appointment. With vast experience gained throughout a career that culminated in becoming the Pipe Major of 1 SCOTS, SSgt (PM) Bell has quickly become a great asset in his new role. He has embarked on training and recruiting the Reserve element to develop this area and is taking the lead on all Scottish and Reserve focussed events, such as the Scottish Corps and Horseshoe Dinner Nights.

In addition to SSgt (PM) Bell, there is a great amount of experience, skills and enthusiasm at 32nd Signal Regiment amongst Regular and Reserve personnel which provides strong foundations for the future. Central to this are Capt Duncan Lamont R SIGNALS - Deputy Pipe President and Quartermaster 32nd Signal Regiment, WO2 (SSM) David MacKenzie, WO2 (YofS) M McPhie and Cpl Alistair Beaton. Top level support to our endeavours is provided by Colonel Joe Cooper, our Pipe President.

The coming year promises to be challenging, with the numerous routine but highly important events being augmented with many others in the UK and overseas. There will be a renewed focus on recruitment and training of Regular and Reserve personnel and the band will be tested in competition throughout the summer. Invitations have been received to participate in the Basle Military Tattoo in Switzerland and make a return visit to Italy, while there is always the scope to augment other bands with individuals or small groups on various Tattoos, performances and other events.

The ongoing support of Commanding Officers and Units received by the Pipes and Drums is always gratefully appreciated and allows the band to develop to its fullest potential. Contact details for all enquiries, recruitment and requests for support are:

SSgt (PM) S Bell: 0141 2245441 / 32SIG-51-PIPEMAJOR@mod.uk

Sgt (PM) T Coleman: 01785 787663 / 11SIGX-SSU-RDSTAFF@mod.uk

Sgt (PM) T Coleman - Corps Pipe Major, Capt J Scott - Director of Bagpipe Music R SIGNALS, Col J Cooper Late R SIGNALS - Pipe President, Capt D Lamont - Deputy President R SIGNALS, SSgt (PM) S Bell - Pipe Major 32 Sig Regt.

THE EVOLUTION OF THE INTERNET: FROM MILITARY EXPERIMENT TO GENERAL PURPOSE TECHNOLOGY

By Professor John Naughton, Faculty of Mathematics, Computing and Technology, The Open University

EDITOR'S NOTE

This is an abstract of an article which can be viewed in full in Vol 1 Issue 1 of the Journal of Cyber Security.

We apologise but we were not able to publish this article on line. If you would like to get a copy of his particular article please contact the Editor.

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FLYING BOMBS, BATTLES AND OTHER EXCURSIONS

By Brigadier AG Bohannon

EDITOR'S NOTE

The Journal regularly features personal accounts from individuals who have particularly interesting career paths.

Tony Bohannan enjoyed a distinguished, productive but decidedly non-typical career with the Corps, which saw him involved in several post-war emergencies, as staff officer and commander, world-wide. When he was commissioned, RMAS did not exist, the country was recovering from six years of conflict, and confronting the realities of the fast-developing Cold War against the background of a run-down economy and a society in turmoil.

Georges Pilotelle 1871.

I was born in London on 24 May 1929 (Empire Day) when each year the country was festooned with flags to commemorate the birthday of Queen Victoria, which they still do on Victoria Day in Canada. For many years, my parents convinced me that this was all for my birthday, and I gullible as ever, believed them.

I am part French; my maternal grandfather Georges Pilotelle, was an (in)famous communard of the Paris Commune of 1871, captured, sentenced to death but escaped into exile in London to join the then jet-set. He was a society portrait painter, set and costume designer for the D'Oyley Carte Opera, couturier to the aristocracy and French activist/political cartoonist. In 1927 my cousin Clarence Chamberlin raced Charles Lindbergh across the Atlantic. Lindbergh got to Paris, and Clarence

to Eiselbaden, Germany a week later – some 3911 miles non-stop.

We lived in Wembley; in 1937 I went to St Dunstan's College, an early City of London School that moved to Catford in 1888, respected for its teaching methods, especially of the sciences. A well-remembered event was the burning down of the Crystal Palace in 1937, which I watched from a hill nearby.

My father was in the First Surrey Rifles in World War 1, but in 1922 decided the Army was not for him and joined the Swiss Bank in London. In 1938 with war coming, he said that this time Switzerland would be over-run, and

Clarence Chamberlain did not reach Berlin, but he flew further than Lindbergh. 1927.

he would be out of a job; we had to be self-sufficient. He bought some acres of the then Selsdon Park Estate (now a hotel), established a small-holding and had a very modern but very ugly house built on it over a bombproof shelter.

He got it wrong on two counts. First, Switzerland prospered, not least by safeguarding Nazi loot. At the end of the war, it demanded war reparations from the UK, and we paid them! Secondly, the house was situated neatly in the middle of the small triangle formed by the fighter airfields of Biggin Hill, Kenley and Croydon. During the Battle of Britain, I was at home for the holidays, and I recall watching on 15 September the JU 87s diving on Croydon airfield, and a Heinkel 111 being chased down our steep valley by a Spitfire. I remember well the blitz, and the nights spent in our bomb shelter; the nearest bomb fell only a few yards away, taking out all our windows and most of the roof.

I was evacuated with the school to Reigate, only 12 miles from home, and easily reached by bicycle. In the

St Dunstans College OTC marching through the City of London, exercising its "Freedom"

summer of 1943, two mates and I were on the Downs above Dorking where we discovered the floor of a beech wood covered in German incendiary bombs, many unexploded. We took some, as they would look fine on the mantelpiece with all the shrapnel we had collected. In the bus, we small boys could not resist showing them off. The bus came to a crashing halt, passengers were evacuated and the police called. We got a mild ticking off, and the bombs confiscated; typical of grown-ups.

Then it was D-Day with troops streaming south. We cheered the Americans and got showered with chocolate bars and the like, but did not bother with the British or Canadians! On the morning of 6th June the maths master burst into our classroom shouting "We've landed!" We were given ten minutes to settle down and then back to work. I remember well the V1s and V2s but nothing of VE Day shortly before my 16th birthday. I read somewhere that these V weapons caused widespread panic. All I can recall is a general indifference.

In early 1947 having (just) passed the higher school certificate (A levels), I decided I wanted to join the Army. At the time that everyone was getting out of uniform, I wanted to get in. Why? I just did. My parents wanted me to go into law, but were very supportive. In those days, I had to have their permission.

So it was that in February 1947, aged 17, I joined the Royal West Kents (the blind half-hundred), my uncle's regiment. I was in 28 Infantry Training Regiment, Palace Barracks, Belfast and already a lance-corporal (someone could spot potential) when one sports afternoon, I was playing cricket (my Uncle Douglas had captained England on a tour of India. I hated it – the balls too hard and too fast.) I was called to the office of the Adjutant (God). What would I say to a commission? "What's a commission?" In Royal Signals. "What's Royal Signals?" That night I was on a train for Catterick.

After a short course learning to be an officer and gentleman, in October 1947 I received a Short Service Commission, eventually converted to Permanent Regular in June 1951. After a course on communications (primarily the WS 19 set) I was posted to Malaya (where's Malaya?) on the troopship Dilwara. Where had she been revictualled? Clearly not in rationed UK. The food was abundant, and the drink duty-free.

2Lt Bohannan Royal Signals

Halfway to Singapore, we three subalterns were called to the commandant's office. "For God's sake, boys, slow down, the Army is so short of young officers, I have to get you to Singapore alive." We just made it. Sometime later I discovered that at that time (1947/48) the Army was so short of technically minded young officers that it had ordered a trawl of all units, and found me.

Major Jack Tidey, Lipis 1950

Going up the Rompin to Aur

Winter, Korea 1951.

Hill 355

A few weeks before the emergency erupted, I joined 48 Gurkha Brigade Signals Squadron under Major Jack Tidey in Johore Bahru. Jack was a wonderful man, a father to me, who taught me so much about soldiering. At that time, the Squadron had only two officers, Jack and myself.

For the next three years, I spent much of my time "jungle bashing", providing rear links for patrols of 1 / 2 GR and the RE in the infantry role; WS62, wet battery, generator, oil and petrol – a four man load. 48 Brigade comprised eight battalions, first in Johore, then in Pahang (Temerloh and Kuala Lipis). Flying as I did over the central mountain range to KL once a week to collect the pay could be an excitement, especially in the monsoon. I also remember well an adventure boating up the Rompin River from the coast to a saki village (Kampong Aur) to establish a jungle fort with airstrip, to dominate the jungle and drive out the CT. Malaya was then some 70% primary jungle.

The war in Malaya (1948 – 62) was the "Emergency", that in Borneo the "Confrontation" and of course Ireland had the "Troubles", never war. I came home again in the Dilwara in December 1950, an acting Captain with a MID, to find the UK still with rationing, dreary and run-down; quite a shock after vibrant Singapore. After only a few days of embarkation leave, I phoned the War Office. "Please get me out of here, anywhere." That night I was back on the Dilwara bound for Korea, via Kure, Japan. (Where's Korea?")

As I knew the ship' drill, I was made Adjutant. It should have been a sinecure, for the permanent staff RSM and Chief Clerk were not going to let me ruin their well-established routines, but some idiot had put the Argyles and the Ulster Rifles on the same ship - a big mistake. At least as Adjutant I got a cabin to myself with significant advantages. By the time we got to Kure, I was "engaged" to one of the ship's QA nurses. She returned home, I went to Korea. Months later, I received a "Dear John" letter from her mother, saying her daughter was to marry a paratrooper. Never trust a para!

In April 1951, I and some others were one night rushed across to Kimpo airbase near Seoul. The Chinese had attacked in force across the Imjin River. I was met by Captain Terry Crump, given his jeep and trailer, and

Setting Out on Jungle Patrol
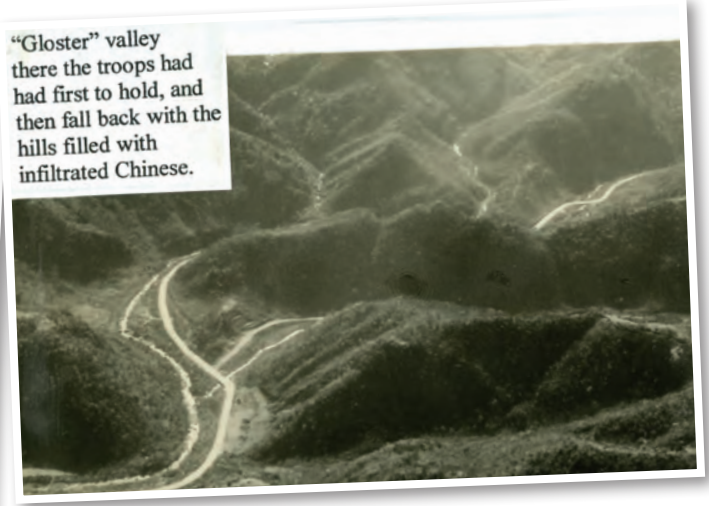
"Gloster" valley there the troops had had first to hold, and then fall back with the hills filled with infiltrated Chinese.

"Gloster" Valley Korea, 1951

The Pipe Major, KOSB piping the attacking company onto the objective.

Typically the Brigade Commander, George Taylor insisted on going forward, taking me with him!

KOSB Pipe Major piping his battalion onto Hill 355

The 38th parallel. "What the war was about."

pointed north against traffic streaming south, to 28th Commonwealth Brigade to command the signal troop.

The Brigade Commander was George Taylor (holder of the DSO, MC and an England Rugby cap), one of those senior officers who always had their favourites. I was one; George liked to be well forward, and liked to take me with him. After the situation on the Imjin stabilised, the Brigade with four battalions and a tank regiment retook hill 355 and recrossed the river. This was a near disaster, because that night a freak storm took all our bridges away.

Finally the three brigades (25th Canadian, 28th Commonwealth and 29th) formed the first Commonwealth Division and together settled down behind a barrier of mines, wire and strong points against which the Chinese threw themselves most nights at great cost, and to no avail.

I came home on the troopship Empire Orwell to be instructor and then Adjutant at the School of Infantry at Hythe, Kent. There I met Jessica. One day in 1953 some idiot in a new-fangled Land Rover crashed into my precious pre-war Austin Ten. I rang Jessica for her solace, but instead got her father (a retired Group Captain). "Jessica's in London with her mother, shopping." I explained the situation. "Come and talk to me" was the reply. "Oh no sir, no need" I demurred. Again the reply "Come and talk to me". I did, and that night met Jessica off the train to tell her I thought we were engaged.

We were married on 19 August 1954 and remained so, happily, for 54 years. Our family, three children, (we lost the eldest), five grandchildren and four great grandchildren are all Australian, but spread around the world. Early on, we bought our boat "Contessa", moored on the Beaulieu River, and a house in the New Forest as a bolthole, and travelled to Australia frequently.

I was then posted as Adjutant of 50 Northumbrian Division Signal Regiment (TA) in Darlington; then as GSO3 in the War Office and in 1959 to the Staff College, Camberley. In January 1960 I was posted to HQ 1 Federal Brigade in Kuala Lumpur, first as DQ and then as Brigade Major. This was the last two years of the "Emergency" and the Borneo "Confrontation". This and Brigade duties apart, I was responsible for all the military aspects of Malaysian State ceremony. The Tunku (or PM) required this to be "just as you do it in London". Thankfully, Brigadier Henry Green was a Grenadier, and knew it all well; three Royal funerals, a coronation, independence day, trooping the colour, many state visits and the "End of the Emergency" parade in 1962.

Then in late 1963, home on a very comfortable German liner to arrive in Southampton in the terrible winter of 1963 for six months leave, before posting as OC 4 Guards Brigade HQ and Signal Squadron in BAOR. It was one of the first combined HQs, and not something many of the Guards officers were happy with. There were problems, but these were sorted out, and all was well. This was at the height of the Cold War, and much time was spent in the field close to the Inner German Border.

This was succeeded by another three years at Staff College as Lieutenant Colonel DS, where I made many friends and useful contacts. This in turn was followed in 1968 by a spell in Singapore and Borneo as OC 99 Gurkha Brigade HQ and Signal Squadron. Commanding Gurkhas was the greatest of privileges; they are superb soldiers, brave, loyal and with a great sense of schoolboy humour which suited me very well.

Victory parade Kuala Lumpur 1962

I was then appointed Commanding Officer of 3 Division HQ and Signal Regiment at Bulford for three years before going on to do a spell in Defence Intelligence. In 1973 I was promoted Colonel, and became head of Military Operations 3 in the Ministry of Defence under Major General Bill Scotter. I was concerned mainly with NATO issues, and one of my tasks was to represent the MOD in the MBFR (Mutual and Balanced Force Reductions) talks in Brussels. This concerned conventional forces, and ran in parallel with the nuclear SALT talks. They came to nothing, as neither side could agree the other side's numbers.

Lecturing in China 1985

Tony, the Brigadier!

Me, SHAPE 1976

In 1975 I was promoted Brigadier and posted as Deputy Chief of Communications and Electronics Division at SHAPE in Mons, Belgium. We had a house on the banks of the Mons canal where my father had fought in 1914. My boss was a German Air Force General who had bombed Liverpool during the war; we became good friends. I well remember a compliment he paid me, at least I think it was meant as one! We had been to a meeting at NATO HQ, where I had cause to tell an Italian General that he did not know what he was talking about. According to Fritz, I did it so well, the Italian took it as a compliment!

There then followed a short spell as a Director to the Defence Policy Staff and then the Director to the Defence Operational Staff where I learnt a great deal about frigates, submarines, fighters, bombers and Space, (through Skynet). Heading a Skynet meeting one day, I was approached by GEC/Marconi and offered the job of establishing a new division within the company concerned with Space systems and the like. The MOD approved, and I accepted, retiring from the Army in 1982, two years earlier than expected. At one stage, I and two others were invited by the Chinese Government to go and lecture at their National University for Advanced Technology. I did not enjoy the experience.

Finally, in May 1986 I retired full-time, and we moved to North Devon from our bolt-hole in the New Forest, to a 16th century farmhouse with eight acres of gardens, seeking new challenges. It has kept us busy. I also became a voluntary worker for the CPRE, representing it at some 23 public enquiries, sailing my Contessa from its mooring on the Beaulieu River, and designing, building and flying model aircraft.

Jessica died on Christmas Day 2008. I am now 87, alert, but with legs that let me down sometimes. I still travel in the UK and on the Continent, and enjoy life with a group of friends (inevitably diminishing). I have all my life been extremely fortunate: wonderful parents and a happy childhood, a superb, talented and supportive wife, a very varied and interesting career to look back on with enough excitements but not too many, and a family any man would be proud of.

Officers, 3 Div HQ and Sig Regt 1969

One mission, one team, one direction.

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THE CORPS IN GERMANY
By Colonel TF Moncur

By 2015, the Royal Corps of Signals had spent some seventy years in Germany, first as a force of occupation and then as a NATO ally. This unprecedentedly long experience was to profoundly influence the development of equipment, tactics and deployment as well the careers of generations of officers and soldiers. Now that this era is coming to a close, it is appropriate that we can try and capture some of the memories and recollections of that time. This article is thus an attempt to encapsulate just some of these experiences. Doubtless some of our readers will have others; the Editor would be very pleased to hear of them, before memories either fade or become enhanced with the passage of time.

The first British Army of the Rhine (BAOR) was first created to control troops in the British occupation zone along the Rhine, following the end of World War One. The Armistice which took effect on 11 November 1918 provided for British, French and American troops to occupy bridgeheads across the Rhine River. The new army had five corps, each of two divisions, and a cavalry division. Regular units were largely withdrawn from BAOR divisions as they formed, with few remaining even to May 1919.

In August 1920 Winston Churchill told the British Parliament that the BAOR consisted of approximately 13,360, including Staff, Cavalry, Royal Artillery, Royal Engineers, Infantry, Machine Gun Corps, Tanks, and the usual ancillary services. The troops were located principally in the vicinity of Cologne at an approximate cost per month of £300,000.

With the elimination of troops in Silesia in 1922, BAOR was organized into two Rhine Brigades and a few supporting troops. It was finally disbanded when The British Army left Germany in 1929.

THE SECOND BAOR AND NATO

The second BAOR came about 16 years later, following the end of World War Two. It had its origin in the 21st Army Group, formed in September 1943 in England and charged with the invasion of Europe. Commanded by General Sir Bernard Montgomery, it initially had command of the Normandy invasion forces. When the US 12th Army Group was activated under General Omar Bradley, 21st Army Group remained in control of the British Second Army and the First Canadian Army.

Following the Normandy landings, units of 21st Army Group crossed the river Rhine near the Germany city of Wesel on 23 March 1945. After a stubbornly contested advance, the British formations, together with the Canadians and Americans advanced into the German states of Nordrhein-Westfalen, Niedersachsen and Schleswig-Holstein. This established the British Army in occupation of the north of the country.

Crossing the Rhine.

At the February 1945 Yalta Conference it was agreed that Germany be divided into four, and this was confirmed in July at Potsdam, with the inclusion of a small French Zone adjacent to the Franco-German border and the much disputed territories of Alsace and Lorraine. Similar arrangements were agreed for Austria and the City of Berlin, deep in East Germany, the Soviet Zone of Occupation.

Three months after the war ended, 21st Army Group was redesignated as the British Army of the Rhine (BAOR), assuming its new title on 25 August 1945. Between then and the formation of NATO in 1949, war time

Churchill, Roosevelt and Stalin at Yalta, 1945.

demobilisation brought successive reductions, eventually leaving it with a strength of only two divisions. This was to be the British contribution to NATO, and reinforcements arrived in September 1950 with the reformation of 11th Armoured Division, followed by 1st (BR) Corps a year later.

In 1951 6th Armoured Division was reformed in Great Britain, and moved to Germany the next year. Also in 1952 the Headquarters of Northern Army Group (NORTHAG) was founded as a NATO headquarters with BAOR under command. BAOR then ceased to be a force of occupation, and became a NATO formation, with responsibility for guarding the northern front from Hamburg to Kassel, against any possible Soviet advance from the East.

Brigadier Norman Butler records his impressions on first posting to BAOR in 1950:

Following a six month Young Officers course at the School of Signals in Catterick, six of the Sandhurst Intake IV were posted to BAOR. As I had passed out slightly ahead of the other five, I found myself commanding a draft of 108 Royal Signals tradesmen, who had just completed their training, and five subalterns, setting off from Richmond Station in late August 1950. We made our way via Darlington, Kings Cross, Harwich and the Hook of Holland to Krefeld where we split into groups going to different locations. The whole chain of transport was controlled by the military.

Although the Second World War had ended five years earlier, Germany was still a scene of utter devastation and occupied by the four victorious nations. I was posted to HQ BAOR Signal Regiment based in Herford and then to 2 Squadron in Bad Oeynhausen, the location of

HQ BAOR. The inhabitants of the town had been evicted and the town was surrounded by barbed wire with only British personnel and German workers (by day) being admitted.

For those of us coming from UK where wartime austerity still ruled, the availability of superb food, cheap alcohol and cigarettes was quite an experience. The currency used by BAOR was British Armed Forces Special Vouchers ("Baffs") and the cheap cost of living was exemplified by the existence of a 3d (just over 1p) note. Gin and

whisky were 5s (25p) a litre. Not surprisingly the German population was tired and subdued though not hostile.

2 Squadron comprised Signal Centre staff and some High Speed Radio (HSR) troops. I was 2ic of an HSR Troop and my main duties comprised checking the mammoth inventories of obscure equipment much of which had been literally been thrown away at the end of the war. I also did shifts as DSO at night. There was no exercising during this period and I doubt whether the equipment captured from the Germans actually worked.

North Korea had invaded the South on 25 June 1950 and UK was in the throes of preparing for another war as we had arrived in BAOR. Relations with the Russians had sharply deteriorated and the UN (in the absence of the USSR) had voted for military action in Korea.

I was DSO in mid-September when a long paper came in with momentous details of the rearming planned by UK with considerable emphasis on BAOR. I must confess that my attention as an impecunious young officer was more focussed on the annex outlining the rise of pay for regulars which meant that I would receive another two shillings per day!

The real import soon became apparent. BAOR was to consist of four divisions (2nd Infantry, and 4th, 7th and 11th Armoured). It was a heady time for us all and in early October I was on my way to join 11th Armoured Division Signal Regiment at Hammersmith Barracks Herford. We were now part of 1 British Corps of Northern Army Group NATO.

Hammersmith Barracks was empty when we started to arrive. We soon had officers and troops but no equipment. Life consisted of route marches and fitness training. The equipment finally arrived in November, and the square was full of enormous crates which were gradually unpacked. The vehicles were collected in packets from various vehicle depots full of war time

stock. I remember collecting a Matador – a vast mobile Armoured Command Centre – from Monchengladbach, and when speeding along the autobahn back to Herford we found that the brakes did not work. It weighed seventy tons. Fortunately there was only military traffic on the autobahn in those days but we had some near misses before finally managing to pull up hanging on to the ineffective hand brakes.

My first job was as 2ic of B Troop (Rear Corps HQ) and then OC O Troop (Signal Centre and DRs).We went through a period of hectic training and in the New Year began an apparently never ending series of exercises staring with Regimental, then Divisional, Corps and finally Northern Army Group. I recall being local ADC for visits by Ike (SACEUR), Monty (DSACEUR) and Manny Shinwell (War Minister).

The final exercise in Autumn 1951 was "Counterthrust" and involved 200,000 troops: there were actually 22 real fatalities. We retreated like mad for six days, then stood firm and finally launched a counterattack. I was usually last to leave a location in retreat together with the late Jimmy Treglown (OC Charlie – cable – Troop) and it was frustrating to watch the "enemy" coming in at the other end of the village reeling up our cable: we never got it back. Obtaining write offs was very difficult.

Our radio equipment comprised WS 53, WS 19 and WS 62, all war time HF sets. None of them were particularly reliable but we had an invaluable sprinkling of WWII veterans who could achieve miracles, mostly using

Morse. Much of the HQ communication was by cable and hundreds of miles of D3 and Quad were laid at each location. As OC O, my key resource was the DR who seemed able to deliver to the right address in the face of chaos.

Life when in Barracks continued to be luxurious by UK standards. One picture which stands out in my mind when Mess Secretary, was the hill at the bottom of which several houses had been built and taken over by us for single officers. Looking out of the rear windows, we could see row after row of new houses springing up, built by remarkably industrious Germans working what seemed like 24 hour days.

One very special memory is of 6th February 1952, when four of us went to the Officer's shop in Bad Oeynhausen, travelling of course in one of our Regimental VW cars available for hire at a nominal rate. We entered the shop to find the German shop girls in tears. "Your King is dead" they sobbed. It is difficult to describe the sense of shock that we felt, cynical young men though we were. The whole of the British Zone went into mourning and many of the local Germans wore black arm bands lining the route when we marched to our memorial service.

ORGANISATION AND REORGANISATION

BAOR comprised three main elements: the main force of 1 (BR) Corps with headquarters in Bielefeld, the British Rear Combat Zone (RCZ) based at Dusseldorf, and the British Communications Zone (Comm Z) with headquarters at

Emblem in Belgium. The Berlin Infantry Brigade was 3000 strong, and not subordinated to NORTHAG but under the control of the Allied Control Council in Berlin.

During October 1954, HQ BAOR relocated from its post-war Bad Oeynhausen headquarters to a new purpose built facility at Rheindahlen, which was also to house the headquarters of RAF Germany, NORTHAG and 2nd Allied Tactical Air Force. The BAOR strength at this time was around 80,000.

Alterations to the force mix took place over the next few years, and saw the emergence of four divisions, restructured and rebalanced, and the successive reductions in strength down to 64,000 and then to 55,000, following the abolition of National Service in 1958-60. Three of the divisions were armoured and based permanently in Germany, while the fourth remained in Great Britain, to be called on as necessary. Each division had armour, infantry, artillery, engineers and signals, in varying strengths, as well air support provided by the Army Air Corps.

In the event of war, BAOR would remain under NATO control, forming part of Allied Command Central Europe, with 1 (BR) Corps having the task of holding its allocated sector of the North German Plain, extending from Hamburg to Kassel, and from the Netherlands frontier to the inner German border. BAOR was flanked by 1(NL) Corps to the far north, 1(GE) Corps the immediate north and 1 (BE) Corps to the south, the broad operational aim being for each to defend their territory, thus imposing sufficient delay in the Soviet advance to allow for a political resolution of the situation.

The complete BAOR area of responsibility extended all the way back to the Channel port of Antwerp, and in time of war, BAOR would become the British Support Command, charged with supplying 1(BR) Corps and guarding the rear areas. Should 1 (BR) Corps come under threat, the Corps would fight with two divisions forward and one in reserve. The fourth division arriving from UK would defend vital military targets in the Corps rear and protect against any rapid enemy tank thrust which might develop.

OPERATING IN BAOR

Thus was set the framework within which generations of British servicemen operated in North West Europe. It was seen as a testing ground for commanders at all levels, and for new equipment, tactics and operations. Careers were made and broken on exercises held on the territory from the Teutoberger Wald to the Inner German Border, and service life thus presented a challenge which the able and ambitious could fully embrace, as well as a testing ground for new outlooks, concepts and designs. It was arguably the experiences forged in BAOR which directly contributed to the success of later real world operations in the Middle East.

Personnel of the Royal Corps of Signals played their full part in this structured existence of service routine, and the certainties of planning and practising for a conflict against an identifiable and well-understood opponent. At times, it seemed as if we played a fuller part than most. Every exercise at whatever level of command needed communications support, for which we had to be fully

practised and prepared through our own Corps exercises, usually more challenging, as veterans of successive communications exercises over the years will ruefully testify.

For those who questioned the rationale for it all, a visit to the Inner German Border (IGB) and the continuous barbed wire fence and mined strip marking the division between the two states provided a salutary reality check. Families living near the IGB who were able to receive the grainy black and white television transmissions from East Germany had continual reminders of what life was like on the other side of the Iron Curtain, albeit through the rose-tinted optic of the party propaganda machine. Colour reception from the Eastern Bloc nations was impossible, due to the different colour encoding system used in their transmissions.

Another reminder of the reality of the situation was evidenced by the daily broadcasts of coded instructions from the DDR to its many agents in the FDR. These were in the form of five-figure groups of numbers read out by a female broadcaster, nicknamed "Magdeburg Annie".

The codes were eventually cracked by American computers. One particular message was identified as intended for an agent in West Germany known as "G" who was active in the Social Democrats, and important enough to be congratulated on the birth of his son.

The known details of the agent, and, crucially, the date of the boy's birth, matched those of a highly placed civil servant in Chancellor Willy Brandt's office, Gunther Guillaume, and he and his wife were put under surveillance. Guillaume's arrest, on April 24 1974, was swiftly followed by Brandt's resignation.

Among the soldiers, exercise life was seen as a welcome change from the barracks routine. Tradesmen were able to practice their craft, participate in manoeuvres for which they had been trained and forge the links of comradeship and cooperation so essential to a functioning and cohesive unit. The frequency of individual postings in and out of units underlined the need for frequent practices to ensure that the new arrivals could learn their roles. The number of suitable communications sites were few in number, and some acquired a certain familiarity with repeated usage. Not unwelcome – it certainly facilitated the whole business of reconnaissance, siting vehicles and establishing communications.

This well-established routine allowed the Army to fully indulge its penchant for organised sport, and a whole range of activities took place, enthusiastically backed up by the Chain of Command. Particularly in the days before the advent of British forces television in Germany, such activities were key to countering the perceived demons of loneliness and boredom which might otherwise have bedevilled the British soldier away from the home base. The standards of performance were high, and it was not unusual for individual performers to achieve international ranking. In athletics, for example, Sgt Jeff Fenge in the pole vault and Cpl Clarence Callender in the sprints were notable examples.

Returning to BAOR in 1958, Brigadier Norman Butler noted how much had changed in only a few years:

In February 1958, I was posted to 2nd Armoured Division Signal Regt at Bunde. Militarily things looked very much the same as they did when I had left in 1952, but there was an incredible improvement in the state of the German Cities: miracles of rebuilding had been achieved.

HQ BAOR Signal Regiment 1950s.

I took part in a rugby match a fortnight after arrival and stupidly tackled head on one of the Fijians that the British Army was recruiting in preparation for the end of National Service. I woke up in Rinteln BMH where I spent the next five weeks. During my stay in hospital, 6th Armd Div was disbanded and the 2ic of 1 Corps Signal Regiment at Herford recruited me while visiting one of their officers in my room.

1 Corps Signal Regiment was located in Maresfield Barracks, Herford and actually comprised six Squadrons to which was shortly added the ASSU and then a further Squadron to make total of eight and a strength of over one thousand men. The MOD felt that they should add to our burden by making us the first unit in the British army to become all regular in preparation for the end of National Service in 1960.

My first job was OC 1 Squadron (Radio Relay). We were equipped with the US ANTRAC which was actually pretty effective, though full of valves some of which needed inspired manual tuning and all of which were likely to expire without warning. Life in those days was a succession of exercises and my last as OC was in October 1958 and lasted four weeks. It was a very fluid exercise and ended as usual with a rapid advance and everyone exhausted. I was very proud of my NS operators who achieved 100% communications over unworkable distances during the final night: sadly the staff were all asleep in the morning and no one noticed.

I must record my misgivings about BAOR communications at this time and indeed later. The staff were in my view provided with far too much opportunity to chat on telephones which depended on solid radio relay communications. As OC 1 Squadron, I had identified just 37 possible hill sites for Radio Relay in the British Zone, only 21 of which were available in peace. The Russians of course must have observed this situation. It was surely unwise to depend on quasi optical radio for our main operational communications, however convenient they were.

I was appointed adjutant to the Regiment as it was in the process of becoming all regular. The recruiters in desperation were enlisting all sorts of undesirables and one of my chores was to get rid of the worst characters as quickly as possible. QR 503 fortunately provided for the discharge of personnel for administrative reasons

Beford LCV-Neuefeld

Med WirelessTroop - Beford LCV

after a formal three months notice, and my assistant adjutant, chief clerk and myself developed a highly efficient conveyor belt.

Some of the sub-standard recruits got into serious trouble before discharge. We had one thousand virile young soldiers, and were also given the task of court-martialling some 60 deserters arrested following the Suez operation in 1956. I did not keep an accurate count of the courts-martial at which I prosecuted, but it must have been at least eighty.

The exploding size of the Regiment demanded that we take over the barracks across the road, and the Barnes Bridge was built by the RE to allow safe passage between camps. The most pressing problem before the acquisition of the second camp was where to park the 600 vehicles and trailers that we had. They ended up parked on the square and all over the camp in available spots. Going out on exercise was a complex procedure, and the various elements had to unwind round the camp circuit as the square was gradually emptied.

Those present will never forget a major exercise in late 1959 when the over-zealous subaltern left as rear officer i/c the camp decided to change the circuit while we were away. Half of those returning noticed the new signs and half did not. They met around the Officer's Mess and formed a perfect traffic jam. The Regiment was piled up nose to tail several miles down the autobahn (a few hundred yards from our gates) as the CO and I found out when we returned from the post exercise conference. It took until midnight to sort out.

In January/February 1960, we took part in the largest exercise of my second tour – Exercise Lion Bleu. Altogether we were out of barracks for four weeks, and eventually returned wearily to our families. Interestingly, four of the officer's wives gave birth in October/November that year. I was promoted to major on 29th October and while entertaining the officers to lunchtime drinks, I was telephoned with the news that my own wife had been rushed to Rinteln BMH and had given birth at 1200pm. I have always been grateful to my son for obviating the necessity of a second party, though it must be the only time in his life that he was ever early.

It was during this tour that the Germans began to emerge from Occupation and become allies. In spring 1960,

our MT Clerk, Grafin von Brose, a remarkable woman who had fled from her castle in East Germany in 1945, asked me to be the guest of honour at the local Herford Schutzenfest. My memories of the week are clouded by the quite incredible amount of alcohol that I consumed in activities that seemed to begin at 6am every morning and finish in the small hours. I was feasted by each company in turn. It was nevertheless a tremendous experience in which I found exceptional comradeship and hospitality. It was, I understand, the first occasion on which a British Officer had taken part in such a ceremony – higher authorities had given their blessing.

I spent my last few months in the Regiment as OC 3 (Cable) Squadron. Our task was to lay the lines for Corps HQ including inter location 10 pair cables. Our hundred "hairies" or linemen – almost entirely from Glasgow or the North East – achieved miracles of speed and endurance as they laid and picked up hundreds of miles of line at each location in fast moving exercises.

FAMILY LIFE IN BAOR

The British family posted to Germany soon discovered that the renowned German reputation for order and tidiness was well earned. Life was governed by a whole raft of regulations, scrupulously observed. Quiet times were imposed during public holidays and at weekends, and during working days from 2200 – 0700. Certain activities were prohibited during such times: creating noise, such as loud music and late parties, lawn mowing and hedge cutting, and sawing or chopping wood. Sundays were treated as days of rest, and it was forbidden to hang laundry outside, wash windows, clean or do car maintenance. Householders were responsible for keeping clean any pavements outside their property, and for clearing away snow from such areas by 0700 daily, or shortly after cessation of snowfall if this happened during daylight hours.

The list of proscribed actions was lengthy. Barbecues were not allowed on the balconies of flats, and parents were held responsible for the behaviour of their children. It was thus prudent to take out insurance against any liabilities arising, a precaution which Germans regarded as essential. Children's play areas could not be used after dark, and children could not ride bikes on the road until

Christmas in Germany.

they had a good knowledge of the highway laws. Bikes could be checked for roadworthiness, and roller skates and skateboards only used in designated areas. Using a British made baby alarm was banned, as they operated on a frequency which could interfere with emergency channels. Burning garden rubbish was not permitted, and there were rules as to where you could park your car – not on your grass!

For wives there were additional irritants. For many years a married lady was not referred to 'Mrs Smith', but as 'wife of Sgt Smith', and it was most useful to have memorised her husband's service number for dealing with military authorities, such as in the family medical centre. The comfort and assurance of living in the UK in proximity to one's family and friends could prove a sore contrast to being suddenly moved to a military housing estate in a foreign land, or occupying a military hiring in the middle of a German village with no other English speakers around.

Those with a liking for charitable good deeds, travel or socialising usually did very well, and many wives discovered degrees of energy, resourcefulness and independence they did not realise they possessed. It was not easy for everyone, however, and the welfare organisations were often called into play when family cohesion broke down.

The orderliness of life in Germany nevertheless appealed to many soldiers, as did the general standard of living, the quality of consumer goods and the goodwill of the populace. There were many marriages between British servicemen and German girls, something which in the early days had been discouraged, and had an additional consideration for Royal Signals personnel in respect of security clearance. Many Corps personnel were cleared to a high level, and this clearance was always reviewed when marriage to a foreign national was in prospect. The situation was particularly difficult if the intended wife had relatives in East Germany, who could, in theory, be subject to pressure.

Lieutenant Colonel Wally Drain spent several tours in BAOR, and he recalls the feeling of always being "on parade", and living in something of a goldfish bowl, such was the difference between the British service families and their German counterparts, and the need to conform to both Service and local regulations. The families living in military hirings, as against quarters, learned to make the best of it and fit in where they could. Comparisons were regularly made with the United States personnel in Germany, who lived in large bases, with all shopping and other facilities provided. The British would take something like dogged pride in showing just how well they coped.

Lieutenant Colonel Stephen Coltman recounts that when he married after completion of his Communications course in 1968, and being under the approved minimum age of 25, he was not entitled to an officer's quarter when he moved to BAOR. Sympathetic Barrack authorities did however allow him and his wife to occupy a Warrant Officer's quarter in lieu. He recalls that in these days before the advent of the military salary few personnel were able to afford new cars, despite being able to purchase them tax-free. Campaign and gallantry medals were not often

Checkpoint Charlie.

seen, except among senior ranks and the older officers. There were compensations: petrol was duty-free, the Local Overseas Allowances were fairly generous, and the excellent autobahn road structure made travel easier.
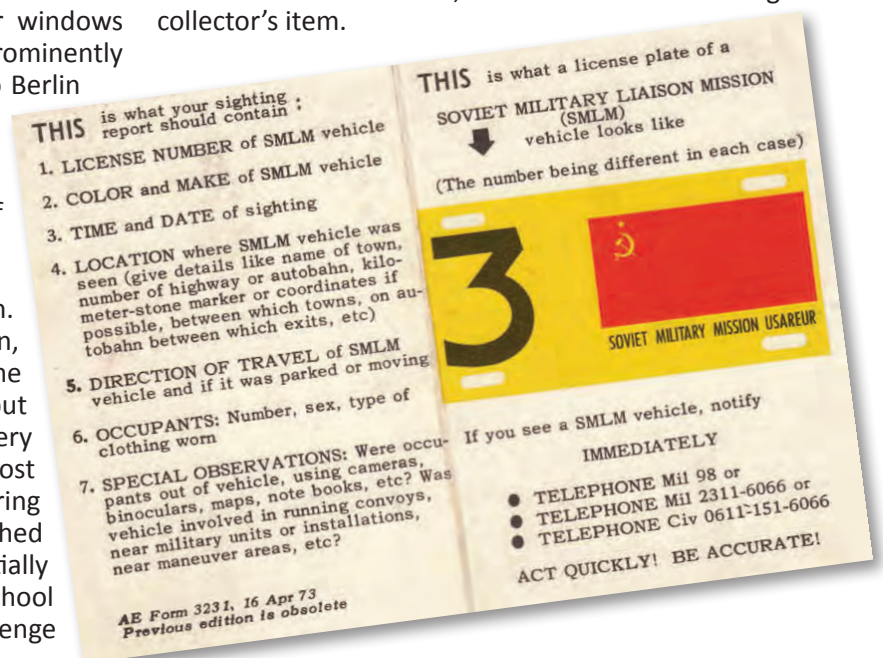
Berlin was a popular sightseeing destination for military families, facilitated by the availability of cut-price accommodation and meals at the Edinburgh House Hotel, but complicated by the need to book and apply for travel permission well beforehand. The travel application had to be completed carefully, as it was scrutinised minutely by the Soviet personnel manning the three official border crossing points into East Germany, whose task it was to give final travel authorisation. Wrong spelling and even misplaced dots or commas could result in rejection.

The procedure at the border crossing point was something of a ritual. The United Kingdom did not recognise the Government of East Germany, so only Soviet personnel could be dealt with at the crossing point. The Soviet guard on duty (usually a young national serviceman) would solemnly present a salute, which had to be answered, even if wearing civilian clothes. Any attempt at conversation by the East Germans was to be met by car windows resolutely wound up and the British passport prominently displayed. Movement up the road corridor to Berlin was monitored, a strict speed limit of 100 kph was imposed, and anyone unlucky enough to suffer a breakdown in transit was obliged to remain in their vehicle and await the arrival of the regular sweep by the Royal Military Police.

Children's schooling was a universal concern. Primary schools were situated in every garrison, staffed by British teachers recruited under the British Families Education Service scheme, but the number of secondary schools were very few, often located some distance away and most parents were faced with sending their offspring to boarding school in UK once they had reached their early teens. Although the cost was partially mitigated by the availability of boarding school allowances, there remained the logistical challenge

of organising travel during school holidays, as well as coping with parents' days, mid-term breaks and sports days. Small wonder that large capacity estate cars capable of carrying school trunks and children over long distances were popular tax-free vehicles for the BAOR soldier. The proximity of grandparents and relatives to offer help in an emergency was often as much a factor in the choice of school as any academic record.

Some diversion and entertainment was to be had in sighting and reporting the reconnaissance vehicles of the Soviet Commander-in-Chief's Mission to West Germany, or SOXMIS for short. These vehicles were based in an enclosed compound at Bunde, under the command of a Soviet Major General, and their official task was to ensure that Britain and her Allies were not surreptitiously preparing for war. Unofficially, they were not above conducting covert espionage away from their designated areas, and everyone was required to report any sightings to the Royal Military Police, giving details of vehicle number plate, number of occupants, location and direction of travel. Such reports were acknowledged by return of an official card, which became something of a collector's item.

THIS is what your sighting report should contain:

1. LICENSE NUMBER of SMLM vehicle

2. COLOR and MAKE of SMLM vehicle

3. TIME and DATE of sighting

4. LOCATION where SMLM vehicle was seen (give details like name of town, number of highway or autobahn, kilometer-stone marker or coordinates if possible, between which towns, on autobahn between which exits, etc)

5. DIRECTION OF TRAVEL of SMLM vehicle and if it was parked or moving

6. OCCUPANTS: Number, sex, type of clothing worn

7. SPECIAL OBSERVATIONS: Were occupants out of vehicle, using cameras, binoculars, maps, note books, etc? Was vehicle involved in running convoys, near military units or installations, near maneuver areas, etc?

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3

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21 Signal Regiment (Air Support).

REGIMENTAL LIFE

Brigadier Norman Butler returned to BAOR in August 1968.

I arrived in Laarbruch RAF Station to assume command of 21 Signal Regiment (Air Formation). They were the last of the AF Regiments, of which there had been eleven in 1945. My primary task was to effect a further reorganisation of the Regiment following the RISTACOM agreement on the future provision of signals assistance to the RAF by Royal Signals.

The Regiment had a squadron at each of the major airfields primarily maintaining the extensive cable networks. This commitment was now reduced to a single squadron with a troop at each airfield. The Regiment established a new squadron to man the RAF Radio Relay Communications throughout BAOR and a further one to provide mobile communications linked to the Northag field network for the Harriers due to arrive shortly.

Soon after my arrival, I was visited by the local German Army Commander who welcomed me to the area and proposed active social and military liaison between our units. A remarkable change from my previous tours! I am happy to say that this led to many happy co-operations and celebrations.

BAOR was now a long established and very well organised military presence. Germany had made a miraculous recovery from the devastation of defeat after a catastrophic war, and would soon be the most prosperous economy in Europe, but surprisingly, local relations were generally good in spite of the high spirits of some British troops and the humiliation still felt by some Germans.

We only participated in a relatively small number of exercises except of course for the Harrier Squadron. The RAF only turned out in force a couple of times a year. Prior to their first major deployment in 1970, they admitted that they their last experience of outdoor operations had been in the Western Desert! When they asked for our co-operation, we were only too pleased to provide it, and thus established an excellent rapport between the Harrier Field Force and its communicators.

There was much to be said for serving with the RAF. Their facilities tended to be better than those of army units and we were delighted to take full advantage of them. Messing and accommodation were all first rate, and sports facilities excellent. At the same time, we were able to claim army privileges such as "woolly pullies" as being an essential part of our identity. They were jealous of our generous establishment of vehicles but pleased to make use of them.

21 Signal Regiment with its airfield facilities and greater time in barracks was a natural unit for successful sporting activities. The post RISTACOM increase in numbers also helped unit teams. In 1970 the Regiment won the Army Athletics Championships and in 1972 the Army Cross Country Championships both of which cups they continued to hold for the next seven years. The shooting teams won both the .22 and full bore trophies. The very active sporting scene in BAOR played an important part in maintaining morale. The facilities were excellent though exercises did disrupt the sporting calendars.

In February 1971 I handed over to the late Roy Phippard, coincidentally at School with me during the War, and became the Chief Exercise Planning Officer Northern

German Kpz M47 Patton which was replace by the Leopard 1 in the mid 1960's.

Army Group. My duties comprised organising major exercises, running seminars, providing shadow enemy and allied HQs and coordinating umpiring requirements.

I remember being Chief Umpire at an exercise for 24 Infantry Brigade Group, acting as what is now known as the Rapid Reaction Force, in Schleswig Holstein. This time a German Armoured Brigade acted as the enemy and greatly outgunned and outmanoevred the light British Brigade. I shall never forget one of my umpiring staff, a WWII infantry officer, returning from a dawn attack saying that he had actually felt terrified when he saw the line of German Armour complete with black crosses coming over the sky line. I had an excellent young German major in my EPS team. Times had changed.

BAOR exercised constantly to ensure battle readiness in the event of a crisis, with full participation from UK based Territorial Army units earmarked for support. Battalion and brigade size exercises took place in Germany, and live firing manoeuvres were held at the British Army Training Unit at Suffield in Canada.

Communications support was needed for every level of unit and formation exercise, and Signals units had to ensure that their procedures were up to mark, which of course could only be tested by holding their own exercises. The most challenging of these were the Flying Falcon series, staged by the Commander Communications at HQ I (BR) Corps. These were usually held in March, so that the Commander Communications could be assured that his units were fully trained and capable of supporting the formation exercises later in the year. The weather in Germany at this time of year was rarely kind, and conditions were often challenging, to say the least. The processes of establishing communications, tearing down, moving distances of many kilometres and then setting up again tested the professionalism, stamina and resource of officers and soldiers to the limit.

Winter conditions could be extreme – on occasions detachments were unable to collapse their antenna masts, which had frozen solid, and during urgent moves were forced to abandon them for recovery later when weather conditions had improved. These same conditions made road journeys hazardous, and real life casualties were all too frequently a feature of the military exercise cycle.

As in all military activities however, humour was never far away, including the time-honoured practice of schadenfreude, or delight in the discomfiture of others. Major General John Stokoe remembers his time in command of 14th Signal Regiment, when the Commander Communications made an unscheduled visit to one his sub-units, which resulted in him being treated as "enemy" and held incommunicado for some significant time! The Commander's opinions on this situation are not recorded!

The view that Corps units were treated as being "on tap" has a resonance throughout senior Corps commanders at that time. Good relations with the formation commander and his staff were crucial to success, and a network of contacts in support and logistics areas were invaluable. These relationships had to be nurtured and maintained, leading to an impression of always being on duty. Inevitably, there were some officers and senior ranks who found the strain too much, and had to be replaced.

Colonel Phil Whitemore recalled the almost formatted cycle of activities which comprised regimental life. Autumn saw the commencement of squadron and regimental exercises, where new personnel were absorbed and trained, equipment tested and checked and preparations made for the higher formation exercises which were to follow in Spring and late Summer. Vehicles were crucial to role of every regiment, and there was a strong and continuous programme of vehicle maintenance and repair. Communications equipment was no less important, and was inspected regularly. Adverse reports were not well received!

As Commanding Officer of 21 Signal Regiment Lieutenant Colonel Whitemore had inherited a strong sporting tradition, and the intervals between exercises were fully taken up with a range of sports, as well as adventure training and skill at arms competitions. Virtually every unit took advantage of the good summer weather to organise Summer Camps away from the exercise locations to facilitate adventure training in different and more challenging surroundings. As always, the intent was to ensure that soldiers were fully occupied, with the minimum chance to get into mischief. Fortunately, relations with the German police agencies were good, and most transgressions that did arise were handed over to the military authorities for action.

Even in winter, adventure training continued in the gaps between major exercises. Snow Queen was the generic name given to the annual programme of ski training fortnights held in Southern Germany throughout the season. Units arranged their own ski hut accommodation with local proprietors, and transport and top level administration was provided centrally. The local administration of the ski hut and detailed organisation of training was usually in the hands of a Lieutenant or Captain, and was a good test of resilience, stamina, tact and initiative for the young officer. Injuries were remarkably few, discipline was rarely a problem and over the years many hundreds of young soldiers were successfully introduced to downhill skiing as a result.

Lieutenant Colonel David Strong was a Squadron commander in 1st Division Headquarters and Signal Regiment, and recalls that by the time the BRUIN communication system was due for replacement, the equipment, which had been designed to cost, was showing its age, and only good leadership and trade training made up the shortfall in performance. The advent of the PTARMIGAN communication system saw a marked increase in the amount of equipment deployed, compared to its BRUIN predecessor, but altogether of a higher standard.

Corps, divisional and brigade signals units had the added responsibility for the administration of their respective headquarters, both in barracks and when deployed. The origins of this arrangement are rooted in historical accords in the early 1960s, but it can be safely stated that the arrangement was not universally popular. Colonel Mike Walker recalls from his time as GSO3 at HQ BAOR that signals units would become involved all sorts of low level political and administrative disputes which had little to do with providing communications.

Lieutenant Colonel Strong remarked that while this was particularly noticeable on exercises, it was also a common feature of barracks life. The Commanding Officer of one divisional signal regiment was so annoyed by what he considered as trivial and trifling comments made during the course of one annual fitness for role inspection that he used the final parade on the barracks square to formally announce to the Divisional Commander that he was relinquishing command, and proceeded to march off the square, leaving his Second-in-Command in charge of the regiment!

WORKING WITH ALLIES

Some adaptations and accords had to take place when cooperating with allied formations, and Lieutenant Colonel Richard Davies has the following memories.

When the Russians crossed the Inner German Border and headed for the Ruhr, 1(BR) Corps was never meant to hold back 3 Shock Army on its own. Sufficient warning was supposed to occur for American formations to come by sea from continental USA and every few years a massive exercise was mounted in BAOR to practise this reinforcement.

One such event, Exercise CRUSADER, took place in 1980 and my troop of Task Force (brigade) Foxtrot Signal Squadron was sent to provide the communications for 1(BR) Corps to take 2nd US Armored Division under command for the exercise. A senior subaltern by then, this mission perfectly suited my independent nature and I thoroughly enjoyed the two months in the field that summer, on the CPX and subsequent FTX.

HQ 2nd Armored had a certain swagger to it. The Commanding General, MG Prillaman, sported a pearl

Fox armoured cars, Spartan armoured personnel carriers and Sultan command vehicles of C (Kent and Sharpshooters Yeomanry) Squadron, Exercise Crusader 1980. Now part of 71st Signal Regiment.

Bruin Bedford C50 Radio Relay

handled Colt .45 as his personal weapon and was accompanied everywhere by an extremely fetching female Second Lieutenant as his Secretary. When the divisional command post moved, the coffee machine was always the last item to be loaded at the old location and the first item to be unloaded at the new site.

General Patton had led the Division during World War 2 and he insisted that its badge - with the motto 'Hell on Wheels' - be worn over the soldiers' hearts rather than on their sleeves. Naturally wishing to fit in, I agreed that my troop should wear the badge too. However the only spare insignia were not field uniform green but the red, gold and blue version for dress uniforms. Thus arrayed my soldiers and I cut distinctive figures. My Commanding Officer was unimpressed, but fortunately the Corps Commander had already visited and agreed that the badges were an excellent measure.

Our hosts were unfailingly courteous, but the experience of Vietnam was still taking its toll on the motivation of the US Army. Drug use was common. The contrast with the professionalism I later experienced in Iraq was marked. So was the food. At mealtimes, a jeep nicknamed the "Hard Rock Café", manned by two large, friendly black soldiers, appeared to dispense a half warm dish for which we paid in cash, the Paymaster having furnished me with what seemed like a fortune in American dollars for this purpose for my troop.

I was caught out a couple of times by the American lack of familiarity with the Corps' battle rhythm. On one occasion, gently moving the STEP UP COMMHEAD into a new location well ahead of its planned activation, I was surprised when the Commanding General drove up and asked if he could take the Corps Commander's BRUIN Conference Call at STEP UP instead of MAIN. The evening conference calls were always tricky to engineer on BRUIN and governed the promotions and blood pressures of Royal Signals Commanding Officers and Foremen of Signals. I either had to guarantee to get the COMMHEAD set up and the call engineered inside 12 minutes or agree with MG Prillaman that he should drive 20 minutes back to MAIN and take the call there, late. My soldiers of course responded magnificently, and the CG took the call on time sitting on the ground at the back of an uncamouflaged 20 Line Auto exchange AFV 439 – a good thing it wasn't a video conference!

THE END GAME

This comfortable and predictable existence started to unravel in 1989 – a year which arguably changed the world. Communism in Eastern Europe, with its centrally driven, state controlled apparatus, had been losing ground for some time to the capitalist influences of the West, and

the East Germans in particular were calling for reforms. Unrest in the former model socialist state had been growing steadily, fuelled by the creaking economy and increasing exposure to Western media. This resonated well in the Soviet Union where First Secretary Mikhail Gorbachev was driving through his own reforms under the banners of Glasnost and Perestroika – openness and restructuring.

The opening of the Berlin Wall on 9 November signalled the beginning of a new European order, with profound implications for NATO and its members. Lieutenant Colonel Mike Collins was then Commanding Officer of 29 Signal Regiment in Berlin, a time when the imbalance in living standards between East and West Germany had become stark, with much civil disturbance throughout East Germany. He remembers his Brigadier sending him to the Wall with one of the new mobile telephones to report back on some alleged unrest. Lieutenant Colonel Collins had been raised in Hamburg, and spoke German fluently, so it was an easier task for him than most. In the event, he was able to report that what was taking place was not a riot, but a very big party! It is believed that several Corps officers arrived to participate, some very senior, resplendent in Mess Dress, fresh from an official dinner!

A former member of the German Army Liaison team at Blandford, Warrant Officer Ulrich Heinicke, was at that time a Faenrich (a direct-entry Warrant Officer) in an East German Volksarmee unit located some way from Berlin. He relates that the civil riots caused much anxiety among his military colleagues, who would be charged with keeping order, as many were reluctant to open fire on their own countrymen. He and his friends were able to watch events unfolding at the Wall, thanks to Western television, but all troops were confined to barracks until the authorities could establish what action to take. Eventually, the Soldiers Committee approached

Berlin Wall in the 1960's

their Commanding Officer for permission to go home for a weekend and find out what was happening. He was initially reluctant, but eventually agreed if they would give their word of honour to be back in barracks by 0630 on Monday!

The next year Germany was reunited, and in 1991 the Soviet Union collapsed, leaving Russia dominant and the former satellite states to seek their own independence. The old enemy had gone, and BAOR had to adjust. The BAOR organisation remained in place until 1992, when the reductions brought about by the Options for Change process saw 1 British Corps replaced by the Allied Command Europe Rapid Reaction Corps (ARRC) and BAOR become part of British Forces Germany (BFG).

Despite the advent of campaigns elsewhere in Iraq and Afghanistan, over the next 23 years successive force reductions followed, accompanied by the steady closure of barracks and bases, including the Rheindahlen complex in 2013, and the move of the residual element of BFG to Bielefeld in preparation for the complete withdrawal of all British military units from Germany by 2019.

The Wall Falls.

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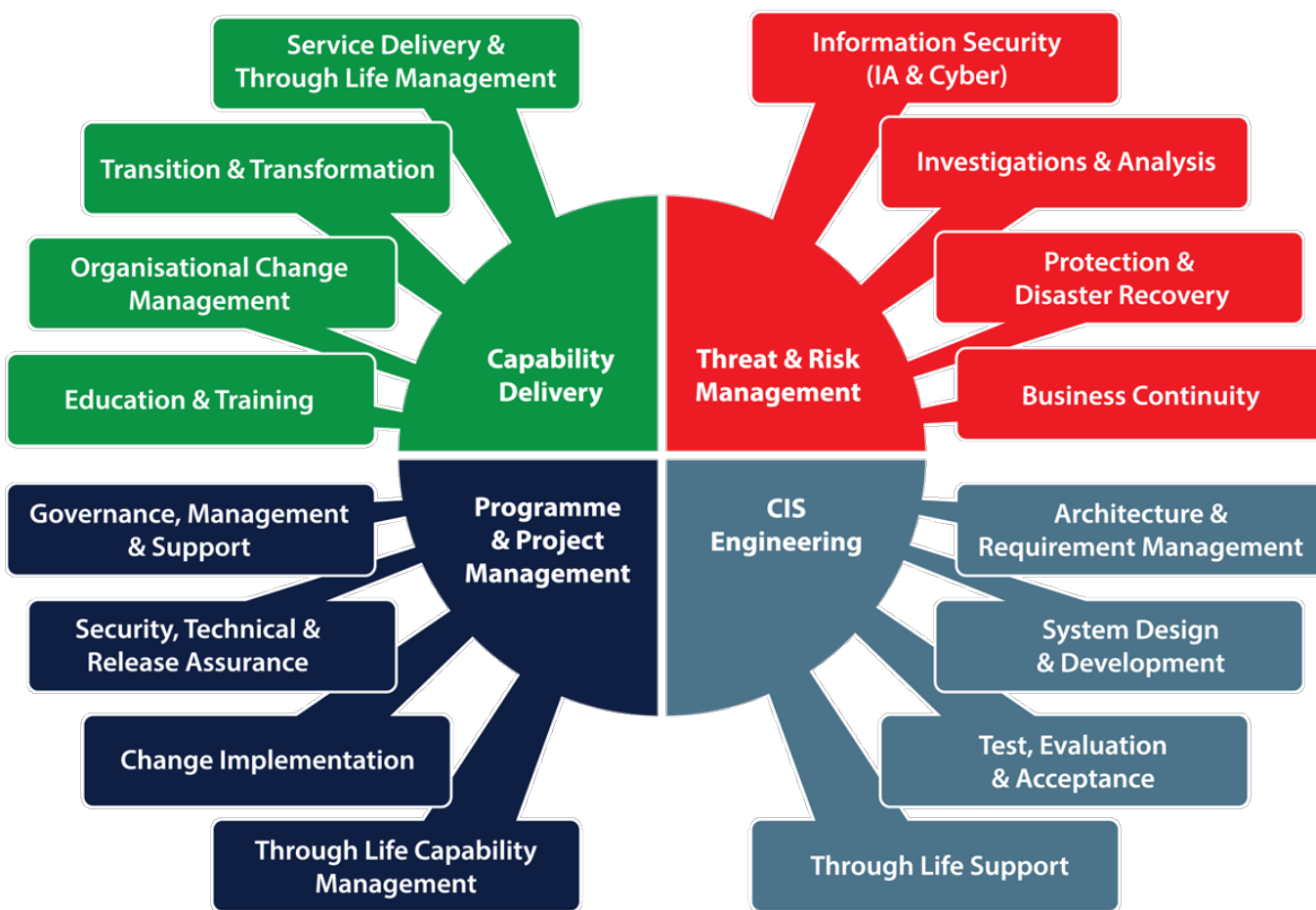
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GREAT WAR COMMUNICATIONS

By Brian Austin and Andrew Webster

EDITOR'S NOTE

Brian Austin is a retired senior lecturer of the Department of Electrical Engineering and Electronics of the University of Liverpool. Born and educated in Johannesburg, he graduated from the University of Witswatersrand in 1969 and spent the next ten years in industry, working mainly on radio communications underground in mines.

He returned to academic life, first at his alma mater, and then, after emigrating with his family to the United Kingdom at the University of Liverpool. He did national service in the South African Corps of Signals and served for nine years in the Citizen Force (TA equivalent), retiring in the rank of Major.

Andrew Webster is a Senior Test Engineer in his civilian career, testing digital TV equipment.

As an Army Reservist, he is a Lance Corporal serving in 37 Signal Regiment as a Class 2 Communications Systems Operator (Bowman).

He has a degree in Modern History from Lincoln College, Oxford and a keen interest in military history.

Introduction

AW One hundred years ago, the hard-pressed Signals Service in World War I performed war-winning, inspiring deeds. This article is dedicated to those signallers. Their story involved back-breaking graft, frequent heroism and a series of radical and dynamic innovations. While most people are aware of the evolution of submarines and aircraft during World War I, the lightning-fast revolution in communications is hardly known.

At the start of the war, signallers used visual means developed during the Boer War, including semaphore flags, heliographs, rocket flares and lamps. Despatch riders on horses or motorcycles, runners and pigeons were extensively used. Telephones and wireless were only in their infancy, the realm of civilian companies like Marconi. The telegraph and telephone links from London to the BEF Headquarters were all run by the General Post Office.

By the middle of the war, the Army, which had expanded tenfold between 1914 and 1916, was using specially designed field telephones, morse telegraph, 20 line switchboards and wireless sets. Tens of thousands of miles of steel armoured cables were being laid six feet underground. Tanks were being fitted with radios, dynamos for power and aerials which could be raised and lowered. Encrypted wireless command nets were in use. Multiple address messages were being sent simultaneously to several HQs.

A major factor determining these advances was artillery, both friendly and enemy. The principal users of telephones were those manning and controlling the guns. Enemy artillery also proved important due to its ever-increasing destructive power. At the start of the war, field telephone cables could be attached to wooden poles along the road in rear areas. At the front, they

were laid in communication trenches, either under the duckboards or stapled to the wall. However, the increasing range and power of German artillery meant that lines were regularly cut.

British cables

BA In the year immediately after the end of the First World War, electronics had not been invented and the wonder of communicating through space without wires was not even called radio, at least not in England. Wireless it was, and it was seen as the invention that stunned mankind. But it was more than a novelty; in 1912 wireless undoubtedly saved many lives following the Titantic disaster, and in the war supposedly to end all wars that soon followed, it was put to great use again. Surprising as it may seem, wireless even found its way into the trenches, those places of unimaginable horror for tens of thousands of young men just waiting for the order to go "over the top" and thence to a fate where one's lifespan was often measured only in minutes.

The wireless communications apparatus of the time was of the most elementary kind but it worked and its use, especially for artillery spotting, proved to be invaluable. Possibly the first technical description of that equipment, and how it was used in battle, was written by a young officer in the Royal Engineer Signal Service and it appeared in four parts in The Wireless World between July and November 1919 under the title "W/T. R.E.", army shorthand for Wireless Telegraphy, Royal Engineers [1].

Army Signalling

During the Great War, as it was called for many years afterwards, all army signalling was the province of the Royal Engineer Signal Service. This special body within the Corps of Royal Engineers came into being in 1908 as a result of the amalgamation of various telegraph battalions formed to provide communications for the army both by wire and visual means such as flags and heliograph from about 1870. With the advent of Marconi's wireless apparatus and its adoption by the British Army as early as 1899 during the Boer War, it was clearly necessary to establish a specialised section whose task was to set up and operate this new technological marvel. And thus the world "Telegraph" was replaced by "Signal" in the Army in 1910 and so it has been ever since [2].

Signallers taking a Message

By 1913, wireless telegraphy was accepted as an integral part of the British Expeditionary Force and training in its use had formed part of the manoeuvres held during that year. Wireless was naturally seen to be the only effective means of communication between the cavalry and G.H.Q. since the existing methods of signalling, which relied predominantly on cables, were obviously useless in mobile situations. At the outbreak of war in 1914 this was the official situation. However, some enterprising officers had already begun to examine other possible uses for this new technology. Amongst these were the problems of communicating with aircraft as well as its use in intelligence-gathering by monitoring the enemy's wireless traffic and feeding the information so gained to the Army's Intelligence Department. But, despite all this, wireless telegraphy was treated officially as "possibly a useful adjunct to visual and line signalling" [3]. We shall now see how useful it turned out to be.

Deep-buried Cable Networks

The opening phase of the war was highly mobile. In August 1914, when Britain declared war on Germany, the cavalry was the dominant force in the army and much of their wireless signalling depended on so-called pack sets used at Brigade level, while 1.5 kW wagon-borne sets were used at the higher Divisional and General HQs.

A wireless wagon and RE personnel

The Cable Wagon was first used to lay cable in the Crimean war. Before the battle of the Somme over 50,000 miles of cable were laid, 43,000 miles above the ground and 7,000 miles of armoured cable dug in to a depth of six feet.

Since only about a dozen of those mobile sets arrived in France with the British Expeditionary Force in August 1914 [1], communications between fixed installations relied heavily on lines; some using the existing French civil network while in other areas dedicated lines were laid by the Royal Engineer cable detachments. These consisted of cable wagons (known as "hearses") pulled by six horses with three riders plus another five men riding alongside. The art of cable-laying on horseback was a highly-developed skill that was drummed into all its recruits at the RE remount depot at Haynes Park in Bedfordshire.

Following the battle of Mons and the British retreat that resulted in the loss of most of the line-signalling system, the war entered a new, static phase involving nearly 500 miles of trenches that eventually ran from the North Sea to the Swiss border. In those rat-infested and sodden slits in the ground two massed armies faced each other across a no man's land of mud, pockmarked by shell holes and frequently sprayed by deadly machine gun fire. Movement was limited and the war became attritional. Communications were now even more vital than before, and signalling equipment underwent some significant changes. It was there in the trenches that signalling in general, and wireless in particular, took on a very different role.

AW - For reliability, robustness and security, deep buried cable was supreme. By Spring 1916, lines were being buried three feet deep by infantry work parties. These were later deepened to six feet to withstand direct hits by the German 11 inch howitzers. The most challenging conditions were experienced in the Ypres salient. Lines were placed in the town's sewer network, until even this was destroyed by massive 17 inch shells.

British Army Signal troops were identified by a brassard worn on the right arm or both arms showing a white stripe on top of a blue stripe. The brassard allowed Signal troops to take priority in traffic jams. These colours survive in the Tactical Recognition Flash worn by Corps signallers on the right sleeve.

7,000 miles of cable was laid during the Somme battles. Casualties amongst the linemen were heavy.

As for leaving the trench system to provide forward communications during an attack – using devices like heliograph sets and signal flags – this could be suicidal. On the first day of the Somme, Tom Dewing, of 34th Division Signals Company, was on duty at a signal post dug into the side of a hill behind a camouflaged curtain. He recalled:

"For a long time we knew nothing and then presently a heliograph flashed our call sign, ZJA. We were delighted. Evidently some of our troops had got to their objective of Contalmaison. We waited, but no further message was sent. The Germans had spotted the signal and had turned their machine guns onto them. It was the last we heard".

As Signals historian, Major General RHF Nalder, observed: "The basic problem was how to bridge the barrage zone forward of the deep buried cable-head up to the leading company headquarters, and this problem was never satisfactorily solved right up to the end of the war".

By 1917-18, an elaborate grid system had evolved in the trenches. There was a forward artery for each divisional sector, with four main communications nodes buried in dugouts. These were: the Forward Centre, 1,000 yards from the front line, which served battalion HQs; the Observation Centre, on the forward edge of the battery zone; the Group Centre, on the rear edge of the battery zone; and the Divisional Centre, 7,000 yards from the front line. Between the nodes, at 400 yard intervals, were concreted test points. The cables were sheathed in lead or steel armour plate.

Laying armoured cable

They were buried at night by work parties led by a junior signals officer. No lights could be used and sound had to be muffled. The hard labour was highly dangerous and gruelling, and sometimes involved digging through graveyards of corpses. Enemy aircraft and balloons spotted and photographed the cable routes. Therefore dummy routes also had to be dug to confuse the enemy.

Signals Intelligence
and the Origins of Electronic Warfare

BA - From the earliest days in the development of telegraphic systems, based on either overhead or buried cables, it was realised that only one conductor was required if an effective "earth return" path was available. This clearly made the installation of such systems both cheaper and easier and so it wasn't surprising that both telephone and telegraph circuits made great use of this method. Given the sheer volume of "traffic" that passed along those lines, and returned through that terrestrial circuit, the earth itself was, as noted at the time, "alive with buzzer and telephone induction". This had a natural consequence from the point of view of military intelligence for it meant that all such signals could be intercepted by the simple expedient of attaching a listening device, such as a telephone, to the earth. This was done by means of two widely separated connections, achieved by driving two metal stakes into the ground as close to the enemy trenches as both topography and courage would allow. Initially, the Germans proved to be more adept than their opponents at this earliest form of what we today would call electronic warfare, but once the danger to security had been appreciated and understood, British training and technology took full account of it and used it to good effect. It was around about this time that the so-called power buzzer was developed and was used extensively to communicate via these telluric currents.

Given all these challenges there were many developments on the technological front. First, a remarkable bit of lateral thinking by Captain (later Major General) AC Fuller of the RE Signal Service towards the end of 1915 led to his developing what soon became known as the Fullerphone. It overcame the problem of the enemy being able to monitor the signals being induced in the ground. The second was the introduction of completely new device to the military armoury: the thermionic valve.

Fuller understood the electromagnetics involved in signalling through the earth and he realised that by sending what were essentially direct current (DC) signals down the line instead of the more usual alternating or AC variety (as generated by the buzzers then in use), the magnetic fields produced would be reduced significantly and this would make "overhearing", as it was called, a much more taxing process for the enemy. At the receiving end the Fullerphone converted the DC back to AC again that produced a tone in the operator's earphones. In between sender and receiver the signals were almost undetectable. However, the Germans continued to use AC signalling on their lines and this provided much intelligence to the British Army, especially when sensitive amplifiers using thermionic valves became available.
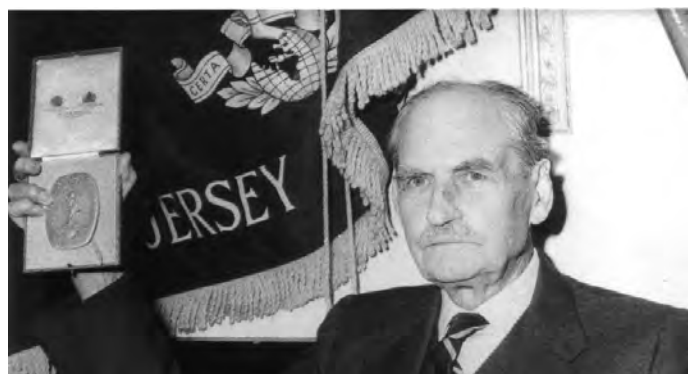
Major General AC Fuller inventor of the Fullerphone with his Princess Mary Medal.

The power buzzer being operated on the front line. Note the French "Accumulateurs" battery pack.

AW - The Fullerphone must rank alongside the armoured fighting vehicle as one of Britain's greatest inventions of World War I. Compact and portable, the Fullerphone used a tiny amount of direct current (2 microamperes being sufficient), such that it could not be intercepted. The early models handled morse only. Later models handled voice calls, but also had a morse key allowing effective long-distance communications over bad and leaky lines. It was found by accident that the Fullerphone could even transmit morse across broken lines, provided that each broken end was touching the ground and not too far apart.

The Fullerphone worked well over Army field telephone lines, with a range of 15-20 miles. It could also be superposed on civilian telephone lines, using a superposing unit. Fullerphone and civilian telephone were able to use the line simultaneously without interference. This is similar to the modern-day superposing of broadband internet connections over an ISDN telephone line.

Fuller had seemingly thought of everything. The only drawback of the Fullerphone was that operating one was a skilled, difficult job. The Fullerphone proved ideal for use forward of brigade headquarters to battalion and company headquarters. It was widespread by 1916 and by 1918 about 23,000 Fullerphones had been issued. It was used extensively by the British, Australian and Canadian Armies in both World Wars and copied by other armies, including the Italians in World War II.

Probably many thousands of lives were lost due to indiscreet telephone conversations giving away times of relief units arriving in the line, names of units as well as locations, times and objectives of major attacks. The German listening posts were extremely successful. Only by 1917 had counter-measures become effective. Earths were run back at least 100 yards from the front-line trenches. Three-letter address groups were used to describe units and were changed regularly. This was the origin of Voice Procedure, still unchanged in the British Army. In October 1916, the British engaged in what could have been the first attempt at the large-scale jamming of communications. They trialled powerful buzzers to drown speech, but were not successful. The project was abandoned.

They did, though, achieve success in wireless interception. The Ottoman Turks relied on wireless in their vast Empire. A British Army listening station was established in Baghdad, where Army cipher experts broke the weak code used by the Turks. "On one occasion General Maude was handed a decoded and translated enemy message, being the operation order for the move of a division, before the enemy stations had finished sending corrections".

Thermionic Valves

BA - Since earth-return currents were often exceedingly weak, unless the intercepting stakes were very close to the sending circuit, the range over which interception was possible was limited. It was the French who led the way in solving this problem when they developed a two-

valve amplifier, the "IT" set as it was known, that greatly extended the range to some 2,000 to 5,000 yards and its immediate use by the British Army brought about significant improvements in intelligence gathering[3]. It was this application of the American Lee De Forest's invention of the triode valve that caused British firms manufacturing incandescent lamps to move rapidly into the world of the thermionic valve. And that, of course, was the start of the electronics age.

But we are getting ahead of ourselves. By 1915, communications technology without wires was already well established using spark transmitters and coherer-based receivers. However the transmitting and receiving apparatus was anything but portable. Not long after the outbreak of war the design engineers back in England faced a completely new challenge: to make wireless equipment small and light enough to be carried by a man, or at least just a few of them. The reason for this was that the war had become almost static. The rate of advance had slowed from that of the horse and the motor vehicle to that of men almost on all-fours. And the fighting took on a new ferocity between foes often only yards apart but separated by what was often a quagmire. Massive artillery bombardments became a daily occurrence and because of the very close proximity between friend and foe accurate targeting was absolutely vital. Good communications between the OP, always situated well forward, and the guns much further back, was therefore imperative.

The BF set, its aerial supports and "Sparks" in a trench somewhere on the Western Front

Wireless in the trenches

Once the opposing armies were "dug-in" within their trenches that changed so little over the succeeding four years, the large and cumbersome wagon-borne wireless sets were soon withdrawn from service. In addition, the damage done to any cables, buried or not, by the almost incessant artillery bombardments meant that wireless became the only viable means of communication both forward to the front line and rearwards to Brigade and Divisional HQs. The well-established method in previous wars of visual signalling by flag, heliograph and lamp could be used, of course, but the drastically shortened lifespan of those wielding those devices, as soon as they put their heads above the parapet, rather decreased their appeal as a mustering amongst signallers. Needless to say, the challenge of being a message-bearing runner on foot— always used only as a last resort— was even less attractive. And so, by the end of 1915, the army had introduced its first wireless sets into the trenches and Tommy Atkins, down there, became used to sharing his abode with "Sparks".
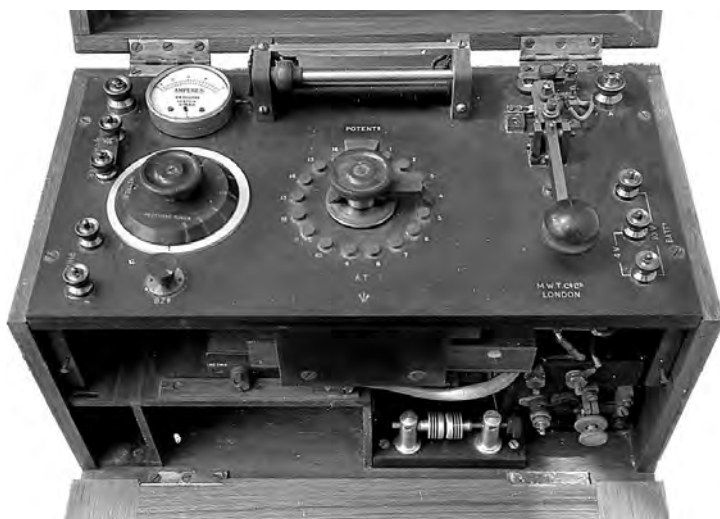
The BF or Trench Set, with its spark gap clearly visible

The BF Set

Amongst the first wireless sets to be used in the trenches by the British Army was one known officially as the Trench Set, Spark, 50 watts, but they were much better known by those who used them as the BF set. Whether this was a derogatory term (given the common use of those initials for something quite different in those days) is not certain, but the fact that the equipment was designed to be very simple to use suggests some truth in that. However, when a visiting general or other dignitary put in an occasional appearance at some Signal establishment or another, the operators would demonstrate the workings of the "British Field" set, thereby preserving decorum.

The BF Set, with its various cables and the poles to support its aerial, was light enough to be carried by three men. However, carrying the 20 Ah accumulators required to provide the power to sustain its operation for the often lengthy military engagements was another matter. Many

more men were "volunteered" for that task. The BF set spark transmitter and the biased carborundum crystal detector (but without any amplification) in the receiver operated at wavelengths of 350, 450 and 550 metres or on frequencies from about 545 to 860 kHz. These were the wavelengths agreed following careful coordination with the Royal Flying Corps (RFC) who were, by that stage of the war, making considerable use of wireless communications between their aircraft and ground control stations.

The aerials used within the trenches depended very much upon the circumstances prevailing at the time. If these (and especially the enemy machine gunners) permitted, then two fifteen foot poles were erected as far apart as was practicable, but typically between 40 and 150 feet apart, and an insulated wire was strung between them. The aerial was generally fed off one or other end but later, based on experimentation back in England, it was used in a T configuration with a single wire dropped down from the centre of the span to the BF set suitably positioned in a trench below. An earth mat, or net, of copper mesh was always used with both aerials in an attempt to achieve the necessary low-resistance ground connection.

An illustration of where the BF sets were deployed during those terrible days in 1916, is shown at below.

What is so evident was the tortuously slow rate of advance possible during the First Battle of the Somme. Mobile warfare it most certainly was not. In three months, the front line moved no more than twenty kilometres. However, it is also clear that the various BF sets, with their frequently inadequate aerials, were capable of working over those sorts of distances from places whose names are now very much part of WW1 history and its folklore. Wireless was certainly making its mark on the battlefield.

Loops and CW Sets

In 1917 a new wireless set was introduced. Claimed to be "extremely portable" [3] (though this is surely a relative term) it was, to give it its formal title, the W/T Set Forward Spark 20-watt B. However it soon became known as the Loop Set. The reason was its peculiar aerial, a small collapsible square loop of brass tubing just a metre per side that could be clamped to a bayonet and then rammed into the ground, as shown right.

Its operation was particularly simple making it most suitable for use by technically unskilled operators. Of course, their ability to send and receive the Morse code was still the sine qua non for all wireless operators. The other feature of the Loop Set that distinguished it from every other wireless set then in use was the frequency at which it operated. This was the true shortwave set. It worked on one of two fixed wavelengths of 65 and 80 metres (3750 to 4500 kHz) and it was claimed to be effective over a range of 2000 yards [4].

Also novel was the method of tuning the transmitter. Instead of having within the transmitter, as is normal practice, a selectable resonant circuit that determined the operating frequency, it used the loop aerial itself to provide the inductance with both the resonating capacitor (or condenser in those days), and the transmitter's spark gap, housed together within a small ebonite box on which the loop was mounted. It is interesting to note that this is probably the earliest use of what we would now call an electrically small loop antenna, sometimes (though misleadingly) called a "magnetic loop". The rest of the transmitter, usually below ground level within a trench, consisted of a high-tension supply and a Morse key connected to the loop by 20 feet of cable.
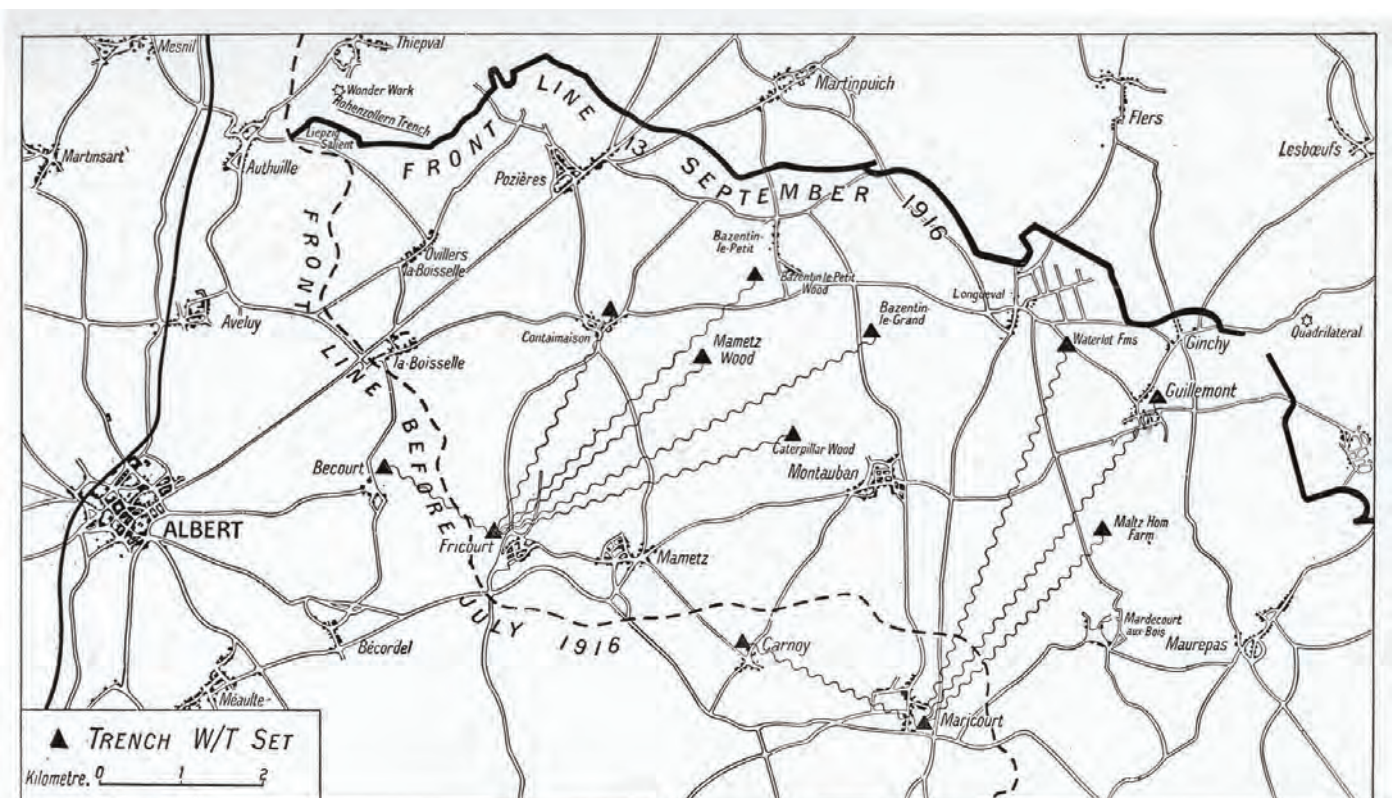
Map showing use of radio in the first Battle of the Somme, September 1916.
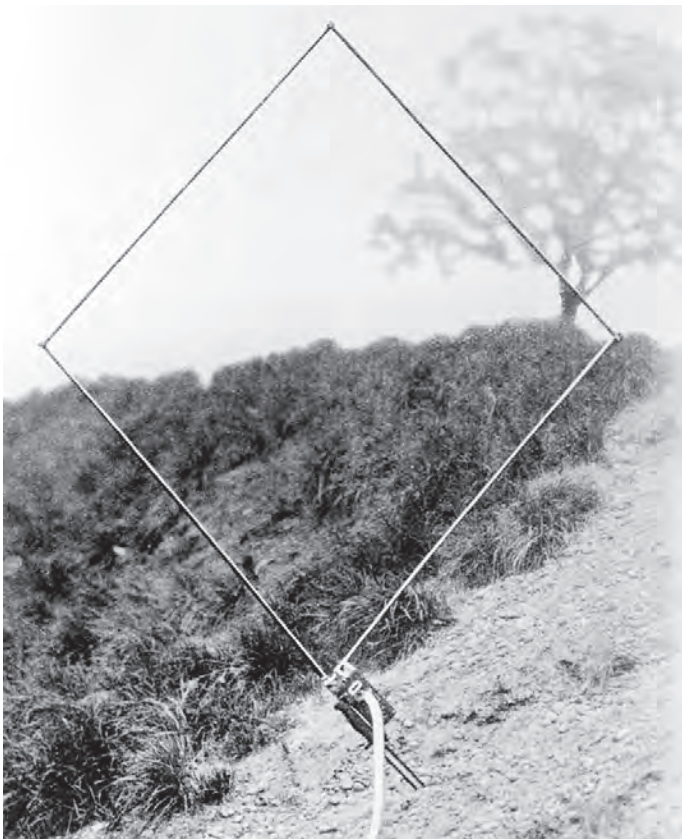
The loop set aerial on a bayonet stuck in the ground

In a separate case was the receiver. This too was very advanced for its time for it included two triode valves, the new French type known as the Telegraphie Militaire or TM valve, perhaps better known as the R valve when in civilian use. Their role was as audio amplifiers following the detector. It should be appreciated that spark transmitters made their own peculiar sound, rich in audio tones which could be heard over earphones. A most interesting demonstration of these sounds, made some years ago in Canada by Dr Jack Belrose, is available on the internet [5].

That same year, 1917, saw an even greater advance in wireless telegraphy when a continuous wave (CW) transmitter was developed at Woolwich, based on a design by Major Rupert Stanley of the Royal Engineers. Not surprisingly it became known as the CW set when it went into service midway through the year.

It contained a single TM valve used as an oscillator when transmitting and as a regenerative detector when receiving. In later versions, two valves were used in the receiver: one as the oscillating detector, the other as an audio amplifier. At a DC input power of about 30 Watts the set covered a frequency range from around 220 to 600 kHz and used the usual long wire aerial and earth mat arrangement described above.

Performance in battle

According to Captain Basil Schonland (see postscript below), the CW set proved to be very effective in battle even when circumstances demanded that the aerials be as low and as short as possible. The CW set was, he said, of 'incalculable value to artillery and other units' and he went on to describe with much verve and enthusiasm how those sets found particular favour with the "gunners" [1].

'If difficulty was experienced in laying and maintaining telegraph lines for infantry "command" purposes, the difficulty here was still more acute. The cry from the artillery was for more CW sets, and still more! With the Forward Observation Officer in his OP, with the guns themselves or with the headquarters of the artillery brigade, the valves of the CW sets were flickering night and day, and that their success was great is beyond any doubt.'

Similarly, he told how the Canadian Independent Force used the CW set to great effect when engaged in highly mobile operations. Evidently, this 'most formidable collection of armoured cars, machine guns and pompoms mounted on cars and lorries' set forth or, as he put it much more expressively, 'sailed into the blue' to engage machine gun nests and anti-tank guns with great success. One car carried a CW set — though he omitted to mention what antenna it carried — with which it maintained contact with its headquarters behind the line thereby keeping it informed 'of the progress of events elsewhere'.

Similarly, parties of scouts working as special observers all along the front line sent back their reports by wireless using the CW set. It is interesting to note that this activity was very similar to that of the unit known as "Phantom" in the next war. The distances over which they communicated 'without the slightest trouble', according to Schonland, were from ten to twenty miles. No mean feat, one has to admit, given the fact that the aerials, whatever their size and configuration, would have been very small when measured in terms of wavelengths, the criterion of performance.
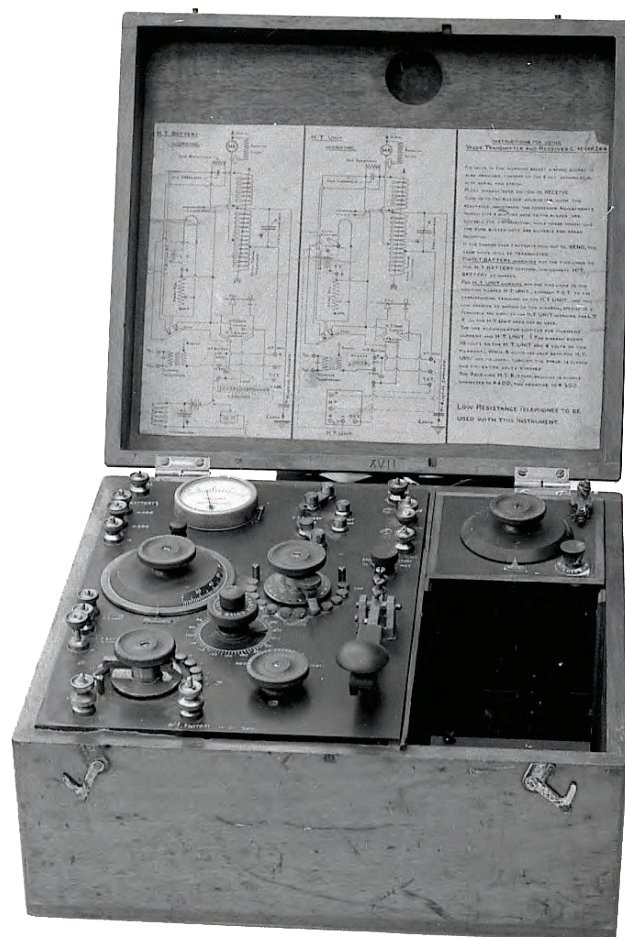

The W/T Trench Set CW Mk1, 30 Watt

Control and Coordination

Naturally, when wireless began to play an increasingly important part in military operations (and never forgetting that the enemy was so equipped as well), the need for careful planning, control and coordination was paramount. The proximity of various military formations one to another, and the number of different wireless "nets" which served each, is shown in another map from W/T RE, below.

These nets were arranged in what was then called the Group System serving Army, Corps, Division and Brigade, as well as all the formations below them. Different types of wireless sets were used at various levels of command and in different areas. To illustrate how this was all done, Schonland included a table, reproduced below, as well as a diagram showing specifically how the wireless nets were established for control of the artillery and the communication with the R.A.F. whose aircraft served as target-spotters for the guns on the ground.

The biggest problem with all complex military wireless networks like this is the possibility of interference between the various users. It was therefore necessary not only to allocate operating frequencies judiciously but also to

A map showing disposition of the British First Army and its wireless communications prior to the August 1918 great offensive
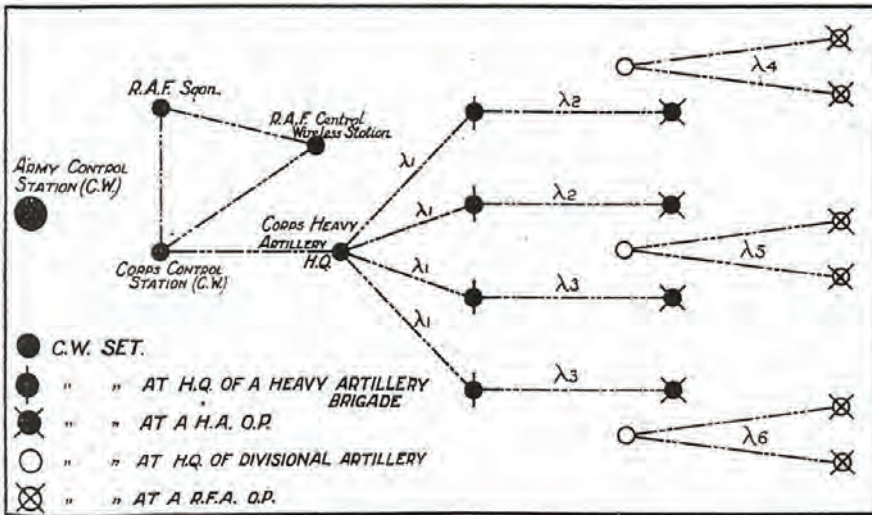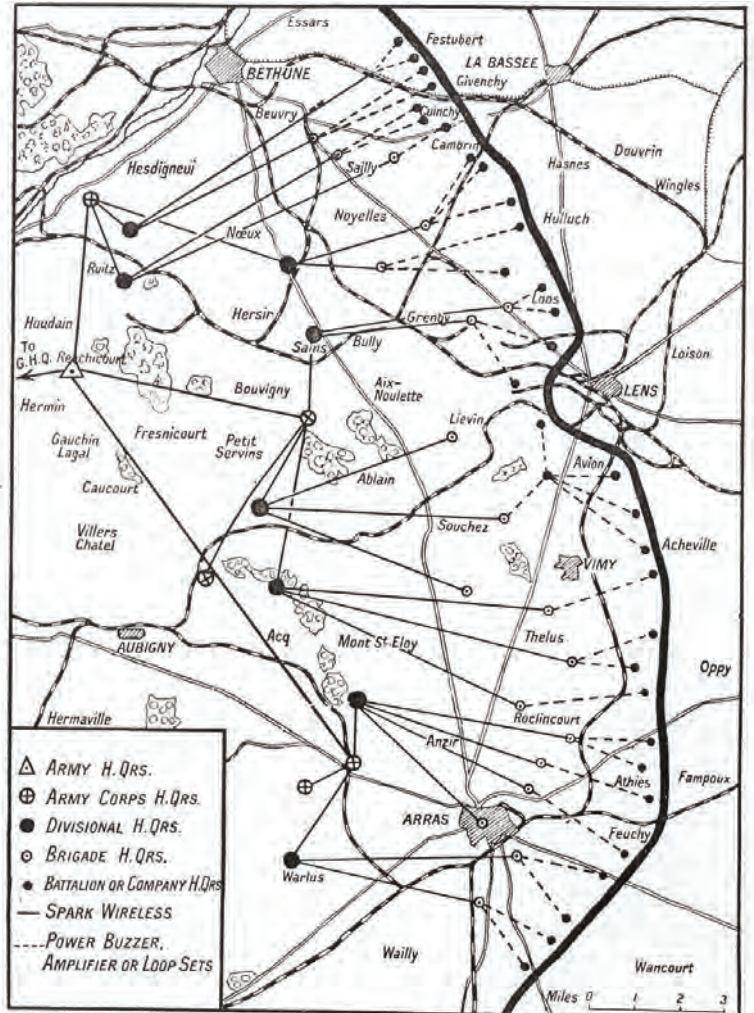
A diagram showing the communications within the artillery, with and RAF target-spotting aircraft

ALLOTMENT OF WAVELENGTHS AMONGST VARIOUS ARMS OF THE SERVICE			
λ	SPARK	λ	CONTINUOUS WAVE
Metres	Used by	Metres	Used by
65 and 80	Loop sets	600 - 2000	Artillery
100 – 300	RAF		Anti-Aircraft
350, 450, 550	B.F. Trench sets		Scouts and observing parties
600 – 1000	Tanks and Cavalry		Tanks
1100	GHQ and Army HQ		GHQ and Army HQ

monitor the activity and take the appropriate corrective action if necessary. This was the job of control stations that searched from wavelength to wavelength and listened in for long enough to detect both interference and poor operating procedures. Once more, as Schonland relates, the Canadians distinguished themselves by making a CW receiver "capable of simultaneous reception on seven wavelengths" to aid in this monitoring process.

Monitoring and Deceiving the Enemy

Wireless techniques soon found their way into the intelligence-gathering world. Both sides monitored each other's transmissions and so messages were, of necessity, encoded. This immediately saw the establishment of what were called "Wireless Observation Groups" whose activities involved both wireless direction finding or, as it was called at that time, position-finding (PF), as well as the decoding of enemy messages. This latter activity, according to Schonland, involved the recruiting of acrostic-solvers from amongst the ranks of readers of the daily papers whose acrostics, or crossword puzzles, provided "a good preparation for wrestling with German messages". Such skills and similar training were to prove rather important during the next encounter too!

Wireless direction finding made great strides during those frightful days on the Western Front. Again it was the part played by the thermionic valve that was significant as were the improvements made to the well-known Bellini-Tossi crossed-loop DF aerial system. By using high gain valve amplifiers it proved possible to decrease the size of the DF antennas and even to dispense with the rather bulky (and heavy) goniometer system in which one multi-turn coil was rotated within another as the means of finding a null in the received signal. The greater sensitivity provided by the valves meant that the Bellini-Tossi loops themselves could be made much smaller and therefore were easily rotated to achieve the same purpose.

Line of Communications

AW - World War I, with its mass armies, witnessed an enormous demand for logistics, supply depots, fuel depots, field hospitals, airfields, post offices and other support infrastructure. This was all built in the 'Line of Communications' area, comprising that part of France between the Channel ports (and Marseilles, the port of entry for troops from India and the Dominions) and the GHQ at Montreuil.

In this zone, the British ran 1,500 miles of telephone and telegraph cables. By 1918, 23,000 telegrams were being sent in the 'Line of Communications' zone per day, plus a further 9,000 from GHQ. These comprised movement orders, operational orders, reports and returns and provision requests. The British Army signals service was completely independent of the French.

Divisional HQs handled 800 messages per day and Corps HQs 4,500. To cope with the huge and ever expanding traffic, the number of troops concerned with signals grew from a Signal Company in 1915 to close to a brigade by 1918.

US Field Telephone Exchange

Numbers of British Army Signal Officers and Other Ranks in the BEF Line of Communication Zone

Year	Officers	Other Ranks
1915	5	268
1917	54	2380
1918	110	4102

During the German Spring Offensive of 1918, the Allies retreated 40 miles and the entire cable network for the Fifth Army front was lost. There was no communications plan for such an event. Command and control broke down completely. As one senior officer explained: 'the ONLY place where it was possible to know what was going on was at the end of a wire' (General Sir Alan Bourne speaking to historian John Terraine, June 1966).

Communication security had to be relaxed, with a growing reliance on unencrypted wireless. Cables were hastily laid on the surface where they were cut to pieces by artillery, transport wagons and other causes.

One exasperated signaller recalled: 'Lines were cut not once or twice, but twenty or thirty times a night, and linemen were out working practically continuously. A cavalry unit which shall be nameless settled down for the night between Divisional Headquarters and an important forward communications post, and signalized its arrival by cutting out some hundred yards of the three twin cables which formed the main divisional route, in order to use them as a picket line for their horses' (quoted in To Win a War, John Terraine, p166).

An example of early post-war mechanisation.

After the War

In this bloody and brutal slogging match, intellect and technology eventually triumphed. The British Army, with their deep-buried cable, wireless sets, Fullerphones, electronic jamming, multiple address messages and communication security measures led the world in the field of communications. The innovations all proved fruitful and many are still used to this day. World War I required lightning quick adaptations. The Signal service struggled under intense pressure, but delivered.

The period between the wars was also dynamic from a signals point of view. The Royal Corps of Signals was formed in 1920, split from its parent Corps, the Royal Engineers. Wireless sets became more powerful and portable. 150 Watt wireless sets were carried in lorries, as the Corps was mechanised, along with the Royal Engineers and Royal Artillery.

Mechanical cable layers replaced horse cable detachments four years before World War II. Teleprinters and multi-channel line terminal equipment were developed. Submarine cables were laid across the Channel, to Jersey, Calais, and, significantly, Dunkirk, to maintain communications with Britain's main ally. In 1938, the Defence Telecommunications Network was begun, a three-year project to integrate the Army, Navy and Air Force commands using switching centres connected by trunk routes in a UK-wide grid. This command network was used to wage the Battle of Britain.

Once again, the signals service was laying the foundations for future success in war.

Postscript – Basil Schonland

Captain Basil Schonland RE

Basil Schonland started his military career as a volunteer from the colonies after arriving in England from South Africa. In fact, he came over early in 1915 with two objectives in mind. The first was to enrol at Cambridge in order to pursue his career in physics, following a first degree in the subject from Rhodes University in Grahamstown, the place of his birth in 1896; the second was to do his patriotic duty, as he saw it, to fight for King and Country. In July that year he satisfied the examiners at Cambridge and was awarded first class honours in part 1 of the mathematical tripos. The following month

he presented himself at the War Office for an interview, where he was accepted for a commission in the Royal Engineers, that highly regarded corps within the Army with responsibilities for all manner of things technical, including the new-fangled wireless. In August 1915, nineteen year old Schonland began his training at the RE Signal Depot near Bletchley, the town that would acquire an almost mythical reputation during, or at least after, the next world war.

In mid-1918 Basil Schonland was promoted to the rank of captain and was placed in charge of all wireless communications in the British First Army preparing for the advance from Arras to Mons. At the age of just 22 he had reporting to him 30 officers and more than 900 men and was responsible for over 300 wireless sets. Before this, at the end of 1916, he had left the front line and was posted to the Central Wireless School at Montreuil where he served as Wireless Research Officer attached to the Wireless Experimental Section BEF and as the instructor-in-charge of officers' courses of instruction. There, during 1917, he and a fellow officer by the name of Spencer Humby carried out some research on using a triode valve as an oscillator [6]. In a letter home, written in July 1918, Schonland told his younger brother that "GHQ are making a wonderful new wireless set as a result of that research that Humby and myself undertook".

Naturally, the results of their research were kept secret during the war but they were published in 1919 following similar work back in England, published the year before, by another RE Signal Service officer by the name of Edward Appleton, soon to make his mark in an entirely different aspect of radio communications as the discoverer of the ionosphere [7]. Together those two papers proved to be of much significance in the early days of CW wireless systems.

Schonland was not a professional soldier. After the war he returned to Cambridge to continue his research under the direction of Lord Rutherford but not before the Army had tried very hard to keep him. He was offered the position of Chief Instructor in Wireless in the British Army and with it the rank of major. But he was intent on pursuing a scientific career and he declined.

However, he was not lost to the colours. In 1939, at the outbreak of war, and now back in his native South Africa where he was a world-renowned expert on lightning, he took on the task of developing a radar system for the defence of South Africa's very long coastline. That work soon brought him to England where he became Superintendent (in the rank of colonel) of the Army Operational Research Group (AORG) and in 1944 he was appointed scientific adviser to the Commander-in-Chief, 21 Army Group, General Sir Bernard Montgomery. This was just prior to the D-Day Landings and the invasion of north-west Europe by the Allied forces under the overall command of General Eisenhower. Brigadier Schonland served with distinction in that role and was awarded the CBE to follow the OBE received after the First World War. Once the war was over he again returned to civilian life in South Africa to be appointed the founding President of the Council for Scientific and Industrial Research (CSIR) and then, on returning to England in 1954, he ultimately became the Director of the Atomic Energy Research Establishment at Harwell from where he retired, with a knighthood, in 1960 [8].

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EDITOR'S NOTE
Articles for the Journal

Articles are solicited for publication in the Journal on any of our range of topics, which covers personal recollections, technical, tactical and equipment matters, as well as domestic Corps affairs. All articles should be accompanied by a passport photograph and short biography to accompany the by-line. They should be in Word format, using 11 point Calibri Body type, and preferably submitted by e-mail direct to the Editor. Any photographs or figures to accompany the text should be sent separately in jpeg format to allow for any resizing or reformatting which might be needed.

THE DRINK OF HEROES

By Tastevin

"Claret is the liquor for boys; port for men; but he who aspires to be a hero must drink brandy."
- *Samuel Johnson*

THE ORIGINS

Brandy (from the old word brandywine, derived from Dutch brandewijn, or "gebrande wijn" meaning "burned wine") is a spirit produced by distilling wine. It generally contains 35–60% alcohol by volume, and is typically taken as an after-dinner drink. Some brandies are aged in wooden casks, some are coloured with caramel colouring to imitate the effect of aging, and some are produced using a combination of both ageing and colouring.

In broader sense, the term "brandy" also denotes liquors obtained from distillation of pomace (pomace brandy) or the mash or wine of some other fruit (fruit brandy). These products are also named eaux-de-vie. Varieties of wine brandy are found across the winemaking world, the most renowned being Cognac and Armagnac from Southwestern France.

The origins of brandy are tied to the development of distillation. While the process was known in classical times, it was not used for significant production until the 15th century. Initially, wine was distilled as a preservation method, and as a way to make it easier for merchants to transport. It is also thought that wine was originally distilled to lessen the tax, which was assessed by volume. The water removed by distillation was then added back to the brandy shortly before consumption.

It was then discovered that after having been stored in wooden casks, the resulting product had improved over the original distilled spirit. In addition to removing

water, the distillation process led to the formation and decomposition of numerous aromatic compounds, fundamentally altering the composition of the distillate from its source. Non-volatile substances such as pigments, sugars, and salts remained behind in the still. As a result, the taste of the distillate was often quite unlike that of the original source.

VARIETIES

Except for a few major producers, brandy production and consumption tend to have a regional character and thus production methods significantly vary. Wine brandy can be produced from a range of grape varieties, but a special selection, providing distinct aroma and character, is used for high-quality brandies, cheaper varieties being made from whichever wine is available.

As most brandies have been distilled from grapes, the regions of the world producing excellent brandies have roughly paralleled those areas producing grapes for viniculture. At the end of the 19th century, the western European markets, including by extension their overseas empires, were dominated by French and Spanish brandies, while in eastern Europe brandies from the Black Sea region, including Bulgaria, the Crimea, and Georgia were pre-eminent. Armenian and Georgian brandies, then called cognacs, were considered some of the best in the world, and often beat their French competitors at the International Expositions in Paris and Brussels in the early 1900s.

The storehouses of the Romanov Court in St. Petersburg were regarded as the largest collections of cognacs and wines in the world, with much of it from the Transcaucasus

Grapes Destined for Brandy

region of Georgia. During the October Revolution of 1917, after the storming of the Winter Palace, the Bolshevik revolutionaries actually paused for a week or so to sample the substantial stores of cognac and wines. The Russian market was always a huge brandy-consuming region in which home-grown varieties were common, but much was also imported. Throughout the Soviet era, the production of brandy was a source of pride for the communist regime as they continued to produce some excellent varieties, especially the famous Jubilee Brandies of 1967, 1977, and 1987. Remaining bottles of these years are highly sought after, not only for their quality, but also for their historical significance.

TECHNIQUES

The base wine used to make brandy differs somewhat from normal table wines. It is made from early harvested grapes, in order to achieve higher acid concentration and lower sugar levels. The yeast sediment produced during the fermentation may or may not be kept in the wine, depending on the brandy style. Distillation from the base wine takes place in two phases. Firstly, a large part of water and solids is removed from the base, obtaining so-called "low wine", which is essentially a concentrated wine with 28–30% ABV. In the second stage, this low wine is distilled into brandy.

The liquid exits the pot still in three phases, referred to as the "heads", "heart" and "tails" respectively. The first part, the "head," has an alcohol concentration of about 83% and an unpleasant odour. The weak portion on the end, the "tail", is discarded along with the head, and both are generally mixed with another batch of low wine, thereby re-entering the distillation cycle. The middle heart

fraction, richest in aromas and flavours, and the purest in ethyl alcohol, is preserved for later maturation. Distillation does not simply enhance the alcohol content of wine. The heat under which the product is distilled and the material of the still (usually copper) cause chemical reactions to take place during distillation. This leads to the formation of numerous new volatile aroma components, known as congeners, as well as changes in relative amounts of aroma components in the wine.
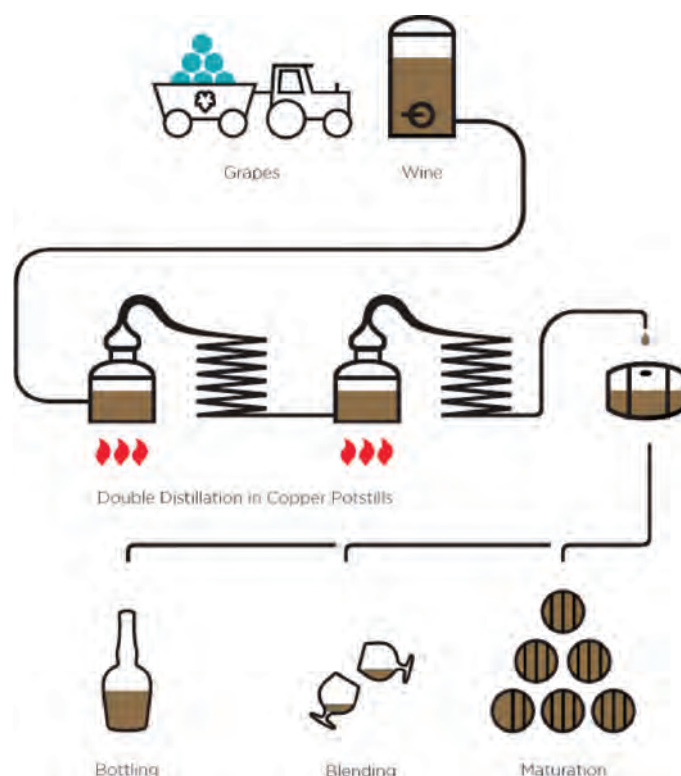
Cognac Pot Still

Brandy is usually produced in pot stills (batch distillation), but the column still can also be used for continuous distillation. Distillate obtained in this manner has a higher alcohol concentration (approximately 90% ABV) and is less aromatic. Choice of the apparatus depends on the style of brandy to be produced. Cognac and South African brandy are examples of brandy produced in batches, while many American brandies use column stills.

After distillation, the brandy is placed into oak barrels to mature. Usually, brandies with a natural golden or brown colour are aged in oak casks. Some brandies, particularly those from Spain, are aged using the solera system, where the producer changes the barrel each year. After a period of ageing, which depends on the style, class and legal requirements, the mature brandy is mixed with distilled water to reduce the alcohol concentration to commercial strength and bottled. Some brandies have caramel colour and sugar added to simulate the appearance of barrel ageing.

COGNAC

The best known brandies come from Cognac, a region in France just to the north of the vineyards of Bordeaux. Six crus are recognised: Grande Champagne, Petite Champagne, Borderies, Fins Bois, Bons Bois and Bois Ordinaires. Note that here the term Champagne has nothing to do with the Champagne region farther to the north-west. Quality Cognacs tend to use grapes from the two Champagne districts, together with the Borderies and Fins Bois, where the best sites have a high chalk content, facilitating good drainage, with sufficient water-retention for grape ripening. The Fins Bois is the largest area, accounting for 40% of the total production.

Eight grape varieties are permitted for Cognac production, the most important being Ugni Blanc (or Trebianno), Colombard and Folle Blanche. The base wine they produce is very high in acid, as explained above, and low in alcohol compared with normal wines. The high acidity protects the wine from spoiling by bacterial action, and the low alcohol level means that the alcohol must be concentrated around seven times to reach the level required in the eventual distillate. This seven fold concentration results in higher congener concentration than if the original alcohol level was higher, thus contributing to the higher flavour concentration in the final product. It will be appreciated that the coolest weather in Cognac tends to produce the best brandy vintages.

A VSOP Brandy

All the Cognac producers use a copper pot still to double-distil their product, any variation between them is connected to the origin and quality of the grapes used, as well as the processes used in distillation and maturation. Distillation is done as quickly as possible to prevent oxidation taking place, and by law all wines must be distilled by the end of the March following the harvest.

The spirit produced is matured in barrels of French oak for a minimum of two years, but normally for much longer. New barrels are used to begin with, to allow the spirits to acquire flavour and structure, before being decanted into older barrels. Blending is crucial to the Cognac process, vintage products tending to be rare. Once made up, the blend is diluted down to the 40% ABV commercial strength, and the colour adjusted with caramel. When young, Cognac has an amber colour, with distinct floral and grape flavours, balanced with vanilla and oak spice. Ageing develops dried fruit and forest floor flavours.

Cognac out of the Cask

Cognac cannot be sold until it is two years old, which equates to a three star or VS grading on the label. VSOP brandy contains spirits which are at four year old in the blend, while in XO the youngest must be at least six years old. Blending is done by very experienced specialists using the sense of smell only, a highly skilled task when it is considered that the best XO brandies tend to contain spirits which are at least 20 years old, meaning a prolonged and costly time spent in maturation. They are priced accordingly. Predicting which brandies will be at their best after 20 years is a tricky business! Sometimes the name of the sub-region will appear on the label, indicating that the brandy has been distilled from wine of that area. For example, the term Fine Champagne is used for a blend from the two best areas, Grande and Petite Champagne, with the former accounting at least half the blend. Vintage cognacs show the date of the harvest on the label.

ARMAGNAC

It is little appreciated that Armagnac was developed far before Cognac ever hit the market. In fact, about 700 years before Cognac, Armagnac was the very first brandy to be exclusively produced in France.

The Armagnac region lies about 50 miles to the south-west of Bordeaux, and has vineyards split into three regions, Bas-Armagnac, Tenareze and Haut-Armagnac. The best Armagnac comes from Bas-Armagnac, and accounts for 65% of the total regional production. Ten different grape varieties are authorised for Armagnac production, two of which account for 90%, Ugni Blanc and Baco. The latter produces the fuller-bodied wines, and contributes to the distinctive taste of Armagnac.

As in Cognac, wines are distilled as quickly as possible, with all distillation being completed by the end of the March following the harvest. Most Armagnac is single-distilled in a column still, with the heads being retained, giving the product a pronounced intensity, which can take a long time to mature. Production of Armagnac is on a much smaller scale than Cognac, and many small producers rely on itinerant distillers and their mobile pot stills to travel from property to property during the distilling season.

Most Armagnac is matured in French oak barrels in a similar way to Cognac, and although needing a longer ageing time than Cognac, the three star variety can be released for sale a year earlier, at one to three years. VSOP is on sale after four to nine years, Napoleon after six to nine years, XO after ten to 19 years, and XO premium after 20 years. Although blends are important in Armagnac, there are more vintage products available than in Cognac, an important commercial point of difference between the two regions.

Armagnac Bottles

OTHER REGIONS

In Spain, the two important brandy-producing regions are Jerez and Penedes, using base wines mainly from La Mancha. Both pot and column stills are used. In Jerez, ageing is accomplished by the solera system, normally associated with the production of dry sherry, a Reserva brandy being aged for at least a year, and a Gran Reserva for three years. The brandies are often deep coloured, and tend to be soft and sweet, although styles do vary.

Elsewhere, brandy production tends to take place using column stills as a way of managing grape surpluses. Non-regulation brandy is distilled throughout France, often with column stills, and although sometimes bearing labels similar to those used in Cognac, such as VSOP, they have no legal significance. Brandy produced in AC areas is however designated by the term fine. In Chile, pico is produced from aromatic grape varieties, giving a fruity and perfumed character. Other counties of note are South Africa and Mexico, the latter supplying a huge internal market by producing brandies distilled from surplus wine. South African brandy must include at least 30% distillates in their blend, and be aged for at least three years. Many excellent brands are produced.
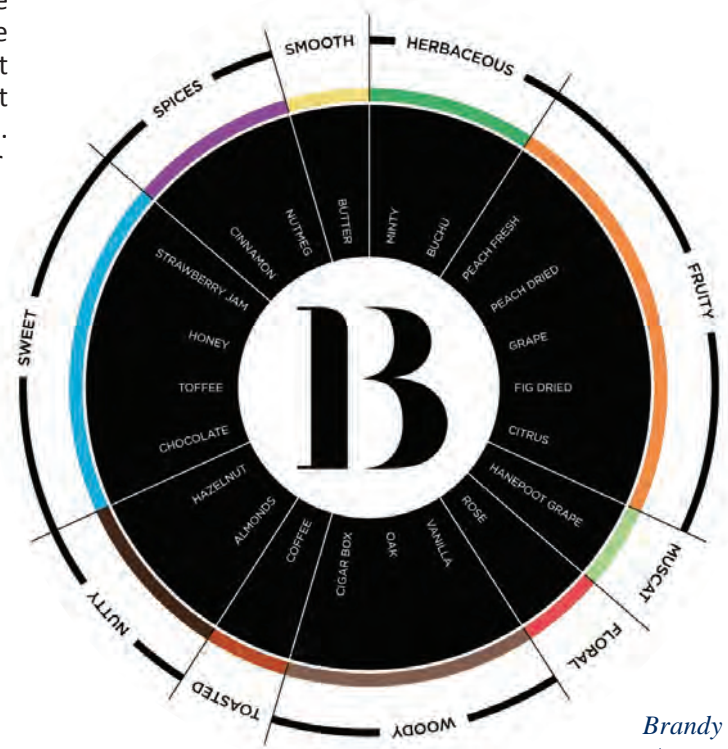
Another type of grape spirit can be made by distilling the residue of skins, pips and pulp left after wine making, the most famous type being the Italian grappa. In France it is known as eau-de-vie marc, and is produced in most vineyard regions, Marc de Bourgogne being well known. Some varieties are aged on oak barrels, and others not, or are stored in glass carboys. These are colourless spirits often at high strengths over 50% ABV. Similar spirits are produced in Spain and Portugal.

TASTING

On the basis that readers would wish to savour their spirit, rather dashing it back in the fashion of saloon cowboys, the following hints are offered as an aid to enjoyment.

Always taste brandy from a clean glass.

- Add a dash of still water when tasting, if you wish.

- Don't swirl the glass, as when tasting wine.

- Don't warm the brandy – it should be tasted at room temperature.

- Start nosing from about 5cm from the top of your glass. Now move slowly down.

- Take a small sip and swirl around your mouth. The intensity of the alcohol will diminish after a few seconds and the rich, complex flavours will come to the fore.

- It's always fun to have the brandy aroma wheel on hand to help you identify the flavours you experience.

Brandy Aroma Wheel
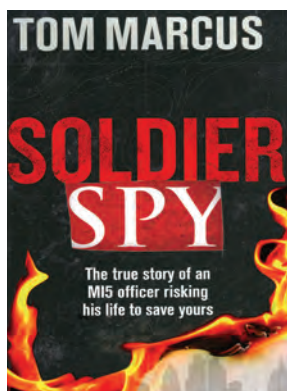
BOOK REVIEWS

SOLDIER SPY
The true story of an MI5 officer
By Tom Marcus

Adventure novels penned by former Special Forces personnel have increased in popularity of late, thanks mainly to fast paced, action filled plots, larger than life heroes and authentic technical detail.

Patrick O'Brian always contended that in military stories, nothing imagined in fiction could match what took place in reality, and it is salutary to see this truth so well underlined in this vivid and compelling biography.

The author's pseudonym masks the identity of of someone who grew up on the streets of northern England to join the Army at sixteen and become the youngest member of the armed forces to pass the selection process for Special Operations in Northern Ireland. He was then recruited into MI5 as a surveillance officer and spent ten years in the Service.

The reader is immediately drawn into the action, with the first chapter describing an operation designed to foil a terrorist plan to attack coaches of children returning on a school trip. The prose is taut, robust, urgent and direct; the interplay of the lone surveillance officer with his back-up team and Special Branch is fascinating and impressive. The author recounts how he cheated on his Army selection tests to gain entry to the Royal Engineers, and then join the Army Physical Training Corps. His confident and brusque approach won him the respect if not the liking of his Commanding Officer, who sent him off for Special Operations training with a bottle of champagne and directions not to come back!

The description of the intense, pressured cycle of Special Operations training and the anxieties engendered is impressive, and despite obvious concerns about disclosing too much detail, enough is revealed to bring home the challenges of a relentless selection course. Unusually for a service which normally relies on applicants, he was subsequently invited to join MI5. As was explained to him, they had enough posh types coming in from universities, what they really needed were street-wise individuals, comfortable at the sharp end of operations. He thus commenced training as a surveillance officer, which he thoroughly relished, and reinforced his view that MI5 had the best surveillance operations in the world.

The book has been cleared for publication, which makes the detailed disclosures of his operational involvements all the more surprising, but also a thoroughly riveting read. The page-turning compulsion is irresistible, such is the wealth of detail and sheer pace of the narration.

Sadly, the strain of continually over-achieving in such a high stress environment took its toll, and one wonders at the leadership and management support that had let matters slide for so long. In the event, the author began to exhibit the classic symptoms of Post-Traumatic Stress Disorder, exacerbated by the tragic death on operations of a close colleague. He was then afforded counselling and support, but matters had gone on for too long, and he was allowed to retire from the Service.

The author acknowledges the support of his wife (also ex-Special Operations) and family in bringing him through the dark days of his final time in the Service, and pays tribute to the continuing commitment and expertise of his former colleagues who continue to expend great efforts at no small personal risk to keep the country safe. It is clear from this book that we owe them all a great debt.
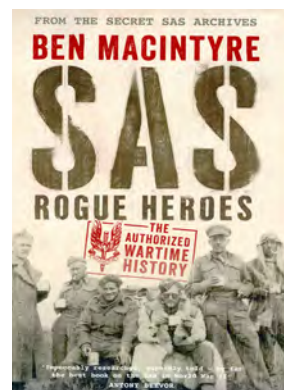
Thoroughly recommended.
Colonel Tom Moncur

SAS ROGUE HEROES
The authorised wartime story.
By Ben Macintyre

Innumerable books, articles and analyses have already been written about origins of the SAS, and it is with some wariness that your reviewer took up this latest work by Ben Macintyre, a columnist and Associate Editor at The Times and author of several well received accounts on

World War Two topics. It seemed that everything had already been told.

This work differs from the others in that the author had access to the regimental archives and the fascinating repository of personal memos, photographs and letters it contains. The startling, lucid and riveting stories which emerge, however dry and laconic the official accounts, are brought to life by the author's talents as a story-teller, which he harnesses to journalistic rigour and flair to produce an immensely readable and absorbing history. The book describes how David Stirling, the playboy scion of a distinguished Scottish clan, survived serious injury to found what became known as the Special Air Service. The warts and all account of his transformation into a determined, persuasive leader, and planner of a punitive series of raids behind German lines in the North African desert is covered in detail.

The other key members the organisation in the early days are identified as Jock Lewes and Paddy Mayne. The former was a totally professional soldier in the classic mould, destined for great things, who instigated the fierce training regime which was to be the bedrock for later success, and designed the "Lewes Bomb" explosive for disabling aircraft on the ground. Mayne was an ex-rugby player, solicitor and natural warrior, but struggling always with personal demons, happiest when grappling with the enemy, and thoroughly discontented by staff work.

The title of the book comes about through the variegated assortment of individuals who gravitated towards this unique organisation, united by a desire to do something "kinetic", to use modern parlance, about the enemy. Thus it was that pianists, tomato growers, adventurers, titled nobility, pugilists, padres, medics and others united to weld a formidably effective, unorthodox fighting force whose ferocity in action was probably unprecedented in military history.

The bedrock of the unit was nevertheless composed of experienced and trained soldiers such as Jock Lewes, Pat Riley and Jim Almonds, the father of Brigadier John Almonds and Captain Lorna Almonds-Windmill, both late Royal Signals. The unit was subsequently to attract warriors from all over: American, Canadian, Irish, Jewish, French, Belgian, Danish and Greek flocked to join, and the organisation expanded enormously over three years.
The book describes the failures as well as the successes; what is striking is the sheer cussed determination of individuals to overcome hardship. Walking two hundred miles with broken ribs, continuing to fight on through shell shock and concussion and cold bloodedly mounting frontal attacks on prepared defences are just some of the feats mentioned.

The action continues after victory in the desert to other theatres; the campaigns in Italy, France and into Germany are covered, and how an increasingly determined and resolute opposition continued to be harassed, obstructed and hampered by classic SAS behind the lines tactics, despite the notorious Hitler Commando Order, which called for the execution of all captured special forces.

The book concludes with an account of the post war actions of a small group seeking and bringing to justice perpetrators of war crimes, and how this was done in a scrupulously legal but thorough fashion. A fitting end to an excellent book, and thoroughly recommended.

Published by Penguin Viking, 359 pages, ISBN 978-0-241-18663-3. £25.

MAJOR GENERAL HAJ STURGE CB

In I977, John Sturge was appointed Assistant Chief of Defence Staff (Signals) in the Ministry of Defence. An MOD communications satellite had just been lost on launch and it had been decided that no new space programmes would be considered, but that the United Kingdom would rely on the United States and NATO for satellites. At his first visit to NATO Headquarters in Brussels, he was confronted by multinational representatives who pointed out that, if there were no United Kingdom satellites, NATO would have no alternative but to purchase from the United States and they did not want to be in that position. He regarded his success, with cooperation from the United Kingdom space industry, in reversing the Government's decision and getting new programmes funded as one of the most satisfying challenges of his career. During this appointment, he also argued for and finally succeeded, in having the service's Information Systems incorporated into his department's responsibilities.

Henry Arthur John Sturge was born in 1925 and educated at Wilson's School, Camberwell. He had never contemplated a career in the Army, but volunteered

on his eighteenth birthday in 1943 to join the Royal Air Force and fly. He failed the eyesight tests however, and was persuaded to go to Queen Mary College to study the wartime National Certificate of Radio Engineering. The end of this course coincided with the end of the war. He then joined the Army and trained as a radio mechanic before being commissioned into Royal Signals in 1947. His first posting was to the Royal Signals Boy's Squadron where he had command of a Wing of one hundred youngsters and responsibility for sports training of all four hundred in the Squadron. He enjoyed this so much that he applied for and got a regular commission. He always believed that, having had the responsibility of boy management so early in his career, he found man management comparatively easy.

After three years in Egypt, where gained Army colours for cricket, he returned to the School of Signals at Catterick, and assumed responsibility for the instruction of all students in radio techniques and equipment, before going on to attend the 1955 course at the Staff College, Camberley. Promoted Major in 1956, he spent three years in the Military Intelligence branch in the War Office before going on to command a Gurkha Signal Squadron, and then to become the signal officer of a Gurkha infantry brigade. He returned to UK to attend the Joint Service Staff College in 1962.

This was followed by two years on the General Staff at HQ BAOR before becoming Chief Instructor at the Signals Wing RMAS. He was then selected to command 2 Division Headquarters and Signal Regiment in 1966. This was another challenge, coinciding with the introduction of a wide range of new communications equipment. After a further intelligence staff appointment in the Ministry of Defence, he commanded 12 TA Signal Brigade his first and very enjoyable contact with the Territorial Army which included a Regiment in Northern Ireland at difficult times.

He then became BGS in the Directorate of the Signal Officer in Chief (Army) in 1972 during which he became the first chairman of the Army Department's Data Processing Committee. On promotion to Major General he became Chief Signals Officer at Headquarters BAOR, for which he was awarded the CB. His role as Assistant Chief of Defence Staff (Signals) was his final post in the Service.

He enjoyed the many contacts that he had with the United States Forces during his service. His intelligence appointments included current activities involving the

Warsaw Pact at the height of the Cold War, as well as the Soviet occupation of Hungary. This inevitably led to close contacts with the Pentagon. He also negotiated with the United States on a treaty concerning the storage of US nuclear weapons in the BAOR area and also for communications co-ordination.

On leaving the Army, he spent six years with GEC where he became Managing Director and then Chairman of one of the subsidiary Marconi Companies. This was followed by six years with Logica as a senior consultant before becoming Chairman of one of that company's subsidiaries.

Outside his main careers, he did a number of voluntary tasks. These included the Corps Committee, as Colonel of Queens Gurkha Signals and adviser to a number of investigations including one Parliamentary study. He was also governor of his old school, Wilson's, and a trustee of its Foundation as well as involvement with his local villages.

He enjoyed games but did not consider himself particularly good at anything, except possibly as an all-rounder. He had minor trophies and medals for rugby, soccer, cricket, boxing, basket-ball, dinghy sailing, snooker and chess. One of his overriding pleasures was gardening, and he created spectacular gardens wherever Jean and he lived. Whenever he had difficult problems to wrestle with, he would almost always go into the garden and do some weeding whilst going over all the pros and cons of what was on his mind. He also loved to work with wood, and followed horse racing whenever he could.

In the early 1980s a hip operation was badly infected and he had four operations and four months in hospital. This limited his abilities thereafter. But he enjoyed contact with his three children, ten grandchildren and great grandchildren. He felt strongly that, in anything that he achieved, he had needed help from colleagues, but particularly from his wife Jean to whom he was married in 1953.

John Sturge was blessed with great personal charm, and the ability to address any problem in a calm and unflustered fashion. He contributed much during his 33 years of service, and he made many friends, and his death on 2 August 2016 was met with great regret and sadness by all who knew him. Our sincere condolences go to Jean and his family.

Maj Gen Sturge CB with Lt Col Byrne, Maj Cox and Capt Dewis of 28th Signal Regiment 1977.

CORPS EVENT DATES IN 2017

Date	Event	Location
18 Jan	RSTL Board	London
03 Feb	Honorary Colonels' Briefing Day	Blandford
02 Mar	CO Enterprise Forum	Blandford
02 Mar	Corps Spring Guest Night	Blandford
17 Mar	RSA Central Committee Meeting	London
18 Mar	RSA AGM	London
30 Mar	RSTL Board	Blandford
02 May	Corps Council Meeting	London
02 May	Corps London Dinner	London
3 – 4 May	Morrison Cup	Blandford
21 May	Eden Camp Parade	Malton N Yorks
16 June	3Rs Dinner	Blandford
17 June	Corps Luncheon	Blandford
17 – 18 June	RSA Reunion Weekend	Blandford
02 Sept	NMA Rededication	Alrewas
05 Oct	Autumn Corps Guest Night	Blandford
05 Oct	COs' Enterprise Forum	Blandford
18 Oct	Colonels Commandant Lunch	London
19 Oct	RSA Central Committee	London
03 Nov	Scottish Dinner	Glasgow
09 Nov	Field of Remembrance	London
12 Nov	Cenotaph Parade	London
16 Nov	Corps Council	London
16 Nov	RSI Lecture and Dinner	London
25 Nov	Project Noel	Liverpool

Merry Christmas

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SO1 Reserves	Lt Col Mike Smith	01258 482083	rsignalshq-reserves-so1@mod.uk
SO2 Royal Signals	Maj Rachel Clayton	01258 482168	rsignalshq-so2@mod.uk
SO2 Commitments	Maj Paul Kelly	01258 482085	rsignalshq-so2b@mod.uk
C2 Whole Life Development	Mr Dave Barlow	01258 482098	rsignalshq-wld-c2@mod.uk
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