

THE RANGER

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Handley Page Halifax – 'Friday 13th'.



Cumberland Map pencil with associated silk map.

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Chairman's Remarks

As I write this, the nation is preparing to commemorate the end of the First World War after four years of events around the country. The commemoration started with the remarkable art installation Blood Swept Lands and Seas of Red at the Tower of London which marked one hundred years since the first full day of Britain's involvement in the War and where each of the 888,246 ceramic poppies represented a British military fatality.

Over these four years the Defence Surveyors' Association has also commemorated the War through its annual Maps and Surveys Seminar as well as articles in this journal. The presentations have been wide ranging and have covered topics including Engineer and Artillery Surveys, Geo Referencing Western Front Maps, the evolution of tanks and their employment on the Somme, Reconnaissance on the Western Front and Surveying Egypt and Palestine between 1916 and 1918. Those presenting have offered fascinating insights into the innovation and exploitation of technology that took place during that War. The DSA concludes its commemoration with a seminar in Remembrance week, at the Gurkha Museum Winchester, to mark the 100th anniversary of the 1918 Armistice; presentations on William Lawrence Bragg and Sound-Ranging in World War One, British Survey on Western Front in 1918, and Flash, Sound and Print in the American Expeditionary Force 1917-1919 emphasised the contribution survey made to the war effort. It was the continuation of this technology in the post war years that led to the formation of the Field Survey Association in 1927 (renamed the Defence Surveyors' Association more properly to reflect the multi-disciplined changing nature of Geographic Intelligence support to the three Services in 1997).

The DSA addresses an eclectic mix of historical and contemporary operational topics as is evident from the variety of articles in this edition. However, it is interesting to see how surveying and mapping have changed over the century; even the language used has evolved from Survey to Geographic, Geospatial and Geospatial Intelligence (Geoint) and Mapping is just one aspect of the trade, be that on land, sea or air. Indeed, the DSA Council has discussed the suitability of our name Defence Surveyors Association in today's world. Geospatial requirements, capability and technologies have moved on considerably as is evident from Colonel Roly Cockwell's insight into what Royal Engineers (Geographic) are doing and where they are going. Some of the challenges he raises in terms of integration and interoperability are also considered by Charlie Sladden in his article on Spatial Data Infrastructure. In it he demonstrates the enormous complexity of providing Spatial Data to the vast array of projects and users across Defence.

An innovation this year was the tremendous initiative from Noel Grimmett in putting together a most informative and well produced mid-year Newsletter to supplement the Ranger. With only one edition of the Ranger a year it is impossible to include all that we do so the newsletter provides an opportunity to extend the reach of the DSA whilst covering more ground.

Returning to the First World War, Professor Gary Sheffield gave an interesting perspective on 'Why the Allies won the War in 1918' at our annual AGM and Dinner. Over the past few years this event has proved to be a great success in bringing together the social and educational sides of the DSA in the convivial surroundings of the Hermitage Station Officers' Mess. The occasion is also a great chance to recognise the achievements of some of our younger practitioners through the DSA prizes. Tony Keeley continues to provide outstanding support for all the DSA activities, but his meticulous arrangements for the AGM and Dinner deserve special mention.

Looking ahead, next year's Maps and Surveys Seminar will again be held at the Arlington Arts Centre and will take place on 28 June 2019. Singular thanks are due to Mike Nolan for all the hard work, commitment and enthusiasm he has put in to make these seminars so successful over many years and for the various mini-seminars he has organised. As always, we seek to provide a balanced series of presentations that reflect our profession past, present and future.

John Knight - *Chairman*

Annual General Meeting 2018

The Annual General Meeting of the Defence Surveyors' Association took place at the Officers' Mess, Denison Barracks Hermitage on the 13th of September 2018, attended by 14 DSA members and chaired by Dr John Knight. The Chairman and Treasurer delivered brief reports followed by the unanimous re-election of all Council members, no other nominations being received. In addition Dr Yo Hodson was co-opted as a Council member.

After the brief AGM DSA members and guests adjourned to the Station Lecture Theatre for the award of the annual DSA prizes. The DSA President, Major General Roy Wood, presented the prizes to three very worthy recipients in the categories: Royal Navy Hydrographic, Royal Engineers (Geographic) and the Royal School of Military Survey. This was followed by the annual lecture delivered by Professor Gary Sheffield.



Guest speaker - Professor Gary Sheffield.

Gary is an eminent academic currently at the University of Wolverhampton, specialising in military history. He has previously held positions as Lecturer in War Studies at the Royal Military Academy Sandhurst, Joint Services Command and Staff College, King's College London and the University of Birmingham. He is the Vice President of the Western Front Association and a member of the academic Advisory Panel of the National Army Museum. He has published widely and authored several books on the First World War. He gave a fascinating, stimulating and utterly captivating talk entitled 'Why the Allies Won the War in 1918'. In spite of the fact that the IT system in the Lecture Theatre failed completely, his talk gave a new insight into the latter days of the Great War, ensuing questions only ceasing because of time constraints.

After the lecture, DSA members and guests enjoyed a reception and black tie dinner, 42 dining, in the Officers' Mess. Guests were drawn from local associations and historical societies, VIP guests including the Chief Instructor of the Royal School of Military Survey, Lt Col Steve Flavell and the Speaker and his wife Viv Sheffield. As always, the Mess did us proud with a three course menu followed by port and cheese and biscuits. In all this was a highly successful event not least because of the stimulating and topical subject matter of the lecture.

Prize Awards for 2017/2018

The following prizes were awarded and presented by the President of the DSA, Major General Roy Wood:



Royal School of Military Survey, Royal Engineers

Sgt Nicholas

Sgt Nicholas has been the Geodesy and Land Navigation Instructor at RSMS (Royal School of Military Survey), his main responsibilities including teaching of the Royal Engineer Geographic Technicians and All Arms Defence courses. Latterly detached to JFC Chicksands, and leveraging his considerable experience of the practical instruction of GEOINT, he has been instrumental in developing the fundamentals of GEOINT (FoGI) module that will be shortly incorporated into the content of the revised long imagery intelligence (IMINT) analysis course that is currently delivered by IMINT Wing of RSMS.

Sgt Nicholas used his extensive experience and knowledge gained as a GEOINT technician, both in the UK and on operations abroad, and latterly as an instructor at RSMS, to refine the training objectives and indicative content to deliver maximum benefit to the trainees within the short space

of time afforded by the course programme. He conducted an analysis of current training to identify shortfalls and opportunities, and provided practical and elegant solutions to address them. To gain further insight into IMINT, he subsequently became a student on the United Kingdom Imagery Analysis Course (UKIAC), which then gave him a unique perspective on how GEOINT data, processing techniques and could be better integrated into the course material for the professional development of the imagery analyst. As a consequence of this training, he is perhaps one of the few, true GEOINT¹ professionals currently working within UK Defence, and certainly one of those within the Royal Engineers (Geo) specialisation.

As a direct result of Sgt Nicholas' work, all future imagery intelligence analysts, irrespective of Service, will have a solid foundation in geospatial information and principles that will then inform, and be integrated into, future analysis and product. Using a combination of lectures and practical exercises, the trainee analyst will be given an introduction into understanding, then manipulating geospatial data to result in a more geospatially referenced final product, that is better aligned with current and future intelligence work processes such as Structured Observation Management (SOM). The resultant analyst will also be better-prepared to operate in a multi-intelligence team alongside, and fully integrated with, GEOINT specialists from 42 Engineer Regiment (Geo), thus realising the force multiplying effect of the mutually-supportive disciplines and the fact that collaboration is key to the successful exploitation of both GEO- and IMINT.

Although there have been several recent initiatives to bring the two disciplines of IMINT and GEOINT closer together, owing to the latent synergies that have long been recognised, this is the first enterprise that has been specifically targeted at introducing a significant level of geospatial training into the Phase 3 intelligence training environment. His time at IMINT Wing will leave a significant legacy in the enhancement of RE(Geo) awareness and IMINT analyst capability and output.

Moreover, Sgt Nicholas has demonstrated the finest qualities of a geospatial technician and soldier, using his skills and experience to not only influence future capability, but to promote understanding and generate an appreciation of GEOINT both now and in the future. His integration into IMINT Wing demonstrated clearly his adaptability and commitment, but his absolute professionalism and sheer energy in all his endeavours have been commented upon by all those with whom he has worked alongside.



Royal Engineers (Geographic)

Sgt Fitzmaurice

For the duration of Op RUMAN, Sgt Fitzmaurice was a proactive figure in developing new working practices, procedures and dissemination of Geospatial Intelligence in support of a Humanitarian Assistance and Disaster Relief (HADR) operation in a high tempo, rapidly developing environment and is strongly recommended for a Defence Surveyors' Association Award.

Finding himself in the position as the senior Geospatial Analyst in 14 Geographic Squadron when Op RUMAN was initiated, Sgt Fitzmaurice immediately immersed himself into project managing a small team of National Centre for Geospatial Intelligence (NCGI) geospatial and imagery analysts delivering an invaluable reach-back facility for forward deployed elements and external agencies. The immediate issue faced by Sgt Fitzmaurice was a lack of geospatial data for the British Virgin Islands, however by proactively approaching external agencies and trawling Open Source websites he procured a substantial amount of invaluable data at nil cost which was subsequently used to bolster the limited existing dataset, significantly increasing the analytic value and credibility of the NCGI team's products. Further to this, Sgt Fitzmaurice was instrumental in the development and population of an ArcGIS Online (AGOL) page, disseminating his team's geospatial analysis to the wider HADR community beyond the NCGI community. This was a momentous moment for the Defence Intelligence community because it was the first time that geospatial and imagery analysis had been disseminated on a public webpage.

¹ Using the definition of GEOINT as defined in Joint Doctrine Publication 2-00, Understanding and Intelligence Support to Joint Operations, Edition 3

Following on from Sgt Fitzmaurice's actions during Op RUMAN, further investigation and significant developments have been made into the provision and dissemination of geospatial intelligence in support of HADR deployments, including the tailoring of 42 Engineer Regiment's three-month technical training investigative project, identifying the required geospatial datasets and the creation of baseline products in support of future potential HADR operations. Additionally, Sgt Fitzmaurice has continued to show personal commitment to increasing the corporate knowledge of NCGI having recently attended an international HADR Geospatial Intelligence Course in Hawaii and has positioned himself to be the Regimental HADR SME for the immediate future.

In conclusion, Sgt Fitzmaurice has displayed outstanding personal commitment to developing and displaying the technical prowess of NCGI technicians in an international forum, pushing the boundaries of employing online methods of geospatial intelligence dissemination in line with how future HADR intelligence is anticipated to be viewed in a multi-agency environment.



Royal Navy

Lieutenant Commander Mark Butcher RN

Across a varied and challenging year, Lieutenant Commander Mark Butcher RN is nominated for the Defence Surveyors' Association Prize for the Royal Navy after delivering exceptional service across a range of assignments including Operations Officer in *HMS SCOTT*, Officer in Charge of the Fleet HM Mobile Survey Team (MST) and Supervising Officer for the trials of Maritime Autonomous Systems (MAS). Throughout each role Butcher has made a significant contribution to the collection, management and exploitation of operational geospatial data within Defence.

HMS SCOTT provides vital support to the protection of the nuclear deterrent and in understanding and shaping the environment to enable freedom of manoeuvre. As the Operations Officer, Butcher had to dovetail the ship's programme to incorporate maintenance, training and external assurance whilst optimising the warfare department output to meet the data acquisition demands established by the UK Hydrographic Office (UKHO) in conjunction with Strategic partners. Against the background challenges of platform material defects and internal manning shortfalls, Butcher's professional management and co-ordination assured optimised efficiency from *SCOTT's* systems in data collection, onboard processing and ultimately input to the UK's specialist marine geospatial centre. The quality and veracity of data collection and output in the time available attracted the highest recognition from the UKHO and external assurers.

On leaving *SCOTT*, Butcher joined the Fleet HM Unit as Officer in Charge of the Mobile Survey Team. He was immediately tasked to deploy with his small team to undertake operations in Rosyth to support the MCM community in maintaining a safe operating environment for submarines in the area. Using his previous MCM experience and having undertaken comprehensive liaison with the customer community he demonstrated an impressive knowledge of the geospatial information requirements. When coupled with his highly professional management of operations this ensured delivery of high quality geospatial data and excellent tailored advice to add significant operational value. His achievements are even more impressive considering he had to deal with a number of very challenging defects that prevented him from operating as planned, forcing numerous short notice changes and increasing the time pressures.

Butcher has also spent a considerable amount of time providing specialist hydrographic expertise to the Minewarfare and Hydrographic Capability (MHC) Project Team to help optimise geospatial data collection from MAS. Despite the challenges of supporting MCM operations in Rosyth, he has poured his energy and enthusiasm into developing and coordinating MAS trials to deliver a greater understanding about the operational utility and the tactical employment of these systems.

Butcher has demonstrated the highest levels of professionalism and dedication and his significant contribution towards optimising the acquisition and management of geospatial data across a variety of operations is worthy of recognition.

One aspect of life in 42 Survey Engineer Regiment 1957-1959 - *Part Two*

By Colonel D.V. Hutchinson MBE (Retd) (Late RE)

Continued from Ranger Edition Winter 2017

I took over command of 19 Topographic Squadron from Major J.A.H. West RE on 2 June 1958. The Second in Command of the squadron was Captain D.J.H. Pycroft RE and Troop Officers were Lt C.W. Maguire RE (3 Troop) and 2Lt G.C. Cox RE (2 Troop). The squadron was at that time one troop officer below establishment with Sgt A. Fox in charge of a third field party. The normal strength of the squadron was about 5 officers and 150 other ranks.

The squadron headquarters was based in Habbaniya with three troops widely spaced in the northern half of the country on field survey work. The squadron was under the technical direction of the Deputy Director of Surveys, GHQ Middle East Land Forces, Episkopi, Cyprus, through CO 42 Survey Engineer Regiment and were locally under the administrative and disciplinary control of the Station Commander, RAF Habbaniya (Group Captain H.I. Edwards VC, D.S.O., O.B.E., D.F.C.).

The squadron was in a quite unique situation. It was the only British Army unit in Iraq and together with the RAF in Habbaniya were the only British military units in Iraq. The squadron operated entirely incognito when outside the confines of Habbaniya. The military personnel wore mufti; the military vehicles carried neither military unit insignia nor Ministry of Defence registration numbers; no military unit signs or flags were displayed at troop camp sites. The Royal Army Ordnance Corps when asked to provide civilian clothes for the field troops to work in supplied complete sets of the clothing issue to soldiers on demobilisation immediately after the end of WW2 hostilities – this included a 3-piece dark suit, a trilby hat, black shoes, mackintosh, white shirt with detachable collar and white underwear. Of course this dress was wholly inappropriate for troops trying to work inconspicuously in the desert and wild country of northern Iraq, in temperatures often well above 100 degrees Fahrenheit and from field camp sites. A long battle ensued with the RAOC in Cyprus trying to get more appropriate clothing and adequate reserves. The RAOC eventually admitted failure and so it was agreed that troops in the field would wear their own personal clothing and receive a clothing allowance in compensation. When in Habbaniya personnel of the squadron wore uniform whilst on duty and conducted themselves in a normal military manner.

The squadron lines in Habbaniya i.e.: the squadron offices, QM Stores, squadron armoury, technical survey offices and small parade ground were on the edge of the “oasis” adjacent to the RAF Airfield. The other ranks barracks, mess halls and officers messes were in the centre of the “oasis” about 1 mile from the lines. The squadron’s motor transport lines were also in a different part of the “oasis” adjacent to the RAF MT lines. Squadron HQ Troop paraded in the morning at 0730 hrs of every working day. The field troops out on detachment operated entirely independently and were further broken down into sections which also worked independently if remote from their troop base camps. Troops and sections were mobile but required additional transport to move the accommodation stores – sleeping tents, mess tent, beds, tables, chairs, and office furniture – when the troop base camp had to be moved. Troops in the field hired as necessary interpreters, guides, muleteers with their mules or donkeys, labourers and camp cleaners. They carried a bullion of Iraqi dinars and Marie Theresa dollars for on-the-ground payments which at times gave rise to security problems. Generally Iraqis demanded payment in Iraqi dinars and Kurds payment in Marie Theresa dollars. Each troop had a No. 19 wireless set and established daily contact with squadron headquarters. These radios were not the most reliable and when operating, as the field troops were, at the extreme range of the equipment and in difficult broken country the wireless communications became very tenuous. Occasionally telephonic communications were possible if the troops were near to civilised communities. Every week each troop sent in a vehicle to squadron headquarters for dry rations, mail and essential personal requirements, clothing and equipment.

At the time I joined the squadron it was deployed as follows:

Sqn HQ.	Habbaniya, Map Ref GSGS 4830, Sheet 427C NO6865.
Det 1 Troop.	In the area of “K3” Pumping Station on the Kirkuk – Tel Aviv oil pipeline. Map Ref GSGS 4830 Sheet 427A NH5644. NCO i/c Sgt A. Fox.

- 2 Troop. In the areas of "43" Pumping Station on the Kirkuk – Tel Aviv oil pipeline.
Map Ref GSGS 4830 Sheet 427D NL0828
Officer i/c 2 Lt G.C. Cox RE.
- 3 Troop. Area East of Kirkuk.
Map Ref GSGS 4830 Sheet 427B NE 4595.
Officer i/c Lt C.N. Maguire RE.

The Detachment of 1 Troop under Sgt Fox was employed on route revision work for 1:500,000 mapping. 2 Troop was engaged on the field check of new 1:20,000 mapping produced under the "Huntings" contract. 3 Troop were doing barometer heighting and photo identification of control points for new 1:100,000 mapping. All of this field work was being done with the full agreement of the Iraqi Government and their Ministry of Defence who, it was understood, would benefit by receiving copies of the mapping being produced or revised. The "Huntings" contract involved new 1:20,000 mapping produced for the British Ministry of Defence by civilian survey and cartographic firm of Huntings Airsurveys in the United Kingdom. I did the take-over tour of these troops during my first week in Iraq. The trouble and somewhat uncultured state of the country was brought home to me on this trip. East of Kirkuk an armed band of Kurdish horsemen rode out of the hills and appraised Major West and me in our L/Rovers. Satisfied that we were harmless they rode off with a whoop. In Sulaimanou a town well-known for its carpet making and where large carpets are hung along the roadsides to weather, we saw an offender of the law dragged along the dirt roads by a man on horseback. The locals treated the incident with profound casualness.

Shortly after I arrive with the squadron I was advised that my private car had arrived at Basra docks and was awaiting collection. I also received all my family's belongings which had been forwarded by the British Military Forwarding Organisation (MFO) direct to Habbaniya. There was at that time no married quarter available to me and so my wife and three small children remained in Berengeria Village in Cyprus once again living out of a suitcase.

I decided to collect my car on the weekend of 12-13 July 1958 so I travelled to Basra by train on the afternoon of Friday 11 July. I stayed that night in a hotel in Basra. I found my car the next day in the docks in a sad state. It had been thoroughly "examined" but by whom I could not find out. The battery was flat, the tyres were flat, the interior was all dismantle and the exterior was very dirty. It took me all of the Saturday to make it mobile and roadworthy so I decide to postpone my departure for Habbaniya until early the next day, Sunday morning. Basra to Habbaniya by road through Baghdad is about 350 miles. It took me all of Sunday 13 July to make the journey. Along the mile upon mile of road through the desert and through the sprawling conurbation of Baghdad I saw nothing untoward to arouse my suspicions as to what was to happen the next day, or even within 6 hours of my arrival in Habbaniya. It was a very pleasant, though very hot drive which whetted my appetite to get to know more about Iraq and its people. I had spent more than two years during World War 2 in the Western Desert of Egypt and Libya and in Syria before going to India and Burma, and I had a great liking for the Arabs, particularly those living in the deserted regions of their countries, and I hope to build upon that acquaintance and friendship during my tour of duty in Iraq. The country savoured of the exotic orient with all its mysterious charm, and its long history and archaeological remains stimulated my interest even further. I am particularly anxious that the great mud-brick arch at Ctesiphon (150ft high by 75ft span) is not damage by the current conflict.

On Monday 14 July 1958 I proceeded as usual through Habbaniya from my mess to the squadron lines in a Land Rover to attend the 0730 hrs squadron parade. My Second in Command Company Sergeant Major and most of the other ranks had already gone ahead when I was suddenly stopped by some armed Iraqi soldiers. This was a surprise to me because normally Iraqi soldiers were not very much in evidence around Habbaniya, armed Iraqi soldiers were a rarity and for Iraqi soldiers to halt a British military vehicle was exceptional. The Iraqis informed me that a coup d'état had taken place and that the monarchy and the government had been overthrown. The "coup" had started at 0300 hrs Local Time that morning but it was not until that moment that action was taken by pro-revolutionary forces in Habbaniya. In fact the road block had been put up during the few minutes between my Second in Command preceding me to the squadron lines and my own journey. I was informed that I could not go to the squadron offices and that I should return to and stay within my own mess lines – all of this conveyed in a smattering of English. After I had pointed out that I was the Officer Commanding the unit and that I had to tell the other ranks already at the squadron that they too would have to return to their messes and barracks I was allowed to proceed with an armed escort! At first the RAF Station Commander was unable to confirm that a coup d'état had taken place because all communications in and out of Habbaniya had been closed down, including the radio in the airfield

control tower. We tried to carry on work in the squadron offices as if everything was normal but with Iraqi guards in the offices and workrooms, and with their guards also on the squadron and station armouries the RAF Station Commander ordered that the squadron offices should be evacuated. Routine wireless contact had been made at 0700 hrs that morning with 3 Troop but not with 2 Troop. There was no news of the coup d'état at that time.

Following the coup all British personnel, service and civilian, in Habbaniya were virtually under protective custody. Guards were placed between the main part of the camp and the adjoining airfield, the MT compound, the Station Armoury and other vulnerable points, which cut off the squadron lines from the rest of the camp. There was a nightly curfew. No movement was allowed outside the cantonment for the first few days and after that only the RAF Station Commander and one or two other persons on special missions were allowed out and then only with an Iraqi armed escort. Concentrations of troops, e.g.: unit parades, were not allowed. Assurances were given by the Iraqi base Commanders, who suddenly took over authority for the security of the base, that personnel and possessions would be protected and said that many of the restrictions imposed were to that end. There had always been nominally an Iraqi military Base Commander but he had no controlling authority.

During the period of "protective custody" the squadron parade every morning either indoors or outdoors as conditions permitted. All the men of the squadron were kept engaged on technical training, NCO Cadre Classes, MT driving and maintenance, First Aid training and recreational training. Contingency plans were drawn up in co-operation with the RAF for a complete emergency evacuation by air or by road to Jordan. Assistance was given to the RAF with guards and security patrols, and squadron vehicles were used by the RAF on special visits to Baghdad as they could not be identified as British military vehicles. All incoming and outgoing mail was subject to censorship and afterwards it became apparent that most official and private mail went astray and was lost. My wife received only one letter from me despite many being sent. The Regiment received only one or two letters in Cyprus. Reserves of food in Habbaniya at the time of the coup were high and food rationing did not become necessary during the whole period of our detention. NAAFI supplies were however rationed. The RAF cinema showed every night the film "High Society" being the only film caught-up in Habbaniya by the coup.

Once the coup d'état was confirmed my major concern was for the safety of the squadron personnel, including the families on station. I was particularly concerned for the safety of the troops in isolated locations in the field with whom I had only tenuous and sometimes no communication. I had no idea how widespread or how severe the insurrection had been in the rest of the country outside Baghdad and its environs. We had lost all contact with the Embassy in Baghdad, for reasons which I will explain later and no contact could be made with the Iraqi Government. Nevertheless, during the whole of this period in Habbaniya the morale of the squadron remained at a very high level as did that of the RAF station personnel. At all times the squadron enjoyed the fullest co-operation and help from the RAF and there arose a very healthy inter-service mutual appreciation between the Royal Air Force and the Army in Habbaniya.

Particular mention has to be made of the Station Commander, Group Captain H.I. Edwards VC, DSO, OBE, DFC, RAF, through whom all contact with the Iraqis and the British Embassy was effected. He was at all times very mindful of the squadron's requirements and wishes and at every opportunity pressed our case to carry on with the field survey work or to withdraw from Iraq altogether. Our position was that the internal insurrection in Iraq was a domestic matter and had no bearing on the status of visiting troops, who were there at the invitation of the Iraqi Government, or on the survey work we were doing, which was to the benefit of Iraq as a whole. Hughie (or Stiffy) as he was affectionately known because he had a stiff leg) was a most remarkable officer. He was a born leader. He had all the qualities of a great negotiator – reserved, enigmatic, determined, fearless and astute. He was very highly principle led and fair in all his dealings and he was held in very great respect, sometimes verging on awe, by the Iraqis with whom he came into contact. He pressured the Iraqis for our rights and privileges day after day. He persistently pointed out that none of the troops in Habbaniya had done any wrong, they had not committed a crime, they were not in any respect Prisoners of War and should, therefore, be allowed to go about our daily work or be permitted to leave the country with all our military equipment and personal possessions. It was to be nearly four months before the British military personnel and their families in Habbaniya were to be permitted to leave Iraq.

The diary of events covering the period when the squadron was held in protective custody was much along the following lines:

Monday 14 July

0715 All quiet and normal. Sqn HQ assembling for first works parade.

0725 OC Sqn and others on way to first parade stopped by Iraqi armed patrol. Reports of coup d'état. Iraqi airmen seen to be drawing arms from their armoury. Sqn HQ sealed off from the rest of the camp by Iraqi guards. Initially, no person or vehicle allowed to enter or leave the area. After discussion with guards, squadron personnel allowed to go to squadron offices under escort. Work in squadron offices as normal as possible. HQ RAF Staging Post unable to confirm report of insurrection.

1100 HQ RAF Staging Post confirmed report of revolt. Stn Commander state the intention was to carry on as normal. The Iraqis had at this time both the station and the squadron armouries under guard.

1230 HQ RAF Staging Post ordered that the sqn office should be vacated, the buildings locked up and no duty clerks to be left in the buildings. Men of the sqn told of the situation and ordered not to provoke the Iraqis. No contact possible with British Embassy in Baghdad. Routine wireless contact had been made with 3 Troop but not with 2 Troop at 0700 hrs this morning ie: before reports of the coup d'état. After a few minutes working passing routine messages network close down for 24 hours.

1900 Sgt Fox I/C Route Revision Party in Pumping Station K3 area arrive back at Habbaniya. He had been advised of the coup by Iraqi Petroleum Coy personnel in the desert and advised to return to base. He experienced no trouble en route.

Tuesday 15 July

1000 Section Comds conference. Sitrep vague and confuse. Stn Comd ordered all to carry on work as usual as far as was possible. Iraqi Base Comd advised Stn Comd to leave my troops in the field. I sent message to Troops to cease survey work and concentrate field parties at Troop Base Camps. Wireless communications between Sqn HQ and Troops opened every two hours. Because of no communications with 2 Troop permission was obtained after much haggling to send ration truck under Iraqi escort on 16 Jul to 2 Troop locations. Movement within Habbaniya restricted to centre of camp. No movement permitted outside Habbaniya. Access to sqn offices was possible only with Iraqi Base Comd's permission and then only under Iraqi escort. Parades of troops in the open are not permitted. I issue orders for all technical work in hand to be complete and made ready for despatch soonest, and for all technical and administrative documents to be sorted into following categories

Cat I Essential to take out or destroy

Cat II Essential to take out under orderly evacuation

Cat III Desirable to take out but could be abandoned or destroyed

Complete work and Cat I papers smuggle out of sqn offices to safer part of camp. This was done by stuffing the papers into Land Rover cushions without the Iraqis' knowledge and then getting the Iraqi escorts to sit on them. The sqn flag was stolen whilst the offices were unoccupied.

Wednesday 16 July

0800 Ration truck departed under Iraqi escort for 2 Troop location near H3 pumping station.

1000 Instructions receive from Iraqis to withdraw all troops from the field to Habbaniya as soon as possible.

1130 Signal transmute to both troops in the field recalling them to Habbaniya and for them to avoid route through Baghdad. We were unable to be sure that 2 Troop received the

signal. Discovered that a number of administrative files had been stolen from the sqn office; the thief, presumably Iraqi, made entry to the office with duplicate key. All remaining compromising documents removed to safe part of camp and unclassified material destroyed.

1300 Staging Post Signal Centre and Airfield Control Tower taken over by Iraqis.

Thursday 17 July

1000 Stn Comd conference. Emergency evacuation warning order received. Sorting of sqn office records continue. Prepare to receive Troops from the field

1600 2 Troop and ration truck sent out on 16th arrived Habbaniya. All complete except for miscellaneous accommodation stores and petrol dumped at H2 pumping station. The Troop had not received the wireless transmission but had been ordered to move to Habbaniya by Iraqi Comd of PS H3 Garrison. No incident occurred on their return journey. Iraqis at Habbaniya meticulously searched convoy removing offensive weapons viz jack-knives, cook's knives, etc and wireless sets and some unimportant maps. All important items successfully hidden and brought into camp. Motor transport, equipment and stores sufficient for a long enforced march were cached around camp against any eventuality.

Friday 19 July - 2 Troop settled in, returning stores and drawing personal kit. Restrictions on movement of vehicles and stores still in force.

1800 3 Troop arrived Habbaniya. No incident affecting Troop en route which stage night 17/18 at PS K3. Many accommodations stores, kit and supplies dumped at troop location near Kirkuk under Chowkidai guard and on trust for one month. Iraqi Petroleum Company refused to take the stores or to give assistance for fear of compromising their trusted relationship with the Iraqi authorities. The Troop was searched on arrival at Habbaniya and treated as 2 Troop were. Squadron motor transport was serviced and made roadworthy against the eventuality of an emergency evacuation by road.

Saturday 19 July - Work in sqn office area under Iraqi escorts intolerable and virtually impossible so temporary Sqn HQ established in troops barracks in centre of camp. I learned that civilian post office on the camp was again open for business so I sent a civil cable saying "All well and everyone with me" to 42 Regiment in Cyprus. (It was learned later that this signal was received corrupt and incomprehensible.) The Stn Comd informed me that he had rejected the offer of relief from Cyprus by paratroopers.

Sunday 20 July

Monday 20/21 July - Days of rest and routine administration.

Tuesday 22 July

1000 Stn Comd conference after his first visit and talk with British Ambassador since the coup d'état. I was informed that HE would not recommend that any British personnel should leave Iraq. We should endeavour to restore our own situation to normal as soon as possible. It seemed to me that Gp Capt Edwards did not appear to share the optimism of HE.

Wednesday 23 July to Wednesday 30 - Days of rest and routine training and administration. First official surface mail received. On 26 Jul RAF Stn Comd yet again formally asked Chief of Iraqi General Staff if sqn could resume field survey work. On Sat 30 July the Chief of Iraqi General Staff replied sqn work could not continue.

Thursday 31 to 2 September - During this period routine training, recreation, equipment checks and maintenance was carried out. The RAF Stn Comd made weekly requests to Iraqi authorities for permission for sqn to resume field work, all with negative results.

20-22 September - After two months of frustrating enforced idleness by the squadron in Habbaniya the suggestion was then put by me through the British Embassy to the Chief of the Iraqi General Staff for a committee of enquiry to be set up by the Iraqis to investigate our

work role in the country and to make recommendations regarding the squadron's future employment or repatriation to Cyprus. This proposal was accepted and on 20 and 22 September the committee visited the sqn to conduct its enquiries.

30 September - RAF Stn Comd advised me that the squadron would definitely be evacuated in the near future.

1 October The squadron prepared valuable and scarce War Office Controlled Stores and the results of the survey work for back-loading to Cyprus. I visited the Embassy to report on the proceedings of the Iraqi Survey Investigation Committee and to discuss movement of sqn out of Iraq and to advise if we could be of help in rehabilitating the Embassy map library following the attacks that had been made upon it.

6 October - One Sapper was attaché to the Embassy for sorting and cataloguing maps.

10 October - I visited the Embassy to complete arrangements for the evacuation of the squadron.

13 October - The squadron handed over all technical accommodation and administrative stores and motor transport to the RAF for disposal to the Iraqis, except for the valuable controlled technical stores.

17 October - The squadron moved into the Transit Area.

20-21 October - The main body of the squadron was evacuated without a hitch by civil bus to Baghdad Civil Airport and thence by civil charter airline to Nicosia and onwards by road to 42 Survey Engineer Regiment at Zyvi.

Personal kit including the married families' "MFO" baggage was later safely back-loaded to Cyprus. My own car I was compelled to leave behind in Habbaniya; however I left it in the care of a taxi driver, one of the former Iraq Levies, and gave him £50 with instructions that when the opportunity arose he was to drive the car to Beirut and there instruct Thomas Cooks Travel to ship it to me in Cyprus. I thought at the time that that was the last I would see of my car and the £50. I had been unable to insure the car in Iraq because of the coup. Only valuable "War Office Controlled Stores" known to be in short supply in UK and Cyprus were back-loaded out of the squadron stores.

The Iraqi Survey Investigation Committee appointed to look into the squadron's activities met on 20 and 22 Sep (see above). The committee consisted of Mr. M.S. Haider – Chairman (Acting Director General of the Iraq Survey Dept), Capt N.A. Beati – Member from Communications Branch 4 Division, Habbaniya, and a Major from the Iraqi Ministry of Defence. The Chairman was obviously looking after the survey interests, the Captain was interested in the security and intelligence aspects, and the Major was very much a sleeping member and contributed very little to the investigation.

The committee's knowledge of the past and current work of the squadron was meagre in the extreme though Mr. Haider was on the permanent staff of the Iraqi Survey dept. There had been no preliminary briefing for investigation by the committee before visiting the squadron. Full details, illustrate with indices, of the squadron's current work was given to the committee. An outline of the past and future work was also given as far as it was thought prudent to do so. It became clear that the committee suspected the squadron of extra-survey activities and produced voluminous route intelligence reports prepared for a sub-committee of the Anglo Iraqi Treaty Organisation in 1956 which it considered were the fruits of the squadron's work. I gave assurances that this was not so but nevertheless the committee were not convinced and said that until they could see some of the completed maps arising out of the squadron's past field work we could not continue with the current field work. It was pointed out that publication of the maps may not take place for months or maybe years after the field work and furthermore the revised or new maps would contain the same type of information as the current maps. The committee were not convinced of this. I then explained that the squadron could not remain idle in Habbaniya until the genuineness of our topographical surveys could be proved. After further discussion the committee said that their recommendations could be anticipated as being that the squadron should leave Iraq and return at a later date, possibly at the beginning of the next year's field season. The committee said that if the squadron returned to Iraq they could accept only those officers and men who were with the sqn at that time. I pointed out the

impracticalities of this idea. The committee also requested that copies of future maps produced from the squadron's recent field work be sent to Iraq. I promise that this request would be passed on to the appropriate higher authority.

I reported the above proceedings verbally to the Military Attaché at the Embassy on 1 October 1958. Up to the 20 October the Embassy were not aware of any formal report having been submitted by the committee. However, when HE the Ambassador had an interview with the Iraqi Prime Minister on 19 October the latter was told of the squadron's imminent departure from Iraq. The Prime Minister expressed the wish, so it is understood, that if the squadron should return at a later date the Iraqis wanted us. I gained the impression that Mr Haider was not a very competent surveyor and he did not have the authoritative manner of a Director General. I learned that the pre-coup Director General and Mr Hassoubi, the Assistant Director General, with whom the squadron had the closest contact, had been "put on pension".

The decision to evacuate the squadron from Iraq to Cyprus came to the squadron from the British Embassy via Group Captain Edwards on 30 September. Plans were prepared to fly out the main body of the squadron on 20 October leaving a small rear party of the Quartermaster's staff for approximately two weeks after this date to return stores to the RAF and hand over accommodation. Only valuable and scarce controlled technical stores were to be back-loaded. This plan was approved by the Deputy Director Survey GHQ MELF on 13 October (his DO reference Svy 1/1900/2 dated 16 September 1958 referred). All the squadron personnel, their accompanying families, personal kit, "MFO" and the few technical stores eventually arrived safely in Cyprus. I was finally reunited with my wife and 3 small children. They had spent the whole 4 months of our separation living out of suitcases in Berengaria Village, Cyprus. In addition my son Paul had suffered a compound fracture of his elbow which put an extra burden on all concerned.

There is a happy ending to the side-story regarding my car. The ex-Iraqi Levie taxi-driver in due course was given permission to drive the car to Syria. He left Habbaniya by the Ramadi to Rutbah road there turning north on the "Nairn Route" to Damascus, so called because it was an unpaved route straight across the desert used by the Nairn bus company between Damascus and Baghdad. Unfortunately he then acquired a puncture and unaware that the spare wheel was carried in a hidden tray underneath the boot he took the puncture wheel back to Ramadi by hitchhiking for repair. Eventually he arrived at Beirut and handed over the car to Thomas Cooks for onward freight to Cyprus. My joy was unbounded to receive one day a telephone call from shipping agents at Famagusta that my car, once again in a rather shabby state, awaited collection by me on the docks. My only regret is that I have not been able to contact the taxi-driver to thank him and reward him for all his endeavours on my behalf.

I feel it would be appropriate at this juncture to give information which was not available to me or others in Habbaniya during the coup d'état and which has been revealed by the release and declassification of contemporaneous cabinet papers under the 30 year rule. On the basis that "ignorance is bliss" perhaps it was better that we were unaware at the time of the terrible atrocities being carried out by the revolutionaries.

It is apparent now that the coup was opportunistic in the extreme. During the week prior to 13 July 1958 President Chamoun of Lebanon requested American military intervention in his country to forestall unsettling trouble. The Americans consulted the British and the Prime Minister (Mr MacMillan) concurred with the American proposal to send into Lebanon American troops. On the 15 July whilst American troops were landing in the Lebanon, the British Cabinet received and considered a request from King Hussein of Jordan for British troops to be sent to Amman to prevent a military coup d'état in his country. The Cabinet agreed to send 2000 men of the Parachute Brigade and they were despatched to Jordan, with a reserve to Cyprus on 17 July. King Hussein I had also earlier requested his cousin King Feisal II of Iraq to send military assistance. Two Iraqi Brigades were ordered to go to Jordan on 13 July.

The Brigades, mainly motorised infantry with some armour, were commanded by two dissident officers, Brigadier Kassim and Colonel Arif. Kassim was the ringleader and he had been waiting for two years for the opportunity to overthrow King Feisal, the monarchy as a whole and the government. When he was ordered to proceed from his permanent station south east of Baghdad through the city to Jordan he saw it as an opportunity to eliminate the monarchy and government in one stroke.

On the night of 13/14 July, the same night when earlier in the evening I had driven through Baghdad on my journey from Basra to Habbaniya and had not seen any unusual military movement, King

Feisal II (aged 23), Crown Prince Abdul Ilal and 19 members of the royal household were assassinated. The Iraqi Prime Minister, General Nuri Es-said, and other members of the government were also assassinated. The British Embassy was sacked forcing the Ambassador, Sir Michael Wright and his staff and families to leave the Embassy compound and to take refuge in a nearby hotel. An Assistant Military Attaché, Lt Col Patrick Wright, was shot dead. Ironically the King, the Crown Prince and the Prime Minister were due to fly to Ankara on the morning of 14 July for a meeting with the Turkish authorities after which the King was due to fly to England to see his 16 year old fiancé who was then at school at Heathfield, near Ascot.

I mentioned earlier that after a few days into the coup d'état the Habbaniya garrison were offered a rescue attempt by GHQ MELF using British paratroops. It is now clear that that force would have come from the security contingent sent to succour King Hussein and then stationed in Cyprus and Jordan. Habbaniya is about 300 miles as the crow flies across the desert from the Jordan frontier. The Station Commander, rightly in my view, turned down the offer of a relief force because of the extreme vulnerability of the British military and civilian personnel in Habbaniya. We, the British, had by that time lost all control of our armouries to the Iraqis. Iraqi military, soldiers and airmen, all armed, were in profusion throughout Habbaniya and occupying defensive positions. We had insufficient transport to move the complete garrison in one lift by road or air even if the relief force could gain mastery of the locality. Iraqi reserve forces from Baghdad to support the revolutionaries were much more readily available than British reserves to support any relief force. The only incident which would in my view have precipitated a request for the British paratroops to be sent to us was if any of the lives of the British personnel were seriously threatened. As we saw it from Habbaniya, not knowing the horrors of the situation in Baghdad, we decided to adopt a low non-aggressive profile of sweet but determined reasonableness with the Iraqis.

We were lucky in one sense in that, because the coup d'état had had to be mounted so quickly and without warning or much preparation, initially only the Iraqi military in and around Baghdad were involved. It was only they who committed atrocities. The military groups in the north of the country did not join in the military action and thereby the safety of my detached Troops was assured until they could return to Habbaniya. It was a paradoxical situation because historically only troops loyal to the monarch were permanently stationed in and around Baghdad and those less trustworthy in the more remote regions.

Whilst all these momentous events for Iraq and for 19 Topographic Squadron were taking place there was in a small village in the Tigris valley near the town of Tikrit a small boy of twelve years old who was learning and living history in the making. His name was Saddam Hussein whom, as I write this (January 1991) is fiercely defending his illegal occupation of the Emirate of Kuwait against nearly universal world opinion and the armed forces of many Western nations and of many neighbouring Arab countries. General Kassem, as he became, who engineered the first coup d'état, was himself executed 5 years after the event in 1963. I think Saddam Hussein might take note of the historical fact and of the opportunistic nature of Kassem's coup.

Following the withdrawal of 19 Topo Sqn from Iraq it spent the next two months rehabilitating and re-equipping itself whilst staying with the Regiment in Zyyi. A new role was also found for it. It was assigned to field survey work in the Arabian Peninsula. The work was very similar to that that the squadron had been doing in Iraq, namely providing height control, astro-fixes and photographic identification control points for new 1:100,000 or 1:250,000 mapping from aerial photography. There was one Troop based in Aden and working in the rough, barren and mountainous country to the west and north up to the then North Yemen border. The actual line of the border was not marked on the ground and it was quite easy accidentally to cross over it into North Yemen. The North Yemenis at that time were disposed in a very unfriendly manner towards the British presence on the Aden Protectorate and let known their feelings towards us by shooting at the surveyors whenever they had the opportunity and whether the sappers were within the Protectorate boundary or not. Fortunately the Yemeni musketry was not of a very high order but it meant that each working or observation party had to have its own armed lookout to give warning of approaching natives. There were no casualties from these attacks.

Another Troop was base on Sharjah Fort in what is now the United Arab Emirates (formerly the Trucial States) on the Persian Gulf. At this time the oil boom had not been born and local places such as Dubai and Abu Dhabi were muddy tidal creeks with small, impoverished villages on their banks. The local economy was dependent on small fishing communities. Again this Troop lived alongside the RAF Staging Post in Sharjah Fort. The Troop's area of work was the territory running north/south

between the Jebel Akhdar to the east and the Rub Al Khali (The Empty Quarter) to the west from Al Buraimi in the north to near Nizwa in the south. Topographically and ecologically it was quite unusual countryside. The Jebel Akhdar, also known as the Green Mountain catches the fringe of the North East Monsoon and relative to the west of this part of the Gulf littoral is very verdant. Long fingers of luxuriant green valleys full of date palms and quick growing vegetables stretch down from the mountain westwards until they suddenly disappear – streams going underground – on the edge of the desert wastes of the Rub Al Khali. When the Troop moved into this area the populace were just beginning to settle down following a period of riotous unrest in the State of Oman. British Royal Marine Commandos and Special Air Service troops had been employed shortly before our arrival to dislodge dissident factions from the natural fortress of the heights of the Jebel Akhdar. Henceforth the Sultanate of Oman was on a much more stable basis and pro-British.

A third small party of surveyors was based on Bahrein at the Royal Naval base HMS Jaffair doing map annotation of the surrounding littoral.

The only sub-unit of the squadron I have not mentioned, and I have not forgotten it, was Squadron HQ. This was based with the Regiment in Zyvi. This was far from being satisfactory, workable deployment of the squadron. Communication and control of the field Troops by the Squadron HQ in Cyprus was extremely difficult. There was no wireless or telephonic communication between HQ and the Troops at all. Signals took an interminable time between sub-units and because of the nature of the organisation and the work involved such signals became very lengthy. Letters took a very long time between HQ in Cyprus and the sub-units in the Gulf area. Because of the difficulty of maintenance and resupply from Cyprus field troops came to rely more and more on local major army units to help them out. The troops had to do more and more of their own administration for which their establishment was not designed and this dissipated their technical effort.

Supervision of the field troops by Cyprus based officers, particularly by myself as OC, was time-consuming and wasteful of effort. I endeavoured to visit each field Troop once per month. Travel had to be by RAF Transport Command. Overflying of Israel and Egypt was not permitted. By a circuitous route the plane flew from Cyprus to Khartoum where it touched down for refuelling and thence to Aden. There was one flight per week. After visiting the troops in the Aden Protectorate one then flew on to Sharjah via Salalah or RAF Masirah and visited the troops in Oman. From Sharjah one flew to Bahrain and inspected the troops there. RAF schedule flights around the Peninsula were about 2 per week and had to be booked well in advance. Unforeseen contingencies sorely disrupted the schedule. At each stopover I invariably had to visit the local British Military Headquarters for liaison purposes smoothing the way for my field surveyor's safety to enter unknown territory. The HQ in Aden stood on the rocky lip of a long-extinct volcano. It was locally known as "Wimbledon Hill" because it was all balls and rackets! Aden was then a duty-free port. Each tour of my field troops took less than two weeks to complete.

I argued vehemently against this ridiculous dispersal of the squadron. I was assured that it was only a temporary measure to see how it would work out! I handed over the squadron in November 1959 to Major G.A. Hardy RE and I believe he managed to get the squadron headquarters relocated in Aden. I returned to the United Kingdom in December 1959.

Looking back on my seventeen months as OC 19 Topographic Squadron I can only conclude that it was a truly unique experience. I shall always be pleased that I was given the opportunity to do the job. Whilst it did not turn out quite as I had expected it to at the onset, it illustrated the old adage and concept that if one is in the Army one must at all times be a soldier first and a specialist whenever the opportunity occurs. The officers and other ranks of the squadron at all times behave superbly – efficient in all they did, calm in times of crisis and adaptable to changing circumstances of the situation. They were dedicated to their martial and surveying professions and were outstanding ambassadors for their country. I like to think that possibly the current Persian Gulf Campaign (1991) is progressing largely in the Allies favour because the maps and charts now being used owe their accuracy and completeness in no small degree to field survey work of 19 Topographic Squadron in Iraq and the Arabian Peninsula in 1958-59.

Four Two – The Regiment

A brief overview of 42 Survey Engineer Regiment

Part Five: Cold War Warriors

By Alan Gordon

Introduction

When the Regiment, that now comprised 308 all ranks and 62 civilian staff, returned from block leave at the beginning of the new decade it was a unit whose roles and tasks were many and varied. Field surveyors were frequently deployed for tasks large and small, relatively local and on the other side of the world and both straight forward and challenging. The Tranet station was fully operational supporting innovative satellite technology and a small Special Safety Organisation (SSO) team was earmarked to react to a nuclear accident. TACIPRINT and MAPSP vehicles regularly supported formation headquarters on exercises at home and overseas and individual officers and SNCOs augmented Survey staff on exercises on the continent. The War Reserve Map Depot was manned and the UK Regional Map Stores were maintained. All these activities were carried on against a background of continual map production and printing. However, the new decade brought an additional element when it was announced that in the September the UK would mount the biggest mobilisation exercise and troop movement to the continent since the Second World War and virtually the entire Regiment would be involved.

1980: A Busy Start to the New Decade

The 8th of January saw a party of 17 surveyors from 19 Squadron leaving Oban en route to Benbecula in the Hebrides to carry out work to fix points required for the missile sites located on North and South Uist and Saint Kilda, the later reached by chartered helicopter. The task was hampered by the severe terrain and extreme winds but was successfully completed by the end of the month. On the 13th of June 35 men from the squadron left Marchwood aboard *HMAV Arakan* bound for Narvik in Norway and then to a camp in a pine forest in Skjold Garrison. From here they fixed the positions of 104 artillery points using a variety of techniques and returned to Barton Stacey at the end of July. During the summer a survey party moved to the Channel Islands to fix their position relative to points on the French coast. Surveyors were based on each of the islands whilst six crossed to work in France.



Sapper Whitehead (driver) observing with Corporal Boulton (field surveyor) booking on Benbecula – many drivers became competent assistant surveyors.

Air Survey Troop also had a busy year starting with a detachment to Belize in the spring to carry out field checking and continual revision of Northern Ireland mapping and various other taskings for the Wild B8s.

13 Squadron was as usual a very busy ‘map factory’ and during the year produced an impressive total of 500 tasks that generated ten million impressions resulting in 1.7 million maps as well as deploying TACIPRINT on 12 exercises and supporting 14 displays and demonstrations.

The year was not all work; on a sunny 27th of June HM The Queen opened the rebuilt School of Military Survey and a cross section of personnel from the Regiment was invited to attend the ceremony and the garden party held afterwards on the sports field. The annual ‘fitness and fun’ camp was held at Fremington Training Camp on the North Devon coast and once again provided an opportunity for the usually Barton Stacey based members of the Regiment to get away and spend time as a unit.

In addition to this full programme of events, throughout the spring and summer the unit prepared to take part in *Exercise Crusader 80*.

Exercise Crusader 80

The UK's defence strategy relied on the mobilisation of 20,000 Territorial Army reservists and the ability to move them and 10,000 UK-based Regular Army troops into position on the continent within 48 hours of receiving a 'go' signal. Whilst the plans to achieve this huge movement had been practised as command post exercises they had never been tested in the field. This would now be done under *Exercise Crusader 80* the umbrella name for three field training exercises; the mobilisation and movement to the continent phase was *Exercise Square Leg*, *Exercise Jog Trot* tested the opening and operation of the lines of communication on the continent through which the personnel and material would pass and the final stage, the battle, was *Exercise Spearpoint*. Such a complex and novel undertaking was viewed by the Regiment with some anticipation.



Air surveyor Corporal Ian Drury fulfilling his war role in the combat map supply chain along with MT Sergeant Jock Campbell.

From springtime onwards preparations for the exercise were well under way including a fairly heavy administrative workload to ensure each person was fully documented for the move to fill a specific role in Germany. Military training, especially NBC which was expected to feature strongly in *Exercise Spearpoint*, and training for role such as air surveyors learning the combat map supply system filled every Wednesday until September.

On the day of the move well over 200 Regimental personnel paraded at Barton Stacey where all had breakfast in the soldiers' dining room at 0500 hours. Coaches then took them to the temporary air mounting centre in a barracks in Windsor for processing and

another breakfast. Here they were joined by several small units to make up an aircraft load and informed that they were to be the first draft through the mobilisation system to fly to Germany. After some time haversack rations were issued and the party was bussed to Heathrow where a tented military departure zone had been set up near the perimeter from where they boarded a chartered Tristar aircraft. Immediately after take-off they were given yet more sandwiches by the crew! After landing at Wildenrath there was a formal welcome in the station theatre and then everyone had to collect their webbing which was piled up in a row of tents – unfortunately it was by now almost dark and the unlit tents contained over 200 sets of identical webbing! They were taken by coach to 14 Squadron at Ratingen where they were welcomed and invited to meet old friends in the respective bars.

The next day was spent on briefing and preparations and the following day everyone deployed to their war locations – 14 Squadron, enhanced by Regimental personnel, moved to Tofrek Barracks at Hildesheim, most of 13 Squadron moved to Monchengladbach to form a second shift at SPC BAOR, a party went to Herford to staff the Corps Map Depot from where some left to man Corps Replenishment Parks dotted over the exercise area. Additional reinforcements were provided for the TACIPRINTs and MapSPs serving with the various formations, some officers and senior ranks reinforced formation headquarters Survey staffs whilst others took up controller posts and a few soldiers stayed at Roy Barracks to bolster the Map Depot staff.

The main phase, *Spearpoint*, lasted for two weeks after which everyone returned to Roy Barracks for a short stand down before returning to Barton Stacey three weeks after that early morning departure.

A Radical Career Path Change: Combat Surveyor

There were two routes by which a soldier could embark upon a career in Military Survey; via boy service where the apprentice would receive soldier and trade training before joining 1 Training Regiment RE to complete class three combat engineer training followed by a posting to a Survey unit or, as an adult entrant who joined the Training Regiment and undertook soldier and then combat engineer training followed by a posting to the School of Military Survey. Here he would undergo aptitude testing and be allocated a trade. However, as there was generally only one course per trade per year, depending on when the next available course started he would be either retained at Hermitage to carry out menial tasks as part of 'pool labour' or be posted to the Regiment or 14 Squadron as a 'potential tradesman' where he would also be employed on menial tasks, generally for

the QM or RSM. This meant that by the time a regular entrant was qualified, and indeed paid, as a military surveyor he could have been in the Army for up to two years and then be only employable at his particular trade.

All this changed in October 1980 with the introduction of a new Survey feeder trade called combat surveyor which replaced the combat engineer training which few, if any, military surveyors ever utilised in their subsequent careers.

The new trade's primary course comprised a six week TACIPRINT module and six weeks of 'storeman survey' subjects; print finishing including guillotine operation, map depot work including fork lift truck driving and combat map supply. The TACIPRINT module was made up of a General Duties Draughtsman course and training on the photographic, plate making equipment and small offset press housed in the box body.

Having passed the course the newly qualified combat surveyor was posted to the Regiment or 14 Squadron where he was immediately employable in either the WRMD or 3 BAOR Map Depot or with TACIPRINT. Specific technician training would follow with the next available course.

Business as Usual

Once back to Barton Stacey from *Exercise Crusader* in Germany it was return to normal for the Regiment. The cartographers in 13 Squadron returned to their light tables and the reproduction technicians carried on working for the Military Survey Print Programme. In 19 the air surveyors who had been 'humping' map cartons for three weeks happily now sat at their B8 or worked on Northern Ireland map revision. The field surveyors who had been carrying out rapid Gunner style work now returned to a number of small tasks including a small detachment in November to the Western SBA on Cyprus to re-establish missing boundary pillars whilst the remainder of Field Troop prepared to deploy to Kenya for *Exercise Fourpence 80* on the 15th of December. Map Supply Troop carried out trials on the new Maps Truck in October; this version had aluminium boxes designed for easy opening and stacking using a fork lift held in racking on the back of a standard Bedford MK truck.



Sergeant John McGuinness checking an SBA boundary pillar – a regular task for the Regiment over many years.

For 19 Squadron 1981 was dominated by two deployments to Kenya. *Exercise Fourpence 80* comprising 34 surveyors and 13 attached personnel only moved to Kenya just before Christmas 1980 tasked to provide a network connecting the work done on *Exercise Fourpence 74* to that of a commercial survey company and to include a connection to the Clifford Chain Triangulation scheme carried out in the 1950s. A base camp was set up at Takaba and the work took place in the hostile North Eastern Province, an area so threatened by Shifta tribesmen that Kenya Army escorts were essential. The detachment achieved all its aims including pre-marking and obtaining spotting photography and returned to the United Kingdom at the end of February. The spring and summer passed relatively quietly for the Squadron, the main events being the annual 'fitness and fun' camp which was held at Nesscliffe Training Camp in Shropshire from the 5th to the 15th of May and a Squadron military training and map supply exercise called *Exercise Superstacker* that took place at Hawley from the 7th to the 21st of July. The field troop then prepared for *Exercise Fourpence 81* and left for Kenya on the 3rd of August returning on the 10th of October.

13 Map Production Squadron was involved in 16 exercises during 1981 including a full deployment from the 17th to the 28th of November to SPC BAOR under *Exercise Print Down* to practise their war role of reinforcing the unit. Other exercises saw TACIPRINT supporting both 6 and 7 Field Force, several Special Safety Organisation exercises as well as unit adventurous training.

Two small but significant changes took place about this time that heralded the direction in which MOD policy was now heading. For years the RHQ and Squadron offices had been cleaned by two redoubtable local ladies, Nancy and Sheila, who worked Regiment hours and were full of gossip and goodwill and happy to clean anything including dirty coffee mugs. Then came the news of their

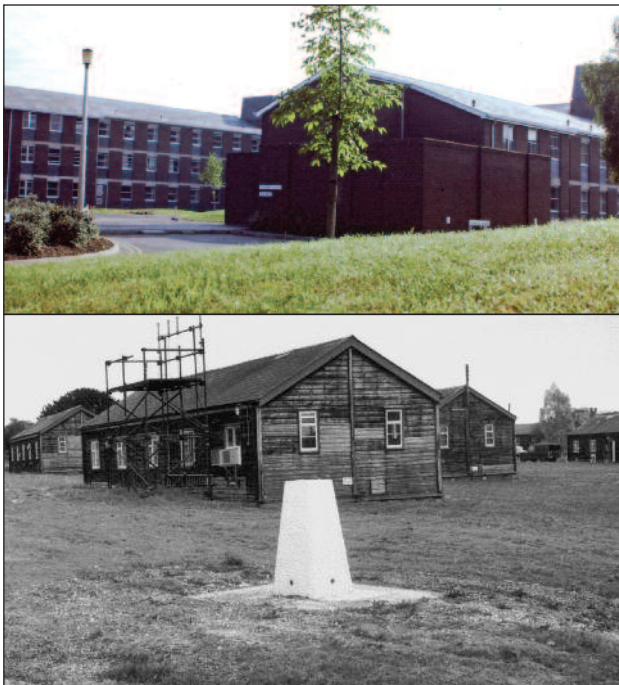
redundancy and the introduction of the first ever contract cleaners who worked after hours to a strict schedule that stipulated that if a desk was to be cleaned then the chair had to be on the floor and vice versa but desk and floor could not be cleaned on the same day. The contract certainly did not include coffee mugs! The second change was the arrival of two WRAC clerks, one for each squadron. These were the first female soldiers to serve with 42 Regiment but as the camp infrastructure was not designed to accommodate women they were housed at the RAPC Centre, Worthy Down and driven to and from the Regiment daily. Another change at this time was the renaming of A Camp as Drayton Camp albeit it had little effect as generally everyone continued to refer to it as A Camp or, as many of the soldiers did, Barton Stalag!



13 Squadron clerk Private MacKenzie, the Regiment's first female soldier.

However, unbeknown to the vast majority in the Regiment a far bigger change was decided in November 1981 that was not only to number the Regiment's days at Barton Stacey but also its very existence.

Rumours of a Move and the Final Decision



Young soldiers used to the modern accommodation at the Training Regiment and Hermitage were taken aback by the wartime huts at Barton Stacey.

New arrivals at Barton Stacey in 1963 were warned not to make themselves too comfortable as the Regiment's stay was only temporary until better accommodation could be found. Thereafter rumours of a move were regular occurrences but only three had any firm foundation. When the Military Railway at Longmoor was earmarked for closure at the end of the Sixties there was a short lived consideration that the Regiment should move there but the accommodation was deemed to be unsuitable. A decision in 1975 from the Defence Review was to close a number of RAF stations and to relocate Army units still in hutted camps to them. MOD Estates branch allocated 42 Regiment to RAF Hullavington near Swindon but it transpired that the Regiment would be required to administer several RAF and RN units still on the site and manage the large estate and so the idea was eventually dropped. At the end of the Seventies yet another former RAF station, Thorney Island, was offered and this reached the 'Q Brief' stage before again it was deemed to be too large a site for the relatively small Regiment.

Yet another MOD review in the early 1980s suggested that the Staff College should move to Hermitage where the School was seen to underuse

the site and the School to move elsewhere. However, driven by this option and an MOD decree that from 1986 wartime hutted camps were to cease being used as permanent accommodation a plan was put forward in November 1981 for the creation of a Survey Centre at Hermitage. This unit would comprise the Regiment, the School and 8 Map and Air Chart Depot which was to move into the nearby Ordnance Depot at Thatcham. In essence, this was the plan taken forward through four years of staff work to be implemented in September 1985. However, it was later decided that the Regiment must disband to save administration overheads but to retain the number that for two generations of military surveyors was synonymous with 'Survey' the new unit was to be named 42 Survey Engineer Group.

The Falklands War: Operation Corporate

The first few months of 1982 passed fairly uneventfully but then the tempo ramped up dramatically when early on the 1st April the Directorate of Military Survey was informed of the urgent requirement for maps of the Falkland Islands and so MCE and 42 Regiment were immediately tasked to print

stocks of the only available mapping which was 20 year old 1:50,000 scale sheets produced by the DOS. On Friday the 2nd April Argentinian forces invaded the Falkland Islands and the Prime Minister immediately ordered the creation of a Task Force to sail south within days to retake the islands; *Operation Corporate* commenced. On the 3rd May lead elements of the Task Force collected stocks of the DOS sheets from the War Reserve Map Depot and at MCE and the Regiment three hectic months followed with continual operational map production and printing.

Early in the operation WO1 Duncan Jacobs from 19 Squadron STCO was deployed to Ascension Island to ensure that later editions of sheets were issued to the Task Force as it passed the island and also to issue air charts supplied directly from the USA to the RAF and Naval aircrews.

The next task was to extract as much information as possible from DOS and more recent photography taken from *HMS Endurance*'s helicopter and produce a Topographic Information Overprint (TIO) to the 1:50,000 sheets. Three NCOs were attached to HQ E-in-C Engineer 1 to help in the production of 'goings' data which was then passed to the Regiment and MCE on the 13th April to commence production of an overprint to the four JOG sheets, a series that was named the RE Briefing Map and was so popular that by the 4th May a third edition was published.

On the 29th April work commenced to enlarge the standard 1:250,000 JOG sheets to 1:100,000 and incorporate the TIO information to produce a five sheet series by the 3rd May. Meanwhile air surveyors were attached to DOS to work shifts with their surveyors to produce 1:12,500 scale maps of Stanley and its approaches in time for the final assault.

The Regiment's air surveyors were then tasked to produce large scale profile plots of Stanley runway and later on the 10th June a similar product covering Mount Kent to facilitate the installation of radar equipment.

The Argentines surrendered on the 14th June and shortly afterwards Military Survey deployed an officer and four men with a TACIPRINT to the Islands. Military Survey's involvement continued for some years with a TACIPRINT from the Regiment manned by a three man crew on a roulement basis producing products such as minefield maps and field surveyors were regularly sent to the Falklands to carry out a wide range of tasks.

Exercise High Trig: The Nepal Survey 1982 to 1985

The aim of Exercise High Trig was to establish a first order geodetic network across the entire Kingdom of Nepal, a country about 550 miles from east to west and between 90 and 150 miles from north to south with the terrain varying in three longitudinal bands from the fertile Terai region at virtually sea level raising through alpine style 'Hill' country up to the high Himalayas. The network was to be created by carrying out a triangulation survey east to west across the country and in the process connecting to twelve Doppler points created in 1980 and 1981 by 512 STRE. With weather conditions allowing fieldwork only between September and March each year the task would be executed during three annual deployments.

Before each deployment the surveyors received comprehensive training both within the unit and at the School of Military Survey.

This training not only covered technical matters but also included first aid, signals, health and hygiene, helicopter handling and background information on the terrain, culture and customs of Nepal.

The first deployment of two officers and 18 soldiers together with all their equipment including Land Rovers left RAF Lyneham aboard two C130 Hercules aircraft and arrived in Kathmandu on the 15th September 1982 and then moved to their base in the Gurkha cantonment at Dharan.

This first deployment worked in the east of the country with each survey party comprising a junior NCO, a sapper and a Nepalese surveyor who acted in a liaison role plus a number of Nepalese porters. Work in the flat Terai suffered from line of sight problems and so use was made of a string of very tall microwave communication towers which were not stable enough for theodolite observations but used for EDM



Sergeant Mick Barnes and Sapper Bob Taylor observing at almost 17,000 feet AMSL – the highest altitude at which Regimental surveyors ever worked.

measurements. At high altitude, using lights at night and heliographs during the day, observations were possible at 70kms and 35kms respectively. As well as the triangulation observations whenever possible astro fixes were carried out for position and azimuth and all points were pre-marked pending future aerial photography.

Road links were poor or non-existent and so whenever possible use was made of Nepalese Army Air Wing helicopters and light aircraft. The field work was arduous with very hot temperatures in the Terai but one party in the high 'Hill' country, not equipped for cold weather, was caught by an unexpected snowstorm that collapsed their accommodation tent whilst their survey tent was struck by lightning, necessitating an emergency evacuation by helicopter.

This first season was very much a pathfinder to establish contacts and develop procedures appropriate for the various terrain conditions even so it successfully produced sixteen trig stations before returning to the UK on the 25th January 1983.

The second season saw the 31-strong team fly out in a VC10 and Hercules arriving in Kathmandu on the 18th August and moving into a fairly grand building called Maya House. The task this year was to continue the network westwards across the central area of the country operating in much the same way as the previous season but it was now possible to mount eight survey parties simultaneously. A tented advance camp was set up at the Gurkha base at Pokhara in the Annapurna region. Once past the roadhead at Nagarot travel was either by helicopter, where cost effective and technically possible, or trekking on foot accompanied by up to 35 porters per party. Despite heavy snow at the higher altitudes, up to 14,000 feet, in early January by the beginning of February 32 stations had been occupied and the network orientation provided by 27 astronomical azimuths.

One incident of note was that the detachment commander, Captain Brian Olley, had to be returned to the UK due to a family emergency. At the time he was in the western region and out of radio contact and it took several days of helicopter search to find him and then rush him to the airport. The detachment returned to Barton Stacey on the 7th February, three weeks ahead of schedule.

The final deployment flew in the inevitable Hercules from RAF Brize Norton to Kathmandu where they again used Maya House as their base. Here the stores were unpacked, all equipment checked and then repacked for field parties. This final season was spent in the far west which is so remote that few Nepalese have ever been there. The field parties were first flown to Nepalganj airfield where a tented advance camp was established and then flown north in a small Skyvan aircraft to the airstrip at Jumla, an area only accessible by air. From here the four parties trekked for days at a time to the distant trig stations supported by 200 locally recruited porters. The longest and highest trek was by a team of six supported by 6 sherpas, for the very high altitude work, and 70 porters with ten horses to reach the peak called Bhalu Lek at almost 17,000 feet. A trig station was successfully created very near the summit but Sapper Taylor succumbed to acute mountain sickness and had to be casevaced. This involved the team and the Sherpas carrying him on an improvised stretcher up a severely steep scree slope, over a ridge and down to a camp where a Nepalese helicopter operating at the limit of its ceiling and without a co-pilot in order to reduce weight carried him off the mountain so that he could be taken to Kathmandu and then to Delhi to recuperate.

Several of the field parties spent an unbroken five months living in the field but by the end of the deployment in February a total of 33 points had been occupied.

Over the three seasons a total of 1,630 observations had been taken between 68 trig points many under trying conditions and all well within the first order specification. High Trig had been a very significant undertaking and was probably the most challenging but prestigious survey carried out by 19 Topographic throughout its entire history and almost certainly the last time that a nationwide geodetic network would be produced by the classical triangulation method.

Map Production Crosses the Digital Threshold

The Regiment's field and air surveyors had been using digital technology in several ways since the mid-1970s however this new technology had little if any impact on life for the cartographers and reproduction technicians. This began to change in the summer of 1983 when a small team of cartographers was assembled at Feltham where they received training from MCE personnel on operating equipment that could capture, store, manipulate and output vector map data. The equipment was housed in two adjoining portacabins and was called 'auto carto'. The equipment comprised a DEC VAX 11/750 32 bit minicomputer with 2 MB RAM with a VMS operating system, disk and tape



Corporal Nick Adnitt at the Auto Carto edit station.

storage, two terminals, a CALCOMP 4-pen plotter, an A0 manual digitising table and an edit station running Laserscan's LITES software.

The procedure was for some map components to be digitised and stored on a magnetic tape that was then carried to MCE's light plotter, an instrument similar to an automated coordinatograph which shone a light source directly onto a large sheet of unexposed photographic film. The pin point of light could be switched on/off as it tracked the digitised coordinates of the data. The line gauge was adjusted by opening/closing the aperture with a pecked line achieved by switching it on/off at defined intervals. It could also plot parallel lines for roads, and patterned lines for railways. Once the data was plotted, the film was processed and a positive of the plate was available for downstream map production and hence the term "auto-carto" was born.

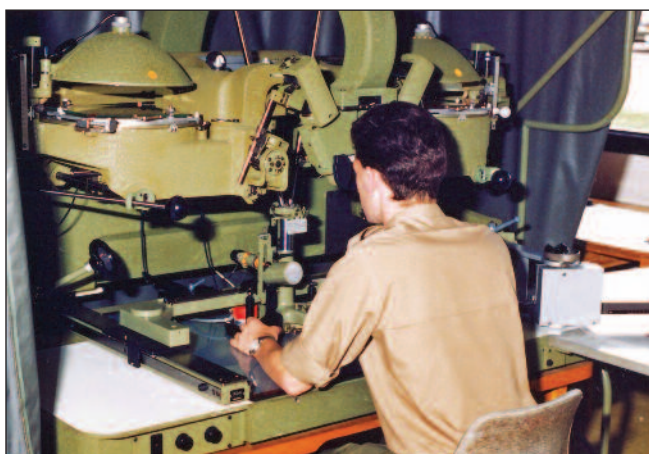
In 1984 the whole system was moved to 13 Squadron lines at Barton Stacey and the operators continued to hone their skills and to demonstrate the system to various visiting dignitaries. Eventually a series K6611 wadi compilation plate which had just been scribed was manually digitised and edited on the auto carto system and the data sent to MCE where a perfect positive image of the plate was produced; three weeks of manual work had been produced in three days! To some this innovation was seen as a threat to traditional cartography but the digital threshold in cartography at the Regiment had been crossed.



The Hell CTX330ER scanner.

The same year saw a radical new addition to the unit's photographic equipment inventory with the arrival of a Hell scanner although the new equipment was installed at Hermitage in anticipation of the squadron's move there in 1985. Four senior photographic technicians attended a training course for the Hell CTX330ER scanner which provided the means to capture, store, manipulate and output raster data and in doing so eventually replace the large process cameras. It comprised two drums, input and output, large enough to hold an M726 map sheet, a xenon light source that traversed a rail as the input drum holding the original map revolved and a control panel that broke the light down into the three secondary colours of cyan, magenta and yellow. A proof would then be made using the output drum holding a sheet of film held in place by a dot screen and corrections applied as necessary to the colours through the control panel. This process would be repeated until an acceptable solution was achieved. As with any new technology unforeseen problems occurred but these were mastered by the specialist operators and the scanner soon became a vital part of the squadron's production system.

Map Production in the Final Years: K6611



A Wild B8 with a tri-axis locator attached to the tracing stand to collect digital data for aerial triangulation.

Whilst field surveyors, especially those in the high Himalayas, tended to 'grab the headlines' the air surveyors, cartographers and repro technicians continued to provide impressive work within their own spheres of expertise.

1983 saw the return of *ab initio* series mapping to Barton Stacey when the Regiment was tasked to produce 13 sheets for a new 1:100,000 scale series covering Oman; series K6611. The RAF flew the photography in early 1983 and then the control was put in by 512 STRE assisted by 19 Squadron. Once the task reached the air survey stage it was then fully appreciated just how very challenging

an undertaking this was going to be due to the almost featureless terrain of the sand desert and salt plain. There were over 600 stereo models to cover the mapping area but due to the paucity of detail point identification was an immense problem necessitating independent observing of each model twice and even then some had to be observed using the Wild B8 with the tri-axis locator and computed by the independent model method as the plotting machine had better optics. In an attempt to reduce rejected models at Feltham where the final solution was to be computed, programs developed for the HP 9835 desktop computer by the School of Military Survey were used in the Troop to pre-compute the solution. Even so, the 'air trig' observation phase took ten months to complete.

Plotting was carried on the Troop's Wild B8 machines but the lack of detail and the changing nature of the sand dunes and apparently random tracks across the terrain presented the operators with untold problems to the extent that this was deemed to be among the most difficult air survey work ever done by the Regiment. In order to overcome these problems plotting was carried out at 1:50,000 and then photographically reduced to the map scale.

The cartographers' task was no less challenging as each map sheet comprised between 18 and 25 components depending on the terrain. Production was by the classical techniques of scribing linework, adding symbols and text produced by photoletering machines and producing various masks. A novel aspect of the series to all the junior technicians was the use of pencil drawn hill shading to highlight relief. Another innovation to the cartographic process was the introduction of the auto carto system to digitise linework and as the project continued much was learned regarding use of the digital technology to the point where all the line components for the last two sheets were digitised rather than hand scribed.

Yet more innovation was introduced at the photographic stage with the use of the Hell scanner to produce a far superior reproduction of the hill shading component that could be achieved using the traditional halftone process. A number of proofs were produced leading to the final proof, copies of which were sent to Oman for field checking and to Feltham to ensure compatibility and edge match to adjacent sheets in the series produced by MCE. Once the final proofs were passed the sheets were printed by 13 Squadron's Print Troop and despatched to 8 Map and Air Chart Depot; a rare case of the entire production process taking place within the Regiment.

Despite the usual problems that occurred during map production within the unit, generally a lack of continuity due to breaks for military training, exercises, routine postings and upgrading courses, and several months complete break in work whilst the two squadrons moved to Hermitage, the final two sheets came off the press on schedule in December 1986.

Whilst K6611 was the major production task for the last two years of the Regiment's life there were always other smaller tasks in hand particularly Northern Ireland tasks and reprint work for the Military Survey print programme. However, before the Regiment was to disband and the two squadrons move to Hermitage the unit was tasked with a high priority classified task; *Operation Moccasin*.

Operation Moccasin: 'Op Moc'

The Government announced in 1980 that the US would base nuclear armed ground launched cruise missiles (GLCM) in the UK at RAF Stations Greenham Common and Molesworth; the former almost immediately became the focus of immense protest. Survivability of the mobile missile systems depended on their ability to change location and because of their size and the need for rapid deployment movement by road was critical and so Military Survey was tasked to provide route planning and launch site information covering England south of a line Liverpool to Leeds. 42 Regiment was duly tasked under *Operation Moccasin*, classified 'secret', to carry out terrain analysis to identify potential firing positions and alternatives, harbour areas, positions for inner and outer cordons and routes to and from Greenham Common and Molesworth that would be useable by the transporter, erector, launcher vehicle (TEL) and all the supporting vehicles of both the US Air Force and UK police.

As well as maps the terrain analysis also utilised classified System 111 imagery and text information on the ratio between crown diameter and height for different tree species to height trees but after trials it was decided that all data would need to be field checked. These field checks had to be carried out covertly as the protesters put very considerable effort into identifying the GLCM deployment routes and launch sites in order to disrupt training and further their cause. The field checking was conducted in small teams with specific instructions; no permission to cross any land thus they were basically trespassing for most of the time, in civilian clothes and 'living' on nightly rates of

subsistence allowance (NRSA). Once they had verified or otherwise the site and route selection the relevant maps went back to 13 Squadron for the production of the final versions which were sent to Feltham for site de-confliction – a number of sites had previously been identified for other emergency use.

For most of the time the project went well with few mishaps on the field checking side; a party was caught trespassing on the Prince of Wales Gloucestershire estate and another on Michael Heseltine's land and as he was then the Secretary for Defence - a bit embarrassing! Two teams had to be bailed out of jail overnight having been caught trespassing and the locals, not believing their story, had then contacted the police. Checking in mid-Wales was also problematic as the cover story for the teams was that they were collecting heighting information so that the newly deployed Tornado aircraft could fly even lower. Not such a good idea when dealing with sheep farmers in Wales!

This was another task that bridged the move to Hermitage where it was completed on schedule in late 1986.

Field Surveys in the Final Years

Although for three years *High Trig* rather filled the headlines 19 Squadron continued to mount significant exercises far and wide and although labelled 'exercises' these surveys added considerably to world's geographic knowledge and would continue to be valuable long after the surveyors involved had 'hung up' their uniforms.

The first major field survey exercise of 1982 took place when a detachment of 31 personnel deployed on the 14th June to the Voss area of Norway for *Exercise Trig Norge 82*. The aim of the task was to produce 23 artillery points within the Mjölfjell Training Area that the Regiment had first mapped in 1968. New tracks, buildings and firing points were surveyed and plotted at a scale of 1:25,000 for a future revision of the map sheet. Large scale plots were also produced of new roads and buildings within the training area and there was even time for a small party to enjoy some adventurous training which included canoeing and mountain walking. The detachment returned to the UK on the 30th of July. Air Survey Troop moved to Rothiemurchus in the Scottish Highlands on the 3rd September to spend two weeks carrying out a small survey task and some adventurous training.

In February the following year a small detachment went to Cyprus for the regular check of the SBA boundary pillars and it also marked the beginning of Project Zeus for which small parties of six or so field surveyors moved to the southern states of the USA to carry out gravity surveys in support of the US Defence Mapping Agency (DMA). Each detachment lasted between three and six months and the task was completed by the end of December. That summer a 35-strong detachment spent six weeks in the Narvik region of Norway on *Exercise Trig Norge 83* putting in a total of 110 artillery points. Despite encountering numerous problems including unfamiliarity with the newly acquired HP41CV calculators, interpretation of Norwegian trig lists, multiple cairns on peaks and unseasonably poor weather the task was completed by the deadline to return to the UK on the 29th of July. Eight members of 19 formed *Exercise Fourpence 83* which was the reconnaissance for a future exercise to strengthen the geodetic network in North East Kenya. The exercise was based at Takaba and traverses were planned along the Ethiopian and Somalia borders, very harsh terrain and such a very dangerous region that it required continuous escorts from the Kenya Rifles. The party spent twelve weeks in Kenya returning to the unit on the 12th October.

1984 was almost a repeat of the previous year with early February seeing a small detachment off to Cyprus for the SBA boundary pillar check but this time there was also a small survey to plot recent housing along the Limassol-Paphos road, an antenna survey at Cape Gata and a Tropo Link survey for Headquarters Land Forces Cyprus. *Exercise Trig Norge 84* took place between the 1st June and the 19th July over a large area around Tromsø and Setermoen. Bases were set up at these two locations and due to the large area to be covered two smaller bases were also used. By the end of the exercise the detachment had successfully produced 175 artillery points.

There was again an SBA boundary survey in 1985 but it was fitting that the last major overseas survey task to be carried out by 42 Survey Engineer Regiment before it disbanded was an *Exercise Fourpence* in Kenya. The exercise was in the region receded in 1983 and the Squadron Commander carried out a further reconnaissance in April which highlighted the need for Bilby towers. Luckily DOS had bequeathed three to the Survey of Kenya and necessary replacement parts were noted, purchased in the UK and taken out by the main party when it deployed later in the year. The recce

also made contact with the original DOS tower party of locals and rehired them to assist during the exercise. Based at Mandera in Kenya at the triple point of the three countries and very much in 'Bandit Country', *Exercise Fourpence 85* was a tricky task involving the completion of a first order survey along the Ethiopian/Kenyan Border and the Somalian/ Kenyan Border. The links to other surveys had never been made in the past because of the difficulty of the terrain but the detachment achieved this using the Bilby towers and under the much needed protection of the Kenya Rifles.

The last overseas survey mounted from Barton Stacey was to the opposite end of the Earth, control and gravity surveys on the Falkland Islands at the end of 1985 and into early 1986.

As The Adverts Said - Soldiers First

As well as maintaining a very high level of technical expertise the Royal Engineers mantra 'you are a soldier first' was now very to the fore. Ceremonial had always been an element of a soldier's life and for the Regiment this was displayed annually at the Queen's Birthday Parade and on Remembrance Sunday. 1982 saw an additional and very public ceremonial event when on the 28th April the Regiment marched down the High Street in Andover to receive the Freedom of Test Valley on behalf of the Corps. The event marked almost two decades of close relationship between the unit and the town where many from the Regiment lived in quarters or hirings or had bought their own homes.



Major John Collins leads 19 Squadron down Andover High Street to exercise the Corps' Freedom of Test Valley.

Military training and preparation for war roles were the Regiment's priority whilst continuing to provide a substantial input to the Military Survey map production programme and carry out impressive field survey tasks. The two squadron sergeant majors rigorously applied the requirements of both the individual and unit Army Training Directives and their efforts were rewarded when the Regiment came runner up to 1/7 Gurkha Rifles in the 1982 Regular Army Major Units Tickell Trophy Competition.

On the 17th May the majority of the Regiment moved to Halton Training Area in Lancashire for the annual two-week 'fitness and fun' camp although this now involved more military training including refresher combat engineering with bridging on the River Lune.

TACIPRINT and MapSP vehicles supported eleven Field Force exercises during that year and 13 Squadron mounted six military or adventurous training exercises. 19 Squadron's field surveyors also practised their war role when they took part in *Exercise Vengeful Merlin*, a Royal Artillery exercise held in BAOR from the 3rd to the 17th September. The Regiment was again involved on the continent when elements from both squadrons carried out their BAOR reinforcement role from the 14th to the 21st October during the NORTHAG Geographic *Exercise Dominate XIV*.

In 1983 13 Squadron's TACIPRINT deployed on ten exercises often accompanied by 19 Squadron's MAPSP and this level of support to formation headquarters was sustained through the remaining years of the Regiment's existence. The squadron also deployed to Germany to exercise the provision of the second shift capability at SPC BAOR and also to reinforce 14 Squadron. In addition Regimental personnel left their technical tasks to enjoy adventurous training in the Alps, Norway, Scotland, North Wales, and the Lake District.

The following year saw a heightened level of military and war role training as the unit geared up for *Exercise Lionheart*, the Army's biggest mobilisation exercise since *Crusader 80*. This time there was the benefit from the 'lessons learnt' from *Crusader* and the fact that 13 Squadron were now well practised in providing the SPC second shift. A major difference was that Field Survey Troop deployed in twenty vehicles by sea, crossing to the continent by chartered ferry and then became the lead unit for the convoy made up of all the vehicles from the ship. They slowly wended their way across the Low Countries to the release point at Haltern in Germany and then onwards to 14 Squadron. The majority of the Regiment's personnel travelled by air to Wildenrath and then on to 14 Squadron before deploying to their war role locations either with the Germany-based squadron which moved to Hameln, at a formation headquarters, forming the second shift at SPC or to man the

combat map supply chain. The field surveyors again supported the Royal Artillery by surveying artillery points for fire locations, known as PIGS (Position Identified Graphics), and going back every couple of days to 'replen' at the Corps Reserve Map Depot at Herford.

The high level of military training, war role exercising and adventurous training continued through the following year until the Regiment disbanded.

This Sporting and 'Dramatic' Life

Regimental life was by no means all work and no play and the story of 42 Survey Engineer Regiment would not be complete without mention of its sporting prowess throughout its entire existence. Military Survey generally, and certainly 42 Regiment, had always excelled at a very wide range of sports both as teams and individuals for example, during 1982 two members of the Regiment represented the Combined Services, nine the Army and 21 the Corps at sports as diverse as angling, canoeing, football, hockey, parachuting, shooting, squash, rugby, tennis, volleyball, and not surprisingly, orienteering. The strength of team performances in specific sports varied from year to year but as a rule the unit achieved commendable results in rugby, shooting and hockey.



Crew member in NBC kit 'camming up' a 19 Squadron MAPSP on an exercise.

In the early Eighties the unit revived its amateur dramatic club, something that could trace its existence back to the Regiment's formation and indeed to its forebear unit 512 Field Survey Company in Tura Caves during the War. Productions included several pantomimes, a series of one act plays and even a straight play that was entered in the Army Drama Festival.

The End of the Story: The Regiment Disbands

The persistent rumours of a move were finally confirmed as fact in 1984 but came with the surprising news that the Regiment was to disband. Life carried on as usual, albeit with only absolutely essential maintenance to the fabric of the old wartime buildings, until mid-1985 when preparations for disbandment and 'colocation', as the move to Newbury was called, got into full swing.

The Regiment was to formally disband at a parade on Wednesday the 25th of September at which time 42 Survey Engineer Group would form. Administratively the Regiment would continue until the 30th of September and then on the 1st of October those units remaining at Barton Stacey were to be known as 42 Survey Engineer Group Rear until the 1st of February when that unit would also cease to exist.

As September approached so kit inspections and practise parades increased and then, together with a contingent from MWF, the unit marched down Andover High Street to exercise the Freedom of Test Valley for the last time. The weeks leading up to the disbandment was one of the very few times during its existence that virtually the entire Regiment was together in one place and the occasion was recorded with Regiment, Squadron and Mess photographs.

Wednesday the 25th dawned bright but overcast and into camp came several hundred 'old boys' to witness the end of 'their Regiment' and to enjoy an open day and reunion. Watched by the spectators seated in temporary stands in front of the gymnasium the Regiment marched onto the vast parade ground for the last time. The Director General Military Survey, Major General Chris Thompson himself a former Commanding Officer, inspected the Regiment and took the salute at its last march past. The Commanding Officer, Lieutenant Colonel John Read, marched off and a contingent from the School of Military Survey marched onto the square and joined the squadrons – symbolically forming the Group. The Regimental flag was lowered and the new Group flag raised and the General presented Long Service and Good Conduct medals to three SNCOs before making a speech to



The Regiment's flag is lowered for the last time.

mark the occasion. The newly formed Group, led by its Commander Colonel Roy Wood, then marched past the General and off the square starting the next chapter for the two Squadrons.

The parade was followed by lunch, tours of the squadron lines and a rugby match before finishing the event with afternoon tea. Thus, after 37 years, 42 Survey Engineer Regiment was no more.

Postscript: Leaving Barton Stacey

When the Regiment moved from Fayid to Zyyi and again from there to Barton Stacey it did so entirely with its own resources; field survey equipment was obviously easily transported but the air surveyors dismantled their multiplex machines and packed them, the helio workers, camera operators and printers with REME section help dismantled the cameras, presses and ancillary equipment, crated them up and then at the new location these tradesmen unpacked and reassembled their equipment themselves. However, by 1985 not only the times but the nature of the equipment had changed and whilst disbanding the Regiment and forming 42 Survey Engineer Group physically occurred during an hour long parade moving the two squadrons to Hermitage took considerably longer. It required many months in the planning, staff work and the letting of contracts to build the technical accommodation at Hermitage and to move and reinstall the equipment before anything could move.

RHQ's functions were now gradually taken over by Group Headquarters at Hermitage and the Quartermaster transferred stores to Hermitage or back loaded those not required and thus the Headquarters slowly wound down.

19 Squadron's move started almost immediately after disbandment with the packing of the field survey equipment and the Squadron Headquarters all of which was moved by the squadron's own transport. The Wild air survey equipment was dismantled, moved and reassembled in December under contract by Paul Sancto, the specialist who had serviced the Wild equipment for some years, whilst the air surveyors and REME moved the other machines. The WRMD was to have a purpose built map store at Hermitage but it was not yet finished and so all the stock was moved by combat surveyors awaiting their technician courses into temporary accommodation at 8 Map and Air Chart Depot at Guilford, now also part of 42 Group. In late December a US technician arrived to install updated equipment into the new TRANET station at Hermitage and so the Barton Stacey station remained operational until early January 1986 when the new station took over.



WO2 Pete Markley, SSM 13 Squadron, examines the charred remains of the squadron office – a sad end to a building known to so many.

One particular incident is of note during this period; 'livers out' entering the camp one crisp December morning were amazed to find that during the night 13 Squadron Headquarters building had burnt to the ground. It transpired that in an overburdened SQMS's office loaned kit being called back in as part of the unit kit check had been left on heaters which overheated and inevitably caught fire, a sad end to the building and an event that hastened the move of the Headquarters.

However, moving 13 Squadron was a more complicated project and a print SNCO was posted in and appointed as the Squadron Equipment and Movement Project Liaison Officer (SEMPLO) tasked with liaising between site contractors at Hermitage, the removal contractors and the Squadron management team. The major items for removal and reinstallation were: two double colour Heidelberg SORDZ print machines, two single colour Heidelberg SORD print machines - one of which was housed in the display semi-trailer - and two dark room cameras and of course a plethora of smaller items from dark room clocks to plan presses. Simultaneously there would also be the installation of a Roland 804B 4 colour print machine, at the time the world's largest sheet fed press, and a Como 220 electronic guillotine and the disposal of unwanted equipment such as the Roland Ultra presses. Unfortunately

the press removal contract was let on a lowest tender basis to an inexperienced firm and several components were damaged requiring remedial work at Hermitage.

As the Squadron was to embrace a new era of very large format printing much of the ancillary equipment such as platemaking frames, sinks, proofing frames, etc. were new procurements installed by manufacturers at Hermitage. The bulk of the movement took place through November and December with ever more personnel transferring to the new location so that by the time of the Christmas leave very few were left. Once the blackout materials were removed from the photographic

areas the sunlight flooded in for the first time in years and revealed just how shabby and makeshift the technical accommodation was.

During this period the Messes held ‘wakes’ to say farewell, had auctions of unwanted property and then closed down although some rooms remained available for ‘livers in’ from the MWF and duty personnel all of whom were fed to the soldiers’ dining room.

At the return to work in January 1986 only a handful of soldiers and one officer reported to Barton Stacey to be responsible for moving or disposing of the remaining stores. Contractors also moved in and started demolishing the wooden huts that had been home to field surveyors for two decades. As the month progressed fewer and fewer people were needed in the old camp until on Friday the 31st January only the O i/c Rear Party was there to hand over various keys to the MWF Quartermaster. He then drove out of the deserted camp for the last time – the end of an era.

WANTED - Articles for the Ranger

Good first-person articles from members always enhance the quality of the Ranger. Defence Survey takes people to remote places often in times of crisis or places officers at the heart of ‘front page’ operations.

The aim is to publish Ranger each year but to do this we need members to put pen to paper, or finger to keyboard now in order to produce the next edition. Articles need not be long and technical, short humorous or poignant stories are also needed. Hand-written or typed copy is very acceptable and all illustrative materials will be returned immediately after scanning,

Guidance to Authors

The Editor - Noel Grimmett, at editor@defencesurveyors.org.uk

Subject – Subject matter should normally be very broadly interpreted as Geospatial Intelligence but articles covering general MOD/Defence matters will also be considered. The aim is for each edition of Ranger to cover a range up to date technology, academic, historical, ‘old boy’ reminiscences, memoirs/obituaries and reports on current DSA activities including prize awards and seminars.

Style – Dependant on subject matter style can vary from fully referenced academic works to informal anecdotal style. Where possible, abbreviations, jargon and acronyms should be avoided or explained. Articles should generally be well illustrated, at least one illustration/image per page.

Tech Equipment – To encourage input from the commercial world authors, as appropriate, are asked to make mention of technical equipment used.

Length – Articles may be of any length however the Editor may consider splitting long articles over several editions.

Obituaries – Dependant on the individual, normally half or full page including photograph.

Copy submitted should consist of:

- Word Document
- Separate Images – not embedded in document and if possible at 300dpi. JPEG
- Proposed article layout
- Short introductory paragraph
- Author – Short pen picture including head and shoulders image, email address and postal address .
- (the latter to enable a hard copy of Ranger to be sent to the author.

Spatial Data Provision to Defence Equipment Projects

Spatial Data Infrastructure (SDI) Gatekeeping



By Charles Sladden

What does this gate have to do with geospatial data I hear you asking? More importantly what's the point of a gate in the middle of a barren moor which has no fence? Every working day for the last 4 years, I have been stood at that metaphorical gate encountering my fair share of frustration in an effort to do the right thing on behalf of the Specialist Geospatial Centres (SGC)¹ and Defence as a whole. However, it is an interesting role and has brought me into contact with every manner of defence project from Nuclear Submarines and Queen Elizabeth Class Carriers with embarked F-35B Jets to AJAX Recce Vehicles and Desert Hawk UAVs. The common theme is that

none of these systems could operate without the vast array of data that the SGCs provide. Indeed it is estimated that 80% of defence projects have a navigation, targeting, C2, SA or planning function necessitating location data. Ensuring that they are supplied with the right data, in the right format and at the right stage in their development would probably seem straightforward to most geospatial aficionados but in the unstable and sclerotic acquisition world with all the prevailing budgetary, operational and programmatic pressures (ultimately all political), I have actually found it to be anything but trivial. This article exposes those difficulties and explores how my organisation, Defence Equipment & Support is seeking to enforce Joint Force Command's Joint Geospatial Policy by erecting a proper fence and making that gate genuinely transitable. (The gate image was sent to me by Col Graham Livesey who owns all the geospatial policy at JFC when I complained to him about my difficulties enforcing his policy!)

So what then is SDI all about and more importantly how is Defence treating it. Kuhn defines it as "a coordinated series of agreements on technology, standards, institutional arrangements, and policies that enable the discovery and use of geospatial information by users"². (See Fig1) The concept is therefore clearly not unique to defence (we only began to adopt it in 2010) and the criticality of standards to the concept will be familiar to many geospatial actors who have enjoyed the delights of DGIWIG, OGC business, and assorted NATO Geo Conferences and WGs down the years.

I accept that discussion of geospatial standards can have a hypnotic effect, especially on those with a strong delivery focus. The temptation is to switch off and take the view that it's all too esoteric and ultimately irrelevant to the real world in which defence and by default the equipment suppliers must operate. However, I would argue that a great deal of thinking has been done to make the SDI concept not only relevant but actually meaningful to the equipment acquisition world. I would even go so far as to contend that the vision and mission statements, shown below, articulate very clearly how SDI underpins Defence business.

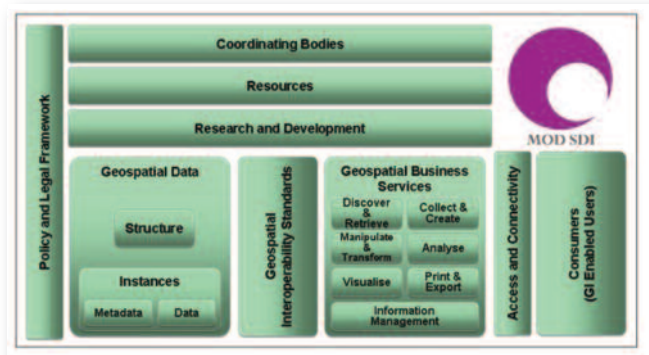


Fig 1 – MoD SDI.

¹ There are 7 SGCs, but the principal data suppliers are the UK Hydrographic Office for maritime charting, the UK Met Office for meteorological data, the Defence Geographic Centre (DGC) for topographic mapping and No.1 Aeronautical Information Documentation Unit (AIDU) for aeronautical products.

² Kuhn, W. (2005) presentation "Introduction to Spatial Data Infrastructures". Presentation held on March 14, 2005.

SDI Vision

Defence will achieve improved decision support through access to timely, fit for purpose and integrated geospatial information and intelligence in fixed and deployed environments.

SDI Mission Statement

Defence will treat geospatial data as an enterprise resource, contributing to improved decision support and enhancing the delivery of military effect. Defence users and systems will be able to store, discover, view, exploit and share geospatial data in order to deliver a common and consistent approach across all operational environments and functions.

As SDI Gatekeeper, my remit is to seek out all those projects which will ultimately become reliant upon spatial data and ensure that they have not only considered those dependencies, but have actively planned what data will be required and how it will be managed. The danger is to assume that all data is readily available off the shelf, with the temptation to take the easy route by allowing industry to take care of it with minimal project intervention. That is the surest route to operational failure in the scenario where the equipment passes all the ITEAP hurdles and is accepted into service, only to discover that it can navigate or acquire its target on Salisbury Plain, Portsmouth Sound or over Anglesey perfectly but there is no data for Helmand, the Persian Gulf or Syria. The risk of the data being unavailable is compounded by it not being properly assured with the associated safety and reputational risks this potentially entails. Based on my topographic foundation, getting to grips with the technical nuances and challenges of hydrographic, aeronautical and meteorological data has been illuminating. Whilst they all have similar properties and can be managed under broadly the same standards regime, the supported systems are often very different.

I do not have a big team at DE&S to share the load. Indeed, I'm basically a one-man band working for the Head of Engineering Services within the Safety, Environment, Quality & Technology Directorate alongside the batteries, software and simulation specialists who perform similar roles to mine. That may seem an eclectic mix but the sharp-eyed will note that these are areas, where consistency and adherence to open standards across the full spectrum of Defence capability ought to pay similar dividends to the geospatial arena, which is also referred to in this context as the spatial data domain. Our guidelines are therefore enshrined in the following System of System Approach core principles:

SOSA Principles

Unifying the Defence Enterprise

Driving business and operational **effectiveness**

Minimising diversity

Designing for **reuse**

Building with **proven** solutions

Ensuring **commonality** of services across the Defence Enterprise

Designing for flexible **interoperability**

Adopting **open standards**

Information as an **asset**

You really don't need to be a systems engineer to recognise how these principles chime with everything that SDI seeks to achieve, not least the open standards, interoperability and designing for reuse aspects. From the Information as an asset principle we derive the SDI treating our data as an enterprise resource.

As every good military surveyor, and indeed anyone who has been involved in the supply of spatial data to the Defence portfolio, the bible is JSP 465 Defence Geospatial Information Policy. For those unfamiliar with how geospatial governance has evolved in Defence, the policy is now owned by Joint Geospatial Intelligence branch who sit in the C4ISR³ HQ of Joint Force Command (Evolved from the DI-ICSP⁴ staff in Main Building). Col Graham Livesey and his team write the rules and I

³ Command, Control, Communications, Computers, Intelligence, Surveillance & Reconnaissance.

⁴ Defence Intelligence – Intelligence Collection Strategy & Plans.

get the dubious privilege of enforcing them with all the project teams in DE&S. The devil is in the detail and the policy is backed up by Def Stan 00-102 which lists all the supported formats designed to satisfy maritime, land, air and meteorological requirements. Neither of these publications are ever likely to make Xmas Bestseller status but they have been significantly revised and streamlined in recent years with the defence enduser as the target audience, rather than the somewhat impenetrable deep technical versions of the past with apologies to any proud erstwhile author. How many people read JSP 465? Answer: One less than the number of authors (although that may be stretching it since it was collaboratively produced!) The diagram that probably best captures the current process by which a project selects its geospatial data is shown below:

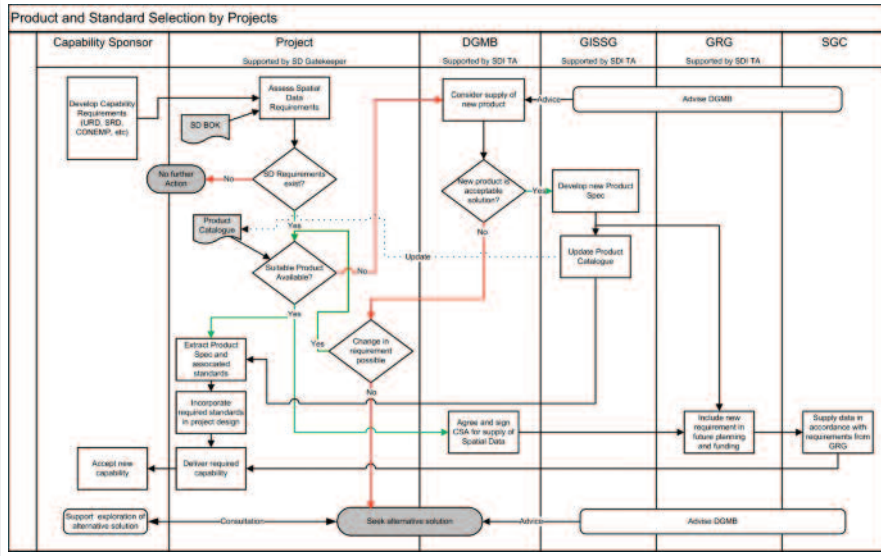


Fig 2 – Selection of Foundation GEOINT Products and Standards by Projects⁵

So in reality SDI Gatekeeping necessitates tracking projects and monitoring what data they are planning to consume when key trials and demonstrations are planned. If a proper line of communication has been established by this stage, then the hard work will pay dividends. That tracking is done by a key component of the SDI Technical Authority, the EPSG (Equipment Project Support Group), chaired by James Prain in Dstl and supported by representatives from the SGCs. The detailed work is done outside of those meetings but the EPSG presents an invaluable forum in which that cross-cutting SGC effort can be co-ordinated. By way of illustration we have thrashed out the plans for provision of appropriate land vector data for the next generation Type 26 Frigate Combat Management System, tackled the 3D data support for mission rehearsal of an urgently procured ground missile system and arranged several crucial multiple stakeholder Technical Exchange Meetings with DGC, Met Office and AIDU to ensure that new air platforms are properly supported. It's under the auspices of the EPSG, that I often initiate a dialogue between a specific branch of the SGC and a PT member. A good example was opening a channel between the GAIT⁶ team producing DVOF⁷ and the Cockpit Situational Awareness Tool PM in the Apache Delivery Team. This role James likes to characterise as my dating agency function, drawing on his proficiency with such platforms.

So what is going wrong and how do we fix it?

In an ideal world, I would have perfect visibility of every project from cradle to grave and be available to assist them with their geospatial data management at every step. Sadly in DE&S we do not live in an ideal world (despite most project manager's unshakable belief in their capacity to create one) and I regularly find myself reacting to late notice requests for data rather than providing advice and guidance as to how to design the system to ensure that it is supportable. Much of this project non-compliance has occurred through genuine oversight and decisions to procure COTS/MOTS⁸ equipment that has been designed to utilise proprietary format or commercially sourced data that might be technically supportable but will incur significant resource burden once it comes into service.

⁵ JSP 465 Pt 1 (V2.0 Nov 17)

⁶ DGC's Geospatial Air Information Team – See Mark Darlow's "High Wire Act at the DGC" Ranger Vol 5 Number 1

⁷ Digital Vertical Obstruction File

⁸ Prime examples being US procured platforms like F-35B Lightning, Apache and P8A with their dependence on NGA CADRG in lieu of NATO ASRP.

After being highly reactive and constantly applying firefighting methods, it was acknowledged at 2* level that we needed to tackle the problem front on and not just resign ourselves to the status quo.

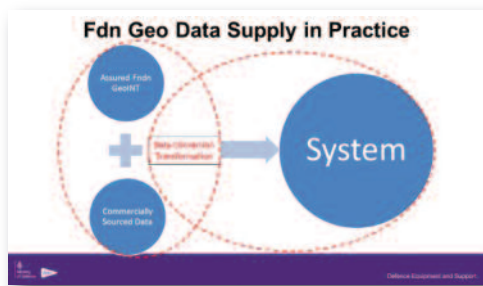
Sponsored by my close ally on the GeoINT Policy desk in JFC, Cdr Iain Ritchie, I have therefore embarked on a detailed investigation into what data systems are using and where they are sourcing it. It seeks to identify the following:

- The spatial data formats consumed by existing equipment in the Frontline Commands (FLCs)
- Where (and how) spatial data is being converted on behalf of the FLCs and for what purpose
- The spatial data formats expected to be consumed by the equipment coming into service.

In order to baseline the scale of spatial data policy non-compliance and how to fix it.

This baseline has to be the startline for solving our geospatial format conundrum and without establishing it, the Recognised Environmental Picture towards which all Foundation GeoINT providers and consumers should be striving will remain an elusive aspiration rather than a realistic goal. From an assurance perspective that remains “the carrot” approach to incentivise users to comply with the regulations, avoiding deployment of “the stick”. The stick still amounts to a “dummy minefield” for those who seek to bypass the gate.

The emerging picture is that assured Foundation Geospatial data is being ingested into systems in conjunction with other commercially sourced data but often necessitating convoluted conversion practices that add delay, cost and safety risks due to processing errors.



From a safety perspective, it is essential to understand whether that conversion is undertaken inside the system boundary and if so who is ultimately responsible for the associated safety case. So the focus is now very much about rooting out this conversion activity and establish how to eliminate it, or at least minimise it. Although somewhat pre-emptive, we have also deployed an Engineering Tool in DE&S (GEAR) which alongside many other specialist

engineering areas provides a handrail for projects and gives them an idea of what spatial data maturity (Table 1) should look like at the various review points in the project’s lifecycle:

Table 1 - GEAR Spatial Data Management Plan (SDMP) Project Review Points

So to conclude it has been an interesting journey thus far. This is a challenging problem, never going to be solved overnight. There are significant Cat A projects that will continue to have to be serviced

Project Initiation Review	The SDMP must identify whether project has SD Component (Y/N) and any dependencies and system integration challenges.
User Requirements Review	The SDMP must identify SGC or appropriate international supplier and incorporate into SH list Eg Broad order data type (Topographic, Hydrographic, Aeronautical, Atmospheric or Oceanographic).
System Function Review	The SDMP must articulate Spatial Data Requirements, identify Project SD Lead /POC and engage SDI Gatekeeper.
System Requirements Review	The SDMP must confirm SD Products from DEF STAN 00-102 (Formats, Coverage & Availability, Classification & Delivery Mechanism) considering anticipated service life versus format forecasted sunseting.
Tender Assessment Review	The SDMP must invoke the relevant SGC CSA/SDA consistent with policy and guidance in JSP 465.
Technical Quality Audit	The SDMP must guarantee the supply of Sample Data with associated Releasability, QA and Safety Caveats.
Manufacture Acceptance Audit	The SDMP must support the selection of optimal solution and a Data supply feasibility/ plan agreed.
Manufacture Quality Audit	The SDMP must ensure project creating or publishing safety critical data derived from SGC or supplied to MoD uses endorsed and fully assured SD.
Manufacture Readiness Review	The SDMP must list its spatial data requirements in Defence Applications Register and comply with JSP 604.

User Acceptance Review	The SDMP must ensure Spatial Data supplied is consistent with agreed specifications.
System Installation Review	The SDMP must ensure correct, usable and agreed SD supplied to meet defined requirement. Installed and operational in selected system.
System Installation Review	The SDMP must ensure that any data transformation or conversion process is covered by an appropriate safety case inside the system boundary.
In-Service Support Audit	The SDMP must ensure Spatial Data remains fit for purpose and continues to be supplied and where necessary refreshed throughout lifecycle.

using existing legacy formats and standards. It will be a Herculean effort to change tack in MoD and for too many players, both military and to civilian, long lead time challenges and cultural shifts are unattractive because they are unachievable “on my watch”. However, just because Defence has got this wrong in the past, does not justify continuing to kick the can down the road and resignedly assigning it to the “all too difficult” box. In line with the Serenity Prayer, I find myself regularly identifying the formats that I cannot change, having to wade in where necessary, but ultimately my most precious skillset comes down to knowing which battles to fight⁹. So there is still a long way to go before we get this right, but Col Livesey can take heart that the message is not only sinking in (Gate1) but key project staff are even recognising that the gate might even be there for their own benefit (Gate 2)!



Gate 1.



Gate 2.

⁹ God, grant me the serenity to accept the things I cannot change, Courage to change the things I can, and wisdom to know the difference. (Reinhold Niebuhr 1892-1971).

Note to Members

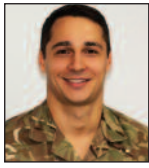
It has come to our attention that there is a problem obtaining copies of - The First World War Battlefield Guide Volume 1 – The Western Front, as mentioned in Barbara Taylor’s article in the 2017 Edition of Ranger.

Copies are not available through the main booksellers, but Barbara has advised us that they may be obtained through the Centre for Historical Analysis and Conflict Research (CHACR) at the following website –

<https://chacr.org.uk/publications-list.php?cat=other>

8X Defence Engagement visit. New Delhi, India.

By LCpl David Taylor



A little more than a week before Christmas leave on a Friday afternoon, I was warned off about a potential Defence Engagement Visit to New Delhi, India. Something that intrigued me as I had never been to India and it all sounded a little too good to be true. However, once leave was over and back in work. The plan, visas and invitation to the British High Commission (BHC) was soon in full swing and confirmed.

After the rather uncomfortable 8 hour flight from London Heathrow, myself and WO2 Chattaway (Int Corps) touched down to what appeared a very hazy, smog covered New Delhi. Something that I didn't expect to be as bad as what it was. We soon had a transfer to the hotel through some of the busiest, wildest traffic I've ever seen and after a quick turnaround visited the BHC to get introduced to the team and further direction of the tasking.

The requirement for us to assist the BHC was to carry out network analysis and personality engagement packs for the Indian High Commission, contractors, stakeholders and key decision makers to help improve and build new relations between the two countries in order for defence contracts and procurement deals to be made. Something that would benefit the UK defence sector hugely establishing defence contracts and trade to a country that has an army of more than a million troops. This along with Geo briefing products help communicate the information identified and generate further interest in contractors and individuals.

The working routine consisted of 9-5 days at the BHC conducting research though the internet as well as meetings and briefings from various personnel to narrow down the analysis we were carrying out and locate areas where the BHC should focus their attention on for the future.



We were fortunate enough to have the middle weekend off while we were on task. An opportunity we exploited greatly with a visit to the Taj Mahal in Agra as well as having a day out exploring the surrounding area of New Delhi on Royal Enfield motorbikes. Something as a motorcycle enthusiast I thought I'd never have the chance to do. This weekend along with the evenings free to explore New Delhi's sights was a great way to explore the city, culture and fantastic food on offer for a fraction of the price to what a takeaway would cost in the UK.

The analysis and products we produced over the two week visit for the BHC was greatly received and appreciated. I firmly believe we have laid the framework to help assist the BHC's relations in India and a tasking like this should not be a one off but maybe a 6 monthly and annual visit to maintain the currency and accuracy of the analysis products created.



- LCpl David Taylor,26.
- Posted to PJHQ on promotion Mar 18.
- Previous assignments include 8 Engr X HQ, 3 CDO X HQ, 42 Engr Reg.
- Joined Jan 2011.
- Geographic Technician, Royal Engineers.
- Keen motorcyclist, skier, rugby player.

New Tools for Military Historians: How GIS can Help Understand Canada's North-West Campaign

By Trevor Ford - Laurier Centre for Military Strategic and Disarmament Studies (LCMSDS), Wilfred Laurier University.

The use of geographical information systems (GIS) has exploded both in the private and public sectors. Not surprisingly, librarians and archivists have staked out a large role with GIS in the public sector through their efforts to preserve and maintain Geospacial data collections. Their efforts have had cross-disciplinary ramifications which include the use of Geospacial data collections in military history. In the Canadian context, military histories have in the past heavily relied on traditional sources such as interviews, diaries and official transcripts of events without any real thought given to geographical information beyond the odd topographical map. This oversight is not due to lack of historical geographical data, but more so because of its perceived lack of importance.¹ This paper intends to highlight how GIS can significantly add to the study of military history and the potential value of GIS projects to the discipline.

For many post-Second World War Canadian historians, Canada's North-West front has tended to highlight the failure of an ill equipped and poorly led Canadian army against a battle-hardened and ferocious German military. In the years immediately after the war, Canadian historians were critical of the army's performance. Even Canada's official war historian, Colonel C. P. Stacey, confirmed the Canadian's failure against the German army stating that the initial invasion of Normandy in France was a classic example of their performance, writing that "man for man and unit for unit, it cannot be said that we won the Battle of Normandy."²

In fact, Stacey believed that it was simply a matter of overwhelming numbers that led the Allies (Americans, British and Canadians) to victory over the *Wehrmacht* in Normandy – a common theme persistent until the end of the war.³

Stacey's first impression of Canadians' battlefield abilities in his 1960 official history *The Victory Campaign* has persevered among others. Historians have tended to focus, as Stacey had, on the recollections of both senior, and to a lesser extent, junior officers in the Canadian army and their British counterparts. Thus, history has not been kind to the Canadian soldiers who fought in Europe during the Second World War.

This began to change in the early 1990s.⁴ Historians began to reassess individual narratives of soldiers and take account of terrain and geography. Historian Terry Copp was perhaps the most inclined to take the latter into account in his seminal book *Field of Fire: The Canadian's in Normandy*. His biggest contribution was taking into account what a small gradient in slope could have in a battle in his aptly titled book: *Fields of Fire* – which highlights how inclines can affect fire ratios of artillery and small arms, potentially giving an entrenched defender a massive tactical advantage. Copp stated that "it would be difficult to write about this or any other military campaign without a detailed knowledge of the ground."⁵

¹When the Official History of the Canadian Army in the Second World War was released in 1960 the main focus for sources used were war diaries, operational reports and personal officer notes. Thus "top-down" type history that many other later histories would also come to use was not uncommon for its time but it overlooks a variety of sources such as geographic data. An excellent indicator of this is the use of actual topographical maps in the official histories themselves. For the *Official history of the Canadian Army in the Second World War, Vol II The Canadians in Italy, 1943-1945* only 25 topographical maps are used in a book of over 700 pages in length. In the *Official History of the Canadian Army in the Second World War, Vol III The Victory Campaign: The Operations in Northwest Europe 1944-45*, which is again over 700 pages, only 14 maps are used. Of the maps that are examined, they are more focused on formation movement that terrain analysis. The lack of overall use of geographical data in Canada's official histories is indicative of the perceived role of perspective geographic tools were to early military historians.

²Colonel C.P. Stacey, *Official History of the Canadian Army in the Second World War, Volume III, The Victory Campaign: The Operations in North-West Europe, 1944-1945* (Ottawa: Queen's Printer, 1960), p. 274.

³*Wehrmacht* is the German word for the united armed forces of Nazi Germany – this included both regular army units and the Waffen SS both of which faced off against the Canadians in Normandy and beyond. Stacey's belief in the "overwhelming the enemy theory" comes across repeatedly in his works and other scholars have taken note. See Terry Copp's, *Cinderella Army: The Canadians in Northwest Europe, 1944-1945* (Toronto: University of Toronto Press, 2007), p.83 for a detailed account of Stacey's beliefs.

⁴John A. English published a monograph on the Normandy campaign that questions Stacey's argument. He is arguably one of the first to take a different tone on the abilities of the Canadian soldiers fighting in Europe, however, his work solely focused on the soldier's point of view with very little terrain analysis or other geographic exploration. See John A. English's *The Canadian Army and the Normandy Campaign* (Westport: Greenwood Publishing Group, 1991). For a complete historiography on those who have written on Canada in the Second World War see Tim Cook, *Clio's Warriors: Canadian historians and the Writing of the World Wars* (Vancouver: University of British Columbia Press, 2006).

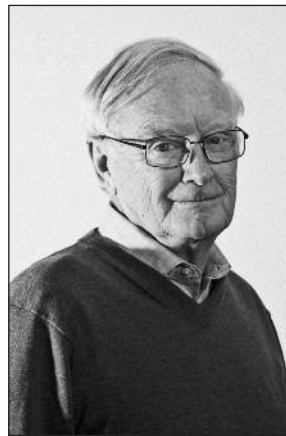
It is from Terry Copp's appreciation of terrain and geographical features, including craters that historians, particularly military historians, can build on their understanding of the past by integrating GIS into basic historical work. As stated above, historians tend to focus on more traditional sources such as paper and oral testimony. Military historians have been particularly these sources when explaining military campaigns.⁶ Although extreme geographic changes (and in Copp's case terrain analysis) are acknowledged, GIS has yet to be implemented as a scholarly source. Although using basic sources are proven to be beneficial and is a step in the right direction, military historians should move on from geo-referenced maps and terrain analysis. By its very nature, GIS collects a variety of intangible data such as air photos and defence overprints that, by themselves, do not offer much, but combined, they can expand our understandings immensely. This complex data goes far beyond any simple geographic exploration because the collected intangibles are invaluable to military historians looking to examine an engagement where a shell, mortar crater, or shifted trench line could prove decisive in understanding the outcome. This can only be done with the accuracy of GIS.

As of 2015, the Laurier Centre for Military Strategic and Disarmament Studies (LCMSDS) at Wilfrid Laurier University began a partnership with the University of Waterloo's geospatial centre in hopes of creating a geographic information system that explores the First Canadian Army's advance through North-West Europe during the Second World War. The project members include Eva Dodsworth, Dr. Geoffrey Hayes, and Trevor Ford. Dodsworth, who heads the Geospatial Centre at the University of Waterloo, has been instrumental in starting the project and supplied the services of her centre to this project. Dr. Hayes, also at the University of Waterloo, has been the visionary for what uses can be gleaned out of the project while Trevor Ford, a PhD Candidate and Archival Manager at LCMSDS, has provided the archival materials (maps and air photos).

From the beginning, the goals of the project were simple. Using source maps and photos from LCMSDS' collection and along with the Geospatial Centre's expertise of Google Earth and georeferencing, a GIS platform is being built to catalogue Canadian battles. In using GIS for each military engagement and reassessing traditional historical records, a spatial data infrastructure is being created. It is the team's hope that this data arrangement will be made available to both academics and the public alike; therefore, creating a system with few restrictive boundaries, while also providing a layered map system that can be manipulated by individuals to better understand the campaign.



C. P. Stacey
Source: LCMSDS Photo Archive –
LMH-P05142



Terry Copp
Source: Library & Archives
Canada – PA-501025

What makes this GIS project original are the sources used to create the layered map. Over the course of the past thirty years, LCMSDS has been collecting thousands of maps, which include hundreds of defence overprints.⁷ These overprints are 1:25,000 scale topographical maps that have had known enemy positions printed onto the map itself.⁸

⁵Terry Copp, *Fields of Fire: The Canadian in Normandy* (Toronto: University of Toronto Press, 2003), p. XIV.

⁶Military historians usually prefer to stay on the operational or strategic level of analysis. This history typically sticks to what the commanders and the overall higher chain of command decided and carried out. Unfortunately, historians of his trade have been accused by social historians of overlooking more important content from the tactical level where the lower rank soldiers were, this includes tactical level maps and geography. See John Keegan's *The Face of Battle: A Study of Agincourt, Waterloo and the Somme* (New York: Viking Books., 1976). Keegan was arguably one of the first military historians to argue for the need to move beyond great men and examine other sources. of interest.

⁷Currently LCMSDS has over 3,000 maps of which approximately 213 are defence overprints.

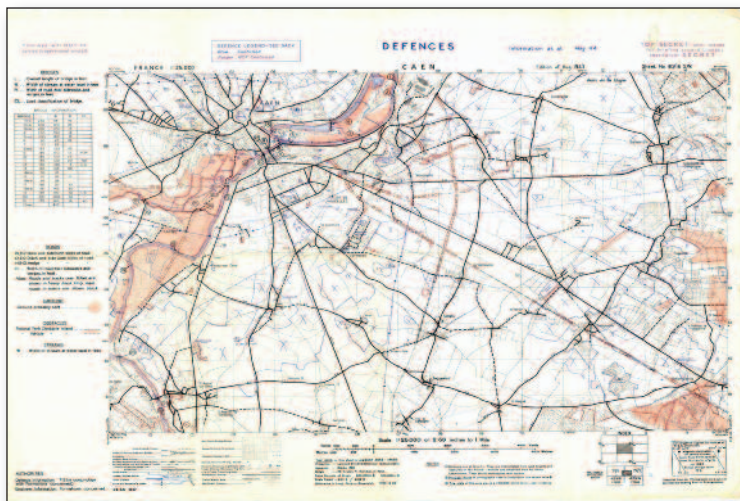
⁸There are some scaled to 1:50,000 but they focus solely on the Italian Front.

These positions came from aerial observation flights conducted from 1944-1945 by the Royal Canadian Air Force and other allied air forces.⁹ These overprints were vital for the soldiers on the ground during the war, as they typically planned their operations around these maps.¹⁰

The idea of defence overprints was not new in Second World War. During the First World War, observation balloons marked enemy trenches and artillery positions on a map. These maps, which military historians now call trench maps, were used in both small operational plans and large strategic aims. As the war continued, the air war brought forth fighter pilots on both sides in an attempt to control the skies so the observers could mark out targets.¹¹ Because entire operations were decided

on the accuracy of the trench maps, military commanders came to view air observation as key to any successful campaign. This lesson was taken in by many during the Second World War. The Allies used a more refined version of the trench map – the Defence Overprint.⁹ Edgar F. Raines Jr., *Eyes of Artillery: The Origins of Modern U.S. Army Aviation in World War II* (Washington D.C.: Centre of Military History United States Army, 2000), p. 11.

Defence Overprint: Caen Defences, 1944;
Source: LCMSDS Map Archive – LMH-M00343



Section of 'Defence Overprint: Caen Defences, 1944' that details gun positions, machine-gun nests, and artillery pits;
Source: LCMSDS Map Archive – LMH-M00343

After the war, most of the maps were sent back to Ottawa and given to the Historical Section under Colonel Stacey. Eventually, after years of gathering dust, they were discarded and LCMSDS accepted them into their collection in the early 1990s. Since then, they have proved invaluable in assessing the obstacles that advancing units faced albeit enemy

positions or geographical hurdles. What further makes these overprints practical for historians is that they match up exactly with air photos taken during the war.

LCMSDS has the largest collection of Second World War air photos in Canada. These photos, as with the defence overprints, follow the First Canadian Army from 1944-1945. Reconnaissance flights would fly steadily at a certain height snapping photos of the Earth at small time intervals. The idea was that entrenched enemy units and geological deformities such as flooding of the land, something the Germans did regularly to impede the Canadian's advance, would be noted and relayed to the ground forces. The photos taken were handled by the Air Photo Interpretation Section of the First Canadian Army in order to plot out advance routes and enemy positions for the mapping section. After the war, the photographs were sent to the air photo interpretation school at Rivers, Manitoba. When the Canadian Forces closed the base in 1971, the collection was sent to the Canadian War Museum in Ottawa. Unable to find adequate storage for the photos (as they number over 130,000),

⁹Edgar F. Raines Jr., *Eyes of Artillery: The Origins of Modern U.S. Army Aviation in World War II* (Washington D.C.: Centre of Military History United States Army, 2000), p. 11.

¹⁰Interestingly enough these Defence Overprints have been largely overlooked by military historians because they focus too heavily on the tactical level – which as stated above tend to be of little interest to those who prefer to stay on the operational or strategic level.

¹¹Lee Kennett, *The First Air War: 1914-1918*, (New York: Free Press, 1999), p. 42.



the War Museum allowed LCMSDS to acquire them.¹² All 130,000 have since been digitized and catalogued by flight number, location and date.¹³

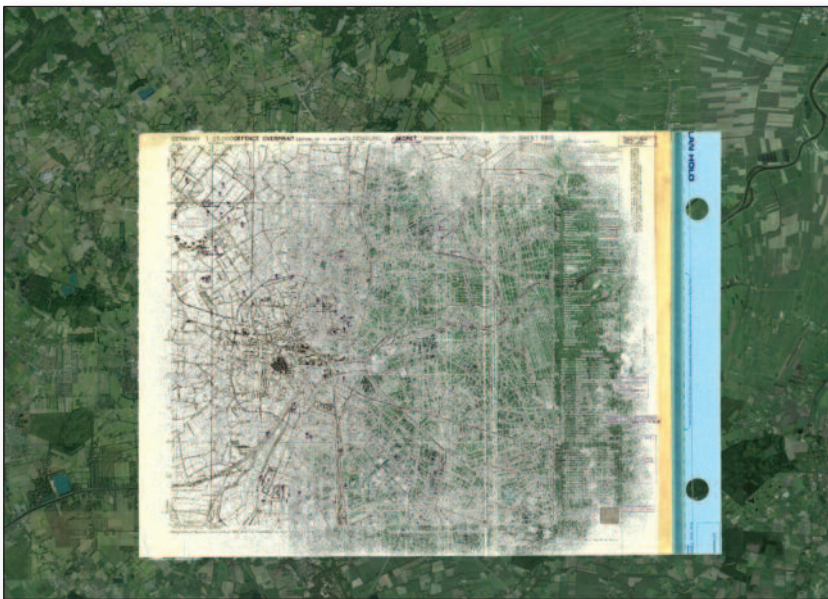
*Sample Air Photo 3079, Sept 11, 1944 – Netherlands.
Source: LCMSDS Air Photo Archive – LMH-A111-3079*

With these two excellent sources, LCMSDS and the Geospatial Centre at University of Waterloo have been constructing an online geospatial map visualization tool. After considering a number of online GIS products, it was quickly realized that ease of access to the platform was of the utmost importance. Two of the most popular online mapping tools include Google Maps and Google Earth - both of which offer free online access to the programs and support organizing and hosting the map images and metadata. Google Maps will act as a repository for the metadata, while highlighting troop paths, and offering KML map files for download. The KML files can then be viewed in Google Earth. Once the project is complete, it will be listed within the Google Maps Gallery section.

In order to enable viewing of the maps in Google Earth, each defence overprint map and corresponding aerial photograph was scanned and georeferenced. ArcGIS was used to georeference each image and Google Earth was used to create the image KML outputs. Shapefiles were created to indicate map coverage, which were then also converted into KML format and uploaded into Google Maps. Each coverage polygon has a map associated with it, and once users click on the polygon, a link to download the map in KML format becomes available.

Each image includes a description, and with the troop paths drawn out, a working platform was created to allow for manipulation by the user to garner a greater understanding of the Canadian war effort in North West Europe by allowing historians the ability to reassess with a new tool. In many ways, historical reassessments are critical to our understanding of the past. More importantly, this

project should be seen as a first attempt to use GIS with military history as future project from other campaigns and wars could greatly benefit from the application of GIS.



*Sample Defence Overprint
georeferenced and layered onto Google
Earth.
Source: University of Waterloo
Geospatial Centre; Google Earth.*

Although this project is in its early stages, Google mapping products are being used to demonstrate the potential of these visualization tools. The

most time consuming component of this project was the georeferencing of the maps; which took just over three months to do. Developing the final map project lasted only several weeks. Moving forward, however, the team would like to incorporate these maps into a more sophisticated GIS program where searching for maps and viewing the maps can be done together. Creating a mapping interface, similar to the Scholars GeoPortal would be ideal and is something the Geospatial Centre is currently considering. Furthermore, this project has the potential to expand itself from simply the Canadian North-West Campaign. For Canadian military history an examination on other conflicts

¹²Terry Copp was then Director of LCMSDS at the time and gladly took them on for preservation. This was an added bonus too as they significantly furthered his research with Fields of Fire.

¹³Beginning in 2011 LCMSDS with the support of a number of private donors began a systematic process of cataloging and digitizing the photographs. A team of dedicated student employees and volunteers at LCMSDS have not only scanned all of the photos but also created a preliminary inventory and a basic finding aid. This preservation phase of the project was completed in August of 2013 with minor work continuing to present.

based on the GIS system we are proposing could expand pre-existing historiography. Good examples of this could include the First World War, the Second World's Italian Campaign and even Canada's involvement in Afghanistan.

Another avenue this project has potentiality with is with modern-day bomb disposal. Over the past two years, LCMSDS has had relations with bomb disposal groups in the Netherlands and Germany, which use both its archival maps and air photos to help identify possible unexploded ordinance. Unfortunately, only individual air photos and defence overprints are used. A manipulated GIS platform would only help further this effort, as the database would focus on certain tell-tale signs of live explosives from both air photos and maps along the Canadian campaign route. If this project was made available to the bomb hunters, having both air photos and overprints layered in a Geographic Information System, the end result would be invaluable. Other HGIS research could also be carried out using this project's approach. Both University of Toronto Mississauga and McGill University Libraries have extensive air photo collections.¹⁴ These air photos, which cover most of Ontario and Quebec, could be combined with like area topographical maps to create a GIS system similar to the project highlighted in this paper.

Ultimately, it is the hope of this project's team that the creation of a comprehensive geographic information system, matched by easy access and manipulation, will allow the public and scholars to better understand Canadian's actions in the Second World War. Battles throughout Canada's North-West Europe Campaign should be re-assessed to highlight changes in terrain and elevations. This is not to say that previous scholarship of the Canadian campaign done with GIS is faulty. Instead, a database like this should be seen simply as an additional tool, albeit a vital one, in the historian's arsenal to better understand an already misunderstood campaign.

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Trevor Ford is a third year PhD Candidate at Wilfrid Laurier University. Having started his doctorate at Memorial University of Newfoundland in 2013, under the supervision of Dr. Mark Humphries, Trevor was offered the chance to come to WLU with Mark in order to continue his studies and join the Laurier Centre for Military Strategic Disarmament Studies in 2014 as Archival Manager. Since his arrival, Trevor has completely reorganized and catalogued LCMSDS' holdings, including a year-long scanning project that digitized all of the Centre's maps. He has just finished setting up LCMSDS' new website waterlootwar.ca, which chronicles the Waterloo County based 118th Battalion during the First World War. Trevor is currently working on several different projects, including one that is a joint venture with the University of Waterloo's Geospatial Centre, where LCMSDS' maps are being geo-referenced and added to Google Maps.

With help from the Social Sciences and Humanities Research Council of Canada (SSHRC) Joseph-Bombardier Research Scholarship and under the supervision of Dr. Humphries, Trevor's doctoral research covers the role of the Canadian military's intelligence units and their domestic activities during the First World War. Trevor specifically examines the Military Intelligence Branch and their conduct against real and perceived enemies during and immediately after the war. This subject is not only unexplored but is also highly relevant to today's national security apparatus and the wider concept of state security in Canada. Trevor has published three articles on this subject and is currently working on a book of collected letters.

¹⁴Dodsworth, Eva H. and Andrew Nicholson, *Using Google Earth in Libraries: A Practical Guide for Librarians* (New York: Rowman & Littlefield Inc., 2015), p. 26.

Operation Ruman

By Sergeant Fitzmaurice - 14 Geographic Squadron, 42 Regiment

I was “stood-up” on Friday 8th September 2017 to support 14 Geo Sqn’s deployable elements supporting Op RUMAN. This was in response to Hurricane Irma that decimated British territories in the Caribbean. This was a Humanitarian Assistance and Disaster Relief (HADR) Op. My role was to collect as much Open Source data as possible to supplement the Foundation data we received from the Defence Geographic Centre (DGC). The foundation data arrived at 2230hrs that night, with Geographic Support Team (GST) adding additional OS data, such as Open Street Map (OSM).

On Saturday morning, myself and a volunteer sifted through the data and added data to it from other sources. We collected data from ArcGIS Online (AGOL), NSG: Open Mapping Enclave (NOME), United States Geological Survey (USGS) and several other sources. This group of data was copied and given to the two-man team that deployed with the Lead Commando Group (LCG) to the Caribbean.

Sunday was used to do some data management of all the collected data, enabling ease of search, modification and archiving.

With a bit of research, I discovered that Digital Globe had released a plethora of Pre and Post Imagery of all the islands of interest. So, Monday started with the team grew from just two of us, to 3 x OS researchers, 3 x Geospatial analysts (GA’s), the OS team was tasked with downloading the Imagery data and collecting information on the key infrastructure in the British Territories, while the GA’s were tasked with plotting the points of the key infrastructure. A brief was given to senior commanders on what the team had done so far and Imagery Analysis (IA’s) were attached to the team to assist with Damage Assessments.

For the rest of the week RFI’s and tasking picked up, the teams were bolstered again. The focus now was on damage assessments of all the key infrastructure, such as hospitals, airports, ports, water supply, electric and bridges. The GA’s worked alongside the IA’s to produce combined intelligence products. The teams went onto 12hr days, to keep up with the demand for information. By this time Hurricane Maria was on its way and just about to hit the British Virgin Islands. All attention then turned to this as a priority, the teams were split down, half on BVI, the other half on additional support to Hurricane Irma.

The ability to support our deployable assets hit a snag as we had limited connection with them in theatre. To allow us to distribute the vector data we had created, the decision was made to produce an open access AGOL site to allow anyone access to our OS created data, along with the damage assessments of bridges, airports and ports. This was the first time the Military had publish anything to the general public to support this type of Operation.

The AGOL site took several days to complete, as it was a learning process for everyone involved. The site consisted of a welcome scrolling splash page, a contents library of all the vector data we had created and a product gallery of all the damage assessment products we made also. This ability has led to the interest in mobile collection tools, with the look to be able to collect information in real time from various sources on the ground.

Several units and agencies were sent the link to the site. The site was used to brief the Foreign and Commonwealth Office (FCO) and Non-Governmental Agencies (NGOs) in theatre. The site was viewed over 1900 times, with a spike of nearly 500 views in one day.

From this Op several people attended the Pacific Command HADR Geospatial-Intelligence course. This has allowed us to form some good ties with other Nations that work within the HADR environment full time.

The Dardanelles

By Stuart Ackland of the Bodleian Library

The British Squadron under the command of Vice Admiral Sr. John Thomas Duckworth, K.B., forcing the passage of the Dardanelles, on the 19th of February 1807.

Unique manuscript maps have a fascination compared to printed maps, especially when they include artistic elements and when they depict naval or military actions, as in this example.

The Dardanelles has always been a strategic waterway separating Europe from Asia and linking the Mediterranean with the Black Sea by way of the Sea of Marmara. The Straits have been the scene of conflict from the days of the siege of Troy in the Greek/Trojan War to the present day, the ill-fated Gallipoli Campaign of 1915 presently being to the fore in the public consciousness of the area.

The action depicted on this map dates back to 1807 when most of Europe was at war and when the French Republic had persuaded the Ottoman Empire to deny the Russian navy passage through the Dardanelles while allowing only French warships to pass through the straits. The Russian declaration of war on Turkey brought Britain into the conflict as an ally of Russia.

Thus, it was that, on the 19th February 1807, a squadron of Royal Navy ships, under the command of Vice-Admiral Duckworth was ordered to force the Dardanelles and it is this naval action which is depicted so vividly on this map.

Duckworth's squadron successfully passed the Narrows while under fire from the Turkish Forts on either shore of the Straits and destroyed part of the Turkish fleet before again passing through the Narrows to the Mediterranean. The map shows the Dardanelles in plan and the various forts on either shore, but drama is added by the oblique views of the ships involved.



About one hundred years after Duckworth's successful passage, another British fleet under the command of Vice-Admiral de Roebeck again attempted to force the Narrows in March 1915 but failed against the modernised shore defences, the minefields and the field artillery which prevented their sweeping. The Gallipoli campaign of 1915 remains one of the most controversial of all the campaigns undertaken by the Allies in World War One.

The map has a grand feel to it, even the title is grandiose, The British Squadron under the command of Vice Admiral Sr. John Thomas Duckworth, K.B., forcing the passage of the Dardanelles, on the 19th of February 1807. There is a list of the ships of the line, information on the strength of defences and description of the damage caused to the Windsor Castle.

Admiral Duckworth had a long and distinguished naval career, joining as a midshipman in 1759 aged 11 and was once concussed by the head of a sailor struck off by a cannonball during battle.

What is unknown is the reason the map was created. The Bodleian does not hold a printed version of the map, so it is unlikely that it was ever published. More probable is that the map, with its accurate depiction of the action and the level of information given, might have been made to illustrate a report of the action or to record the events. Whatever the reason, we are left with a dramatic and intriguing document of a small part of one of the more famous conflicts in history.

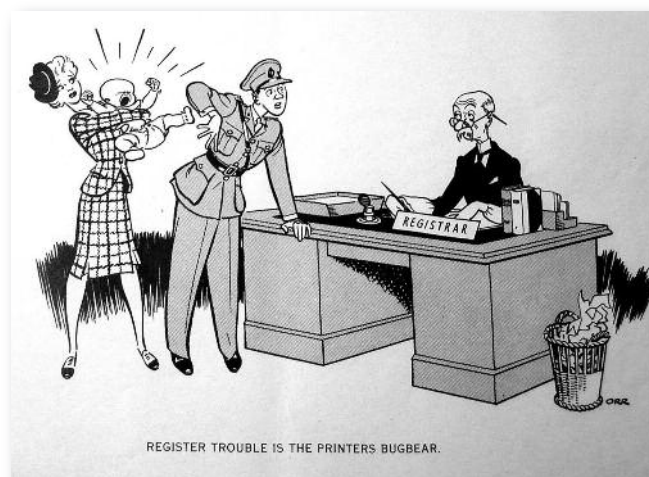
In this inset we can see how close the ships were to the Turkish forts of Sedd el Bahr on the peninsula and Kum Kale on the Asiatic shore as they passed through the straits.



A note at the bottom of the map tells us that the 'Circumference of the marble shot which entered the side of the Windsor castle, and wounded her main mast, is 6 feet 11 inches. Weight eight hundred and four pounds'.

If the list at the bottom left of the map records, in order, the squadron sailing in line ahead, then the Windsor Castle would have been the fourth of the ships from the top, not one of the two shown firing at, or being hit, by the forts on shore.

The British Squadron under the command of Vice Admiral Sr. John Thomas Duckworth, K.B...
Manuscript on paper, c1807. (MS) D30:24 (12)



“Siga, siga”

Mapping the Cyprus Problem in the current series of talks.



By Sgt Nick Wood RE, UNFICYP Force Cartographer

Nestled in the Levant, Cyprus’ entire history has generally been led in some way by its geography, whether that be in a positive or negative aspect; from Alexander the Great, through the Crusades, the ancient seafaring age through to our modern one, few islands can lay claim to being of as much interest to as many different civilisations as the so-called birthplace of Aphrodite.

Whereas international focus could be seen broadly through the window of the strategic significance of its placement in the Middle Eastern region, it’s the internal division of the island that keeps both the UN Peacekeeping Force in Cyprus (UNFICYP) and the Office of the Special Adviser to the Secretary General (OSASG), both situated within the confines of the United Nations Protected Area (UNPA), in business; one third of the total landmass in the North sits in political limbo, a state unrecognized by the majority of the international community and, until very recently, inaccessible by Cypriots from the Southern area. This division, sweeping from East to West, dissects the capital city, Nicosia, as well as separating towns, roads and communities from both sides. Opposing forces from Turkey and Turkish Cypriots in the North and Greek Cypriots in the South face each other across a buffer zone metres wide in places to maintain a decades-old status quo that many have tried and failed to break.

UNFICYP’s mandate is varied and includes the maintenance of the buffer zone with approximately 850 military peacekeepers and 60 UN Police officers, who provide humanitarian assistance and security that enables farming and other activities to be carried out in safety. The OSASG, formerly led by the UN’s Special Adviser to the Secretary General (SASG) Espen Barth Eide, shares an overall aim of supporting a comprehensive settlement to the “Cyprus problem” and consists of a team of political and thematic experts and differs in purpose to UNFICYP by providing direct support to Presidential negotiating teams representing the two sides, facilitating the negotiation process as well as chairing technical committees and working groups.

Both groups are based within the United Nations Protected Area (UNPA), which sits on the site of the long abandoned Nicosia International Airport. Thriving with tourism and complete with a recently upgraded new terminal building in 1968, it closed after bombing by the Turkish forces in July 1974 and never reopened; a symbolic representation of the time when the clock stopped for a significant portion of Cyprus.



The famous Cyprus Airways Trident 5B-DAB, which sits abandoned on the former Nicosia Airport’s apron to this day.

As the sole representative to the UN on geographic matters on the island, I became attached to the OSASG team, tasked with the daunting job of trying to make sense of the political negotiations on territory, one of the founding pillars of the negotiation process (along with governance and power-sharing, European Union matters, security and guarantees, property and economic matters).

Cyprus – A Brief History

Cyprus’ history lends some clues as to how this problem has simmered for so long. First settled about 11,000 years ago, it has been ruled by the Byzantines, Lusignans, Venetians and Ottomans. In 1878, the British were allowed to occupy and administer Cyprus under an agreement with Turkey due to its strategic location in relation to the Suez Canal. The First World War saw Turkey joining Germany’s side, leading to a British annexation of the island and becoming a Crown Colony in 1925.

In the mid-20th century, a series of riots organized by the Greek Orthodox Cypriots demanding enosis (union with Greece) took place; Turkish Cypriots, however, wished to remain under British rule. By 1960, after a series of bombings and the beginnings of inter-communal violence, Cyprus was granted independence.

The mid-1960s saw an increase in inter-communal violence and the UN deployed a peacekeeping force to the island in 1964. A solution was not found and, in April 1974, a coup d'état was conducted by the Greek Army and Cypriot National Guard in order to try and force the annexation of the island to Greece. Five days later, Turkish forces commenced a military intervention (*Operation ATTLA I&2*) in Northern Cyprus in July 1974 citing the right to unilateral intervention under the 1960 Treaty of Guarantee. Cyprus became partitioned leading to a mass migration of refugees from both the North and South, displacing thousands of people and polarising the ethnicities of the two halves of the island. The hardliners lost power in December 1974 and 1975 saw the Turkish Federated State of Cyprus declared in the North. A whole-island federal solution was never found and in 1983, the Turkish Republic of North Cyprus (TRNC) declared independence, a status recognised by itself and Turkey to this day.

The Republic of Cyprus has been an EU member state since 2004 and adopted the Euro in 2008.



An overview of Cyprus showing the buffer zone. Source: United Nations.

Previous attempts at a solution

We were acutely aware of the historical background of the negotiations as well as their subsequent outcomes. Guarded optimism abounded but the past was certainly against us.

Through forty years of high-level diplomacy, many different groups have tried and failed to resolve the conflict in Cyprus. These include the 1977-1979 High Level Agreements, Jimmy Carter's 1978 Anglo-American-Canadian plans, the 1992-1994 "Ghali Ideas" (ex-UN Secretary-General Boutros Boutros-Ghali) and most recently, the Annan plan. This plan came very close; named after the then-Secretary General, Kofi Annan, this plan would have coincided neatly with the accession of the island to the EU bloc at roughly the same time. Due to this, the plan was widely supported internationally and by the EU but defeated by an overwhelming referendum vote from Greek Cypriots, who voted 75.8% against the plan versus the Turkish Cypriots' 64.9% vote in favour.

These attempts by Presidents, Secretary-Generals and some of best diplomats of the past decades certainly added some gravitas to our task but also some skepticism by the media and some Cypriots in general who had, of course, seen promise fade away many times before.

A climate of hope

Ultimately, these opportunities are few and far between and the presence of two pro-solution community leaders in Nicos Anastasiades (President, Republic of Cyprus) and Mustafa Akıncı (leader of the Turkish Cypriot community) made the climate one of hope. On February 11 2014, the leaders signed a declaration stating "the status quo is unacceptable and its prolongation will have negative consequences for the Greek Cypriots and Turkish Cypriots," and expressed a desire to commence results-orientated negotiations, leading to a bi-communal, bi-zonal federated member state of the EU.

This declaration set off a chain events, commencing with the first meeting in May 2015 under the Secretary-General's new framework. This led to a number of meetings between the two sides, hosted mainly within the UNPA. This area provides both the security and neutrality necessary for constructive dialogue.

Right place, right time

Working for UNFICYP as the Force Cartographer, I was already exposed to some of the challenges facing the Cyprus talks; a significant proportion of the work I perform with UNFICYP involves reinforcing, through maps, the UN's alignment of the buffer zone in order to maintain the security of it, as well as performing edits of the UN dataset to match intelligence reports from patrols and keep an increasingly precise record of cease fire lines and zones of special status within our area of responsibility. When you start to piece the various civil, policing and military issues together the mapping of this zone is dynamic, at times chaotic and contentious. As mediators, often the UN (and by extension, my role), are required to try and make sense of these views by meeting with governmental organisations from Cyprus and other UN entities. This arbitration is vital in keeping the posture of the UN at the correct level.

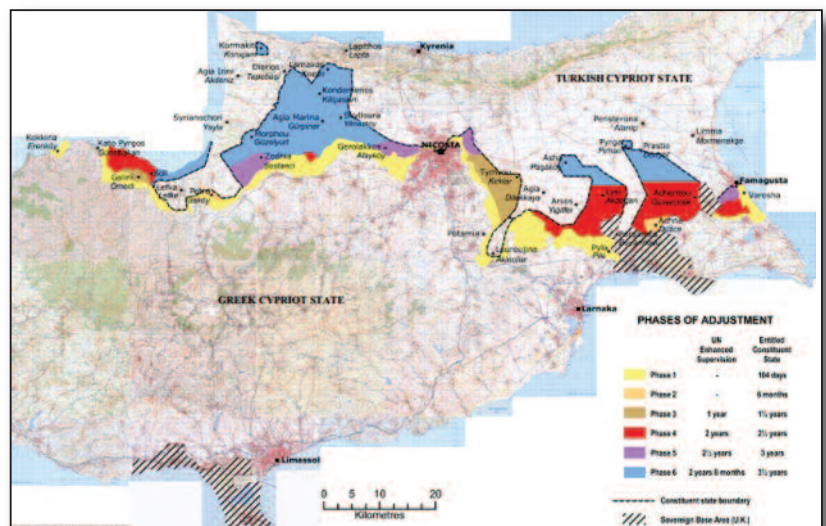
Shortly after my arrival at UNFICYP in September 2016, I was asked to meet with the UNFICYP Chief of Staff and OSASG members to discuss what I could offer; I had already gained some experience of boundary disputes from my time in Afghanistan, where for a period I was involved in mapping the Durand Line as part of my work for ISAF. As I was also already familiarized with the political situation and geography of the island, this favourable meeting led to a request to provide GIS analysis and mapping to support negotiations. A simple request with expansive opportunities, as it shortly became clear that not only would I be attached to the negotiating team, but that I would be travelling to Switzerland to take part in political-level discussions. While I was told my posting to UNFICYP would not be a "sleepy hollow" type of posting as quite often Cyprus is perceived, nothing could have prepared me for the sharp cultural shift of working environment from Armoured Infantry Brigade exercises to the diplomatic community (although both the food and accommodation are far better in the latter).

A contentious division

Territory is one of the thorniest issues contained within the Cyprus talks; both communities see special significance in parts of the other side's claimed territory, including sites of religious importance, areas where great numbers of the populace were displaced and abandoned towns of economic importance such as Varosha, the "ghost town" south of Famagusta which was once a prime holiday destination for the wealthy.

The division can be perceived in many ways, although focus is mainly concentrated on the percentage of area and coastline each side holds. Mapping this divide is hard enough with the current status quo but adding these extra dimensions makes the task not only technically difficult but also a stand-off of bargains and trades to reach an acceptable solution. Adding in questions such as whether returned land would be useful (a vast piece of the central part of Cyprus is increasingly arid, lacking in fresh water and hard to farm), the proportion of useful coastline being adjusted and whether the overall solution would be popular enough to pass a referendum vote increases the complexity of the task further.

During the 2004 Annan plan, a solution to territory was proposed by reducing the Turkish Cypriot constituent state's landmass from a little over a third of the total island down to 28.5% in six phases over a 42-month period. The interesting "jagged" shape of these adjustments in the map below comes from the problem of adjusting only the percentage of territory agreed, while also gaining the desired built-up areas and not too much empty or unusable land. Drawing a straighter line would adjust a greater percentage of total land, or would miss conurbations seen as vital to the agreement passing the referendum.



Territorial adjustments proposed under the 2004 Annan Plan.

Preparation and potential issues

Knowing preparation was key in the success of these territory discussions, I had to complete some ground work in the lead-up to the Switzerland talks. I collected historical data where possible and joined to built-up area features to try to constructively identify areas of significance using old gazetteers to find long-abandoned towns and villages, being referred to in three languages in some cases (Turkish, Greek and English). These areas and the people moved from them have changed significantly since the 1970s and although it's relatively easy to say that this many people moved from this town, it's much harder to comprehend the practical implications of finding ancestors, moving them back if requested and supporting such a scheme. In hypothetical scenarios, it was therefore possible to see what a divide would give in terms of population return.

As well as major built-up areas, villages owned by recognized minorities and the many areas of cultural or religious significance were identified. The Annan Plan was a useful frame of reference although as a failed attempt it could only be used to make some assumptions as to what might happen once the two sides negotiated territory in Switzerland.

I also had to categorise the areas of the various de facto divided landmasses within GIS feature classes, as well as blank versions to enable quick divisions should proposals be made at the negotiating table. Whilst these preparations were helpful in contextualising the problem, in reality there was no way of actually foreseeing what would or would not be discussed.

The Conferences on Cyprus

An agreement to conduct talks in Mont Pèlerin in November 2016 was an historic achievement for the UN, bringing these thousands of invested hours to a head at a formal venue in order to discuss, among other subjects, territorial adjustments to form the basis of a unified Cypriot federal state.



Former UN Secretary-General Ban Ki-moon opens the first of a series of negotiations in Mont Pèlerin, Switzerland.

Two rounds of talks in Mont Pèlerin produced considerable buzz in the Cypriot media and some hectic challenges following intense political-level negotiations over the following weeks. I had to adopt a reactive role to support the process, as quite often the subject would drift in and out of discussion, however despite considerable expectation that territory would be substantially discussed, often I would be expected to quickly produce statistics using GIS software by calculating an adjustment including a certain subset of geographic data; how a town, or portion of land or coastline, would affect the percentage balance of territorial adjustments. Sat in front of a roaring fire in the billiard room of a five-star hotel, it dawned on me that there have been worse places to be sat doing rapid-fire work like this in my time as an RE Geographic Technician.

Despite our best efforts, an impasse meant that the mooted idea of a solution in 2016 was highly unlikely and so it came to pass, with a resumption of discussions back in Cyprus up until the end of the year. The stage was set for an international conference on 12th January 2017 at the UN Office at Geneva, with initial discussions between the 9th-11th. Located within the impressive Council Chamber room of the historic Palais des Nations, these preliminaries would include a first in the history of the Cyprus negotiations – a submission of maps to the UN from the two Cypriot Delegations. This carried a huge amount of symbolism as negotiations rely on a certain semblance of constructive ambiguity – a map, on the other hand, is a “cards on the table” moment; a procedural breakthrough and the spark to enable the inauguration of the international Conference on Cyprus.



Validating the map submissions in a private room at the Palais des Nations, Geneva.

With this faintly-terrifying-but-exciting idea swimming around my mind, the map submission was conducted in a secret room in the Palais des Nations, guards stationed at the door. My job was to ensure that the maps submitted by both leaders fit the general parameters of the agreement they had. With probably the two most important people in Cyprus staring a hole in the lid of my laptop, I tried to remember how to perform the basic GIS tasks I had to use – pressure has a way of making the simple seem impossible sometimes. Using the blank datasets prepared, I was able to quickly import the sides' submissions and

divide the island's area, giving a percentage figure of proportion in order to ensure both maps met the required parameters. These measurements and their corresponding outcomes are still a subject of intense island-wide focus and cannot be disclosed in much detail but once the maps were verified they were placed into a vault in the Palais.

This submission of maps was crucial to the conference and the following day the two Cypriot communities as well as the three guarantor powers of the 1960 Treaty of Guarantee led by their respective Foreign Ministers (Greece, Turkey and the United Kingdom), as well as an EU observer team led by Jean-Claude Juncker, met in the Council Chamber to commence talks at a level not encountered for nearly 15 years.

The talks progressed to a technical stage over the course of the next few months and the sides met in the summer of 2017 in picturesque Crans-Montana, Switzerland with foreign ministers from Greece, Turkey and the United Kingdom again in attendance. The Secretary-General opened the conference on Cyprus for what would turn out to be the last time for the foreseeable future in the current series of talks. Despite considerable effort, an agreement could not be reached at that time.

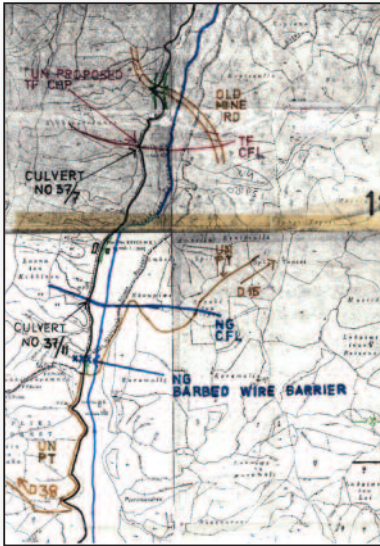


The OSASG Team with current UN Secretary-General Antonio Guterres.

Post Talks

What's next? The situation is hard to predict. Political tensions in the Mediterranean from natural gas exploitation by the Republic of Cyprus in areas claimed by both sides, as well as subsequent blocking tactics by Turkey seem likely to increase the difficulty of getting back to a negotiating table. A promising development is the arrival of a UN envoy to the island to try and reignite the process – the leaders recently dined together for the first time in a year, however the mood is that the process cannot work in an open-ended manner as it has in the past. Rebuilding confidence and trust between the two sides will be imperative in the coming months in order to foster a conducive negotiating environment to further dialogue.

Despite the low tempo of the talks, mapping the buffer zone is keeping us busy here on the island. We've been facilitating the building of new crossing points through liaison with surveyors and the study of archived maps recently – with the relentless progress of GIS technology, the widespread availability of satellite imagery and ever more precise GPS devices, there's a constant game of catch-up trying to keep the various lines spatially accurate. Making very old cease-fire lines drawn from 1:50,000 scale maps relate to ground sign spotted on satellite imagery or patrol is a constant struggle. Indeed, this is not a new problem; in 1974, a demarcation of the limit of areas occupied by Turkish Forces at the time of the first Turkish occupation in Cyprus was surveyed by a cell formed of members of 1 Air Survey Liaison Section RE based in Akrotiri. In an Royal Engineers Journal entry written



An 80s-era 1:50,000 scale map showing hand-drawn BZ alignment.

by Lt. Col. T A Linley RE in 1975, he recalls that each side “produced their own 1:50,000 scale maps marked to show their views of the limit of areas occupied by the Turkish Armed Forces at the time of the cease fire. Their views differed considerably!”. It’s strangely comforting and yet frustrating to share these problems with those of an RE survey team from nearly 50 years ago.

I also support and manage online GIS applications that support UNFICYP peacekeepers across Cyprus, including on iPads to identify violators of rules that maintain security in the buffer zone. These range from hunters, farmers, joyriders and illegal immigrants, through to the opposing forces and the occasional glider pilot. Additionally, I develop and lead the training of our biannually-rotating troops and police officers in map reading and navigation, delivering lessons both in a classroom environment as well as field training. And because this is a multi-national operation peacekeepers deploy from the UK and a large number of other countries, including Argentina, several Eastern European nations, Bangladesh China, Ireland, Sweden and many others, training is always an interesting challenge.

As I leave in August 18, I have some time now to reflect on a hectic and at times slightly surreal posting with pride at the accomplishments of our team over the past 2 years. There have been plenty of high points as well as low ones, including the historic map submission. I have immensely enjoyed my role as makeshift diplomat, meeting among others both previous and current Secretary-Generals Ban Ki-Moon and Antonio Guterres, as well as foreign ministers including Boris Johnson. Although perhaps we didn’t attain the success we had worked towards with hope, it feels like some tangible progress has been made and the starting point of the resumption of talks may not be quite as far back as a few years ago. There is some political will to use the outcomes of the previous talks to recommence, which gives some promise that all was not in vain.

At a personal level I offer my thanks to the United Nations for the opportunity and the trust given to me to apply my skills at such a high level and wish the best for the mission. It’s slightly ironic that two otherwise peaceful, laidback communities haven’t resolved their differences...yet.

Henry David Thoreau, who among many talents was a fanatical surveyor, once wrote: “*The boundaries of the actual are no more fixed and rigid than the elasticity of our imaginations*”, a reminder that through cooperation, trust and political resolve, perhaps these long-serving divisions can be altered and that this fascinating island can exist as a unified one, once more.

Staff Sergeant Nick Wood joined the Army in 2003 as an Apprentice Tradesman at ATFC Arborfield, joining the Royal Engineers in 2004. Upon completion of his trade training as a Terrain Analyst, he has served in Germany, the Netherlands, Canada and the USA, as well as three separate tours of Operation HERRICK and on Operation TELIC, working in a wide spectrum of roles from the strategic level at Headquarters ISAF in Kabul, down to tactical-level analysis for UK Special Forces units. He has previously served as an analyst within Headquarters Allied Rapid Reaction Corps, an Instructor with the Royal School of Military Survey (RSMS), as a Brigade Geographic Sergeant in Headquarters 20 Armoured Infantry Brigade and most recently as the Force Cartographer within Headquarters United Nations Peacekeeping Force in Cyprus (UNFICYP). Posted on promotion to Staff Sergeant, he is currently employed as a Troop Staff Sergeant within 14 Geographic Squadron RE. He is a keen ultramarathon runner and has also represented 42 Engineer Regiment (Geo) and the RSMS at various running events, mainly in the discipline of cross-country.

My Two Tours in the Far East

By Roger Jones BEM

After 2 years at the Army Apprentice School Harrogate and a further year at the Army Apprentice College Chepstow I qualified as a Field Survey Technician Class 3. ¹ In April 1962 I was posted to 1 Training Regiment RE Cove and spent 4 months training as a Combat Engineer.

I finally arrived in Singapore in October 1962 and on joining 84 Svy Sqn RE was immediately sent to Nee Soon to attend a Malay Language course. I returned to 84 in late November and on the 8th December was sent to Labuan at an hour's notice and then moved straight to Brunei to set up a map store and make sure all the maps from Singapore got into the correct hands. ²

A field troop detachment under Capt Geoff Gathercole was established in Kuching, Sarawak, and in January I was relieved from the map store and proceeded to Kuching to join the detachment. For the next 3 months we carried out various tasks for Lands and Survey, and with the Confrontation starting numerous troops were arriving in Kuching. ³

Over the next 6 months I carried out various field tasks in the first and second divisions of Sarawak along the border but now due to the Confrontation we had to be armed, not just with shotguns (used for hunting for dinner). Then on Malaysia Day (31st August) I was posted to 2 Troop based in Keningau, North Borneo, under Lt Bob Eade. I had to arrange my own flights to Labuan, then Jesselton, then by train (with the Computer Truck) to Tenom and finally to Keningau arriving on 16th September 1963. By this time North Borneo had become Sabah and then joined Malaysia.

In the next six weeks we built our own 'longhouse'. ⁴ I was sent to Sepulot where after an aerial recce to see which mountain we had to clear, we hired local labour and set off up river by 'prau'. ⁵ No outboard motors, hand paddles only. It took us five days to get to a kampong near to the base of the mountain, where we had to hire a new labour force. Another two days up river and then three days walk up the mountain, so we hoped! No maps or aerial photographs just good sense. We needed to get to the highest point, when we started to go down we stopped cleared the top (2 days); we weren't at the top; after a further day's walk/climb we tried again, this time successfully. It took 2 weeks to clear the top and establish a trig point. The point was Bandako; we got to name the trig points. We also had to establish a line of sight to another trig point, being cleared by another surveyor. Once established we then returned to Sepulot, a good 8-day trip, managing to return to our base in Keningau by Christmas.

Early January back into the field, this time a six day walk to Long Pa Sia to clear a mountain (third highest in Sabah), which I named Murk Miau. At Long Pa Sia a troop of Gurkha Engineers had been helicoptered in to build an airstrip. We were there when the RAF air dropped a D7 bulldozer into

the clearing but missed. The parachutes failed. This area was on the border, so we had to inform the local SAS patrols of our intentions of occupying Muruk Miau, which was on the border and over 2000m high (very cold at night). From Long Pa Sia to the top was a four-day hike, just keep going up, you can't miss it! At this height the trees are very small and a lot of moss. Three days to clear and get back in the warm. We managed to hitch-hike a lift from the Army Air Corps, Scout Helicopter, saved a six-day walk.

Up to now no survey work was undertaken, just labouring. The RAF is now giving us air support to return to our trig points to carry out the necessary measurements. In September 1964 the troop moved to Tenom, 30 miles away and Lt Ken Harding took over the troop. We then, with air support (RAF Whirlwind 10

Helicopter), survey traversed across the 'empty quarter', from Sepulot to Kalabakan near Tawau. This area was completely devoid of kampongs and surprisingly little game. We ended up with 42 Commando, based at Kalabakan waiting for air support to complete the traverse. We finally returned to Tenom and completed altimeter surveys from air photos for the mapping near the border. In



Going up River Baleh to set up forward base from Kapit Sarawak.

August we flew from Tenom, by RN Wessex helicopter, to Bario, Sarawak to carry out altimeter surveys again near the border. In October my 3 years were up, and I returned to Singapore for my posting to Barton Stacey.

From January 1966 to June 1967, involved in many field trips and took a Technician Class 1 course at Hermitage.

In June 1967 I was posted back to Singapore, spending one night in Singapore before going on to Labuan to join the troop. Capt Mike Nolan was handing over to Lt John Elder and I took over from SSgt Alf Isherwood. With Confrontation now ended, we were tasked by Lands and Survey/AD Svy FARELF the first job being in Tawau.

We moved to Tawau and were based in the Tawau Hotel. The job was mapping control for 1:50,000 mapping in Donum area north of Tawau. Whilst we were in Tawau, the troop HQ moved from Labuan to Kota Kinabalu (KK). After returning to KK we had to plan for a large job, supported by the Royal Malaysian Air Force. I spent the next two weeks travelling around the west coast hiring 20 labourers (Lands and Surveys wished us to hire local people). The troop, labourers and stores were booked on the MV Rajah Brooke and sailed to Lahad Datu. I flew ahead to organise accommodation at the abandoned Segama Tobacco Estate.



MV Rajah Brooke - Photo and copyright Ted Scull 1974.

We had two large praus built to send the field party up the Sungai Segama to the Danum area, as well as having air support. Unfortunately, no air support arrived so I sent the two praus up river. Five days later they returned - travelling through a gorge one of the prau had broken up, but luckily no one was injured, and all the equipment was saved. With the water rising fast, everything was moved to a higher position on the bank, where they stayed the night. The next day the field party returned but had to leave a quantity of stores behind, including the army issued radios.

On their return (23rd December) I sent the party back to KK for a Christmas break and with one other I went up river to try to recover the stores. After two days I realised how dangerous the river was becoming and decided to return. The Segama river was 20 metres wide at the tobacco estate when we left, when we returned it was over 200 metres wide with the tobacco estate and all our stores and Land Rover under 20 feet of water. With more luck than judgement we managed to get our prau to Lahad Datu. Had a good Christmas. I had to wait a week before the river returned to normal. I managed to get the Land Rover to PWD and within a week it was back on the road. I returned to KK to re-plan. In the mean time we were tasked to carry out a 'Black's Azimuth' on one of the trig points in the centre of Sabah. I went into the field with two other field surveyors and spent six weeks observing most nights when the weather allowed.

In April the troop moved to Tawau with the promised RMAF air support. Over the next seven months with good air support we carried out the mapping control in the Danum area. Lt John Elder handed over to Capt Dick Ellis as Troop Commander. After Christmas we carried out a recce for a new task for the troop to move to Kaput, Sarawak.



Royal Malaysian Air Force – Roger taking field surveyors and labours onto Trig Point.

The troop was given two days' notice to leave East Malaysia. The Families and the Troop, plus all stores had to be at the airport where a RAF aircraft arrived from Singapore. I was left behind to settle all the bills with Lands and Surveys and all the local merchants with which we had accounts.

I was then asked to extend my Far East tour by another year. After a month I went to Kapit to organise accommodation and hire labour for the next task. I was there from March to September before the troop arrived. The biggest problem was keeping 20 labourers busy although Lands and Surveys were footing the bill. Capt Dick Ellis arrived with the troop on an LCM and we had full support from the RMAF. We had to set up a forward base by river, at the head waters of the River Ableh.

Capt Philip Robinson took over from Capt Dick Ellis as Troop Commander. The Troop took a Christmas break back to Singapore returning in early January and completing the task by April.

I again stayed behind to sort out all the bills and finalising all Lands and Surveys accounts in Sibiu.

Then went to Singapore to assist in planning the troop's trip to Pontianak - "Op Mandau". Then went to Pontianak by LCT. But that's another story.

Roger Jones was recommended for an award for his exceptional contribution to the surveying of the BORNEO TERRITORIES during his two tours totalling 5 years 8 months.

This was recognised by the award of a BEM in the Queen's Birthday Honours 1971.



Indonesian Allouette parked at Kuching Airport during 'Op Mandau' collecting food supplies.

Notes

1. Harrogate Group 59B was the first Field Survey Technicians in the British Army.
2. A small rebellion erupted against the monarchy in 1962, which was suppressed with help from the UK. Known as the Brunei Revolt, it contributed to the failure to create the North Borneo Federation. The rebellion partially affected Brunei's decision to opt out of the Malaysian Federation.
3. Indonesia's declaration of Confrontation against the proposed Malaysian state occurred on 20th January 1963, with the first recorded infiltration and attack at the police station at Tebedu in the 1st Division of Sarawak on 12th April 1963.
4. Built raised off the ground on stilts and are usually divided into a public area along one side and a row of private living quarters along the other side.
5. Boats usually without a deck that are propelled by sails or paddles.



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Terrain Models in the American Expeditionary Force 1917-1919

By Mike Nolan



Painting the map detail on the surface of the plaster models.



Making plaster casts, a messy business.

A brief description, taken without permission, from already published sources, which are acknowledged with thanks.

In this issue is featured a model as well as a map.

In order to be able to interpret terrain depicted on British trench maps easily the British initially experimented with layer-shading but the methods used were labour intensive.

The next step was the production of relief maps based on contour layers cut out of Bristol-board each layer bounded by a particular contour value, in effect a series of stepped terraces.

The vertical scale, defined by the thickness of the boards of course was thus exaggerated. This method has been described in detail by Dr. John Peaty in an article in the R.E. Journal. This "Chedanne" method was also used by the Germans.

The French developed the same system, based on similar layers of board for each contour value, but with the application of Plaster of Paris between the contour terraces to produce a smooth terrain model. From this master-model a cast was made which could be used to produce further copies of the model.

For each model made, a master-map of the area of the model, printed on special Japanese paper was then pasted over the surface of the model. The nature of the relief and the limits to which the Japanese paper could be stretched were factors to be considered in deciding the vertical scale of the model.

(It is believed that this Japanese paper may have been Mulberry Paper which has the property of being able to be soaked in water without breaking up.

(It is also believed that it was this paper which was used in some of the escape and evasion maps produced in World War Two).

By the end of the war, the Service Geographique de l'Armée had produced about 366 such models of the French front.

Later the French adopted a method that had been developed by the sculptor Henry Arnold (1876-1945). The Arnold Method consisted of modelling a clay relief by means of a

special apparatus. A negative cast was made from which Plaster-of-Paris positives could be produced. The map squares or grid was then inked on the surface of the model and the detail added in coloured paints. In this method, any vertical scale could be decided upon. In practice the usual vertical scale was four times the horizontal scale. This method was found to be less laborious, less time-consuming, and less error-prone. Hand-painting was more laborious than simply pasting a map on the surface as in the Chedanne Method. The initial issue of relief models was usually 10 copies.

The 29th Engineers of the American Expeditionary Force initially adopted the Chedanne Method but later also adopted the Arnold Method. For Staff use the Chedanne models were preferred because they showed all the map detail and were more durable and portable.



Using a small tripod mounted electric light to study intervisibility on a terrain model.!

The Arnold models were preferred by the Artillery. They were also used exclusively for the study of inter-visibility by the shadow method.

The 1:20,000 scale was almost universally adopted for relief models but the machine-gunners demanded and occasionally got 1:10,000 models though it was considered that the effort in their production was out of proportion to their value.

The Americans considered that relief maps/models at smaller than 1:20,000 scale, showing only a very general idea or picture of the topography, were of little military value.

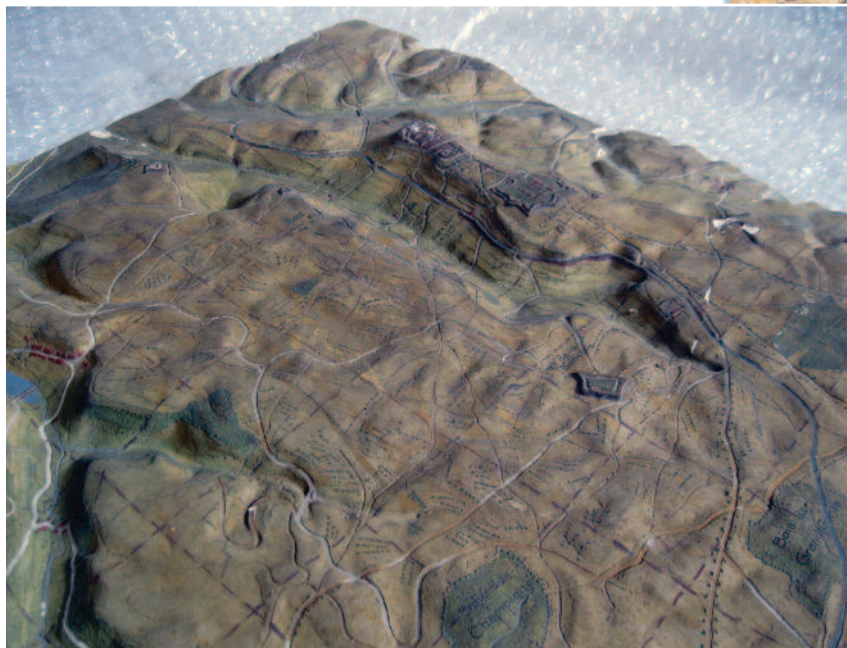
1. They thought that the British layer-shaded maps were too laborious and too expensive for field production.
2. They considered that a better result could be obtained by photographing an assemblage of 1:20,000 scale models lighted so as to bring out the relief by shadows. From these photographs, half-tone copies could be produced.
3. Another method considered acceptable was by stumping of a contour map to produce similar effects to 2.

For the study of intervisibility, the drawing of profiles was considered too slow and laborious. It was easier to use a Profilograph on the relief models. However, the Americans considered that the use of a system of electric lights on the Arnold relief models was far superior and capable of great development. The system, as used by both the French Second Army and G-2 Branch of G.H.Q., A.E.F., consisted of small tripods with a small electric light located at their bases which could be placed anywhere on the relief model. The shadow cast on the model, indicating areas invisible from the light source, could then be outlined in black on the model and then transferred from the relief to the map.

Sources:- U.S. Army in the World War 1917-1919, Volume 13, pages 73-74.
Voila Les Americains! By Sylvain Riandet, Langres, 2017.



The model of the Langres sheet, from above.



Model of Langres in the Langres City Museum showing the medieval walled city and the 1840's citadel.

The DSA Annual Maps and Surveys Seminar 2018

By John Knight

This annual seminar, the 13th in the series, took place on the 8th June at the Arlington Arts Centre, Newbury. Once again, Mike Nolan collected together excellent speakers who delivered a good balance of presentations between historical studies and current operational activities.

The morning session focused on historical topics with two presentations on World War I by Alan Wakefield and Peter Hart, both from the Imperial War Museum. Alan started the day with his interesting presentation *Mountains, Mules and Malaria – Soldiering with the British Salonika Force (BSF) 1915-1918*. He identified shortcomings and deficiencies in the BSF due to its low priority. Through comparisons in the experience of troops serving with XII Corps and XVI Corps he demonstrated that the latter was somewhat of a ‘sideshow’ within a ‘sideshow’ consisting of small-scale raiding. He raised the problems of climatic extremes in winter and summer which limited military activity to April, May, September and October. Disease was another significant factor, especially malaria in the Struma valley, with British casualties due to disease being twenty times the level of battle casualties. After the War, men of BSF felt their contribution to victory was sadly overlooked.



Outside the Arlington Arts Centre, Newbury.

This was followed by Peter Hart’s fascinating talk on *Haig - Britain’s greatest Commander in Chief*. He examined the career of Douglas Haig’s greatest Commander in Chief. He reviewed his pre-war achievements and his performance as both a corps and army commander between 1914-1915. However, Peter focused on Haig’s superb performance as Commander of the BEF from 1916-1918 where he considered his approach to his multifarious responsibilities as well as the difficulty in combatting the ever-mutating defensive tactics of the German Army. He concluded by examining Haig’s ultimate success in creating the culture where the ‘All Arms Battle’ would emerge to eventually win the war.

We were fortunate to have Lt Jon Edmonds RN to start the afternoon session that brought us up to date with a focus on current operational activities. His insight on ICEX18, a bi-annual multi-national exercise sponsored by the USN and held 200nm north of Alaska in the Beaufort Sea clearly demonstrated his professionalism and resolve. He explained how ICEX is used to further submarine Arctic testing and evaluation, exercise joint and multi-national coordination, assess Arctic military uplift capability and camp mobility, and evaluate improved communications and connectivity. His role for the Royal Navy HM was to continue developing on-scene weather observation and high latitude forecasting capability. This is particularly important as the Arctic is rapidly becoming an area of tension as sea ice melts more extensively and the passage of vessels is becoming more frequent throughout the year. This was the first time the RN had participated in an under-ice exercise since the fatalities of two sailors onboard the Trafalgar class submarine HMS TIRELESS in 2007. The arduous training on the North Cape that took place in Norway to cope with the extreme weather conditions also helped to build team ethos between the USN HM and the UK HM. Jon’s HM team participated in field parties that facilitated the surfacing of HMS TRENCHANT, USS HARTFORD and USS CONNECTICUT at various times and assisted with the first triple surfacing of three submarines in the Arctic since 1992. However, all was not



Presentation being given by Alan Wakefield.



WO2 SMIG Matthews RA.

specialist technical work as his team also spent many gruelling hours clearing ice for a 2500ft long runway!

John Kedar kindly stepped in at very short notice to give a thoughtful insight to the future of the Ordnance Survey, and indeed national mapping agencies, with his attention-grabbing presentation *The future of the Ordnance Survey – heritage or holograms – rambling or robots*. Creating, maintaining and distributing detailed information for Britain is a huge operation requiring some 500 million geospatial features in the master map up to date. He identified four waves of development, military (18th C), industrial (19th C), computing (20thC) and today’s better problem solving using geospatial data. He illustrated the wide range of government activities that depend on spatial data, as well as the role Spatial Data Infrastructure (SDI) plays in Sustainable Development Goals. These arguments were supported by various studies over the past 10 years that identified the percentage impact of SDI in terms GDP impact in a range of countries. He concluded by identifying the various

challenges that National Mapping Agencies face but concluded that they still have a future but only if they change.

LCpl James Smith gave an impressive talk on *Geo Support to Medical Outreach Activity on EX ASKARI SERPENT by HQ 1 (UK) Division* which demonstrated the capability of young RE Geographic Technicians. He exploited this medical regiment health outreach exercise in Kenya to provide a coherent patient data collection and geo analysis process based on open source geospatial tools for use by the UK and Kenyan participants. The project aims to provide geospatial analysis of health-related issues and trends, allowing better targeting of health resources in the areas visited. The processes and applications used have military wider applicability, particularly in UK Defence Engagement activities, often in areas where UK Defence mapping is sparse or lacks currency. 2016 was the first time EX ASKARI SERPENT deployed with embedded geo support and allowed the cell to demonstrate the capabilities and value of RE (Geo). In addition to providing hardcopy mapping to the Exercise, the Geo Techs grasped the opportunity to undertake human terrain analysis using data collected from the Health Outreach Clinics to enhance the understanding of local demographics, prevalent medical conditions and any geographical trends or patterns in the data.

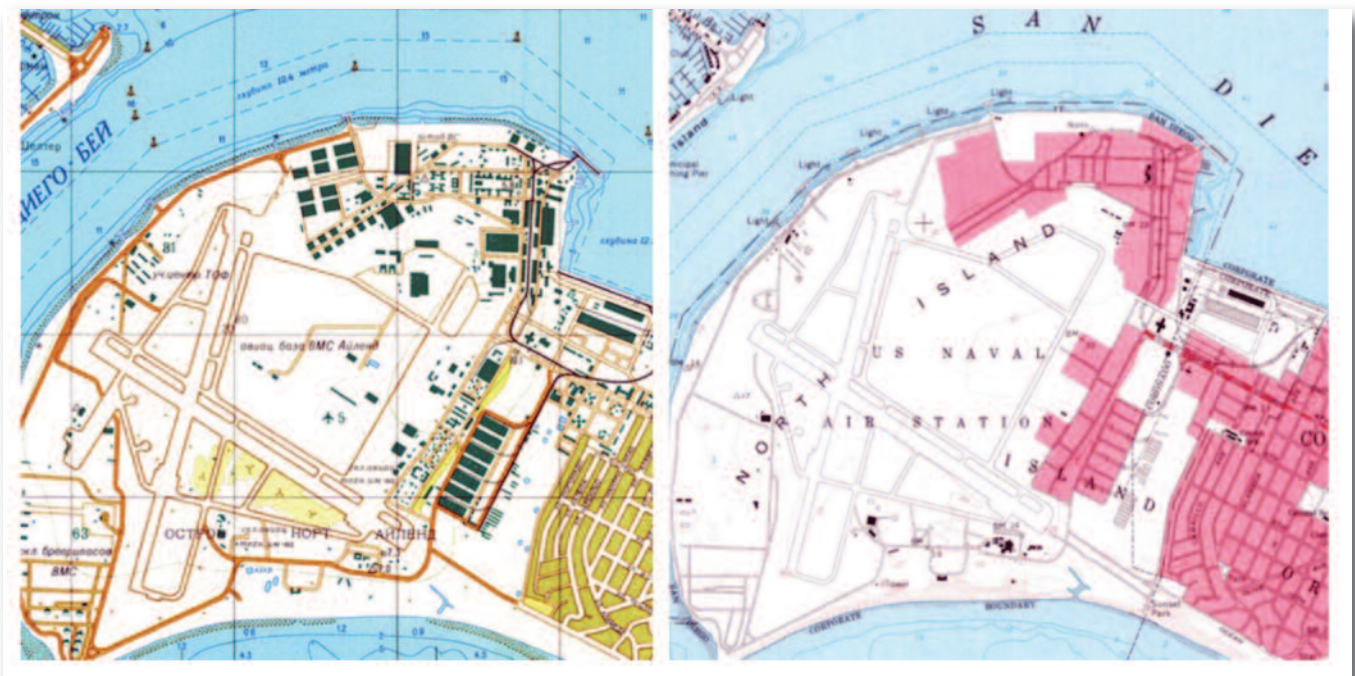
WO2 SMIG Matthews R.A. from the Royal School of Artillery, Larkhill completed the operational talks with a presentation on *Gunnery Survey - Current and Future*. He addressed current Royal Artillery Survey techniques, mostly based on GPS to get to Survey State B (Theatre Grid). However, he also covered the need for high levels of survey in GPS-denied environments and the use of image mensuration as reversionary modes to get to State A (Battery Grid). Despite the presentation technology failing, WO2 Matthews exploited reversionary methods to give an excellent presentation without any slides.



LCpl James Smith and Sgt Damien Lloyd from HQ 1 UK Division.

Throughout the day a display of historical military maps and memorabilia were on display in the Arlington Arts Centre. Mike Nolan provided some excellent examples of maps relating to the Survey in Macedonia from 1916 to 1918. These are of interest as on the evacuation of the Dardanelles, the Maps & Survey Section and the Printing Section moved to Salonika. After a shaky start, the arrival of Maj H. Wood RE placed the British survey on a sound basis of a measured base and triangulation. Maps were compiled at both 1:50,000 and 1:20,000 scales by both plane-tabling and the use of aerial photos. Chris Barrington Brown kindly provided video facilities to illustrate Mike Nolan’s PowerPoint of the Macedonia campaign in support of his maps of the campaign. Unfortunately, a video of a Canadian Broadcasting Corporation’s film of aerial reconnaissance and map mapping in WW1 couldn’t be streamed due to Wi-Fi limitations at the Arlington Arts Centre.

Thanks are due to all the presenters for a most interesting and informative day, to the very helpful staff of the Arlington Arts Centre and to CO 42 Engineer Regiment (Geographic) for supporting the event with a static display of modern survey equipment currently employed on operations.



Superior detail ... San Diego naval facilities, Russian and US versions.

Understandably, this book is preoccupied with detail. But it does offer one intriguing hint as to why the Soviets excelled over the West in this sphere post-war. Russia, essentially a land power, has long been very understandably fixated by mapping the ground – its own vast spaces, and then by extension everyone else's. Their battles would always be primarily on land; so details of terrain matter greatly. But the West expected to operate an air-based war and was content to work with less informative maps, filling in the gaps where necessary with air recce. Perhaps modern digital methods make these distinctions a thing of the past? Still - check out all that extraordinary detail ...

Being in possession of reams of material, the authors have been working up this volume patiently over many years with several expert collaborators. They would have done well to recruit an Imagery Analyst to their group, which would have saved them from elementary errors such as asserting that vertical imagery cannot be used to gauge the height of an object.

But in sum, they have done a fine job. For anyone interested in geospatial intelligence, poring over this book gives the same kind of pleasure as roaming around Google Maps. The hundreds of illustrations (predominantly extracts from maps) are superbly reproduced. The authors fairly describe the Russian cartographic achievement as an “unsurpassed” pre-digital database of “geographical knowledge and geopolitical potential”. This book does it justice.

A version of this review first appeared in the Spring 2018 issue of the of the Medmenham Association's Newsletter.

For more information on the Medmenham Association, visit www.medmenham.org



Welcome to Saufend - Transliteration from Cockney for Polish users.



Operation Emily

By Albie Field

Background

During the late 1950's when the Cold War was at its height it was decided to equip the RAF with Intermediate Range Surface to Surface ballistic missiles, **Thors**.

These were to be based in Eastern England in 4 groups each consisting of 5 sites with each mounting three Thor rockets.

The groups were to be centred at 4 operational RAF Stations, RAF Feltwell in Norfolk, RAF Hemswell in Lincolnshire, RAF Driffield in East Yorkshire (East Riding at that time) and RAF North Luffenham in Rutland.

The satellite stations were at: -

RAF Feltwell: - North Pickenham, Mepal, Tuddenham and Shepherds Grove.

RAF Hemswell: - Ledford Magna, Bardney, Coleby Grange and Caistor.

RAF Driffield: - Full Sutton, Carnaby, Catfoss and Breighton.

RAF North Luffenham: - Melton Mowbray, Folkingham, Harrington and Polebrook.

Internet searches for each of these stations give some interesting reading in particular <https://historicingland.org.uk/listing/the-list/list-entry/1400806> which mentions Project Emily.

D. Mil Svy was tasked with providing surveys for all sites and the strength of 13 Field Survey Squadron RE based at Fernhurst in Sussex was increased in 1958 by 1 Captain, 1 Staff Sergeant, 2 Sergeants 2 Corporals and ? Sappers as survey personnel and 1 JNCO and ? Sappers as MT personnel. Transport included Landrovers, Austin Champs, Bedford QL, Ford & Morris trucks and a motorcycle.

I was lucky to be one of those allocated to this task as a newly qualified A3 Trigonometrical Surveyor and it provided me with an excellent grounding in my chosen trade.

Operational Surveys



Work started in 1958 at RAF Feltwell with the detachment quartered at RAF Feltwell which was a welcome change from the point of view of accommodation and messing.

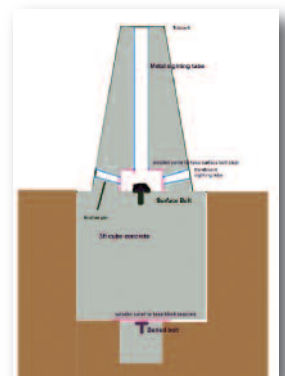
At each proposed Thor site, a baseline of approximately 1,000 feet (to the best of my memory) was selected, two pillars built to Ordnance Survey standards at each end of the baseline.

Once the location has been decided upon a 3-foot cube hole is dug and in the centre of the bottom centre is dug another 1-foot cube hole. This hole is filled with concrete and a brass bolt inserted to act as a buried mark.

When set centring marks are set up and the block & its mark covered with wood to keep it separate.

The three-foot hole is now filled with concrete and a brass bolt inserted centred on the buried bolt, while the concrete is still not set angle iron anchors are inserted to anchor the pillar.

When this is set the pillar can be built, a wooden cover is put over the surface mark and the pillar shuttering erected. Cardboard sighting tubes are situated into the holes in the shuttering and the box covering the surface mark and a metal tube down the centre, a flush bracket is positioned in the shuttering. The shuttering is now filled with concrete and tamped down ensuring that the metal tube remains upright. The brass tribrach is anchored to the top of the concrete and while it is possible





This picture shows pillar building ready to centre the surface mark.

centred over the surface mark. Some days later when set the shuttering is removed and any facing work completed.

Most pillars that we built were completed with hand mixed concrete but for the Hemswell sites we were lucky enough to borrow a cement mixer from the RAF.

The baseline was then measured using MACCA base equipment

This involved measuring the base line by catenary taping using the specialised equipment.

The equipment included: -

- Three standard invar tapes of 24m length, graduated at 1mm intervals for only 0.1m at each end.
- Two field invar tapes of 24m length, graduated at 1mm intervals for only 0.1m at each end.
- One 6m invar tape graduated throughout.
- Two Straining tripods c/w straining wires and weights. The pulley is adjustable both laterally and vertically.
- Measuring heads including magnifiers & centring devices.
- A theodolite for alignment.
- Various tripods
- Level & staff
- Tape supporting poles
- Canvas screens.

To the best of my recollection the bases were in the order of three hundred metres.

The field work proceeded in the following manner.

Several tripods with tribraches & measuring heads were aligned and set out from one end of the base using a theodolite and a steel tape. The setting out had to be done so that each bay was within the range of the invar tape.

The first and final bay measured in a session involved taking standardisation measurements using the three standard tapes and the two field tapes using the same procedure.

All tapes to be used in a measurement were removed from the drum which was approximately two feet in diameter and attached to two wooden poles via springs to avoid straining the tapes. The straining tripods were set up and aligned with the bay to be measured. Each tape in turn was removed from the carrying poles attached to the straining wires, positioned across the measuring heads and the weights gently lowered to apply the tension. The final alignment using the adjustable movement of



the pulleys completed. Six pairs of readings are now taken at each end on the graduated section with the tape being moved between each pair of simultaneous readings. The readings were taken using a magnifier to 0.1mm. The difference between the forward & back readings for the six sets to agree to 0.3mm. The mean difference applied to the nominal tape length of 24m gives the measured length. Temperatures being taken for each set of measurements. All the remaining bays are measured with only the field tapes. To avoid personal equation errors the two observers change ends every ten bays. The final bay will normally be measured using the six-metre tape only. The heights of the measuring heads being determined by levelling. This gave one peculiarity, as most levels gave an inverted image the short staff used has the figures upside down, this was fine until we received a new automatic level which gave an upright image.

The whole measurement is then repeated in the opposite direction, in the event of the base not being completed in the day marks are transferred to a peg in the ground to carry on the next day. The specification was for the forward & back measurement to agree to 1 part in a million, one part in five million was achieved on more than one occasion. In the event of there being any wind the canvas screens were held up to shelter the bay being measured. The observers included Capt. J. Henshaw, S/Sgt Bob Louden and Sgts. Pete Riffle & Dis Dyal.

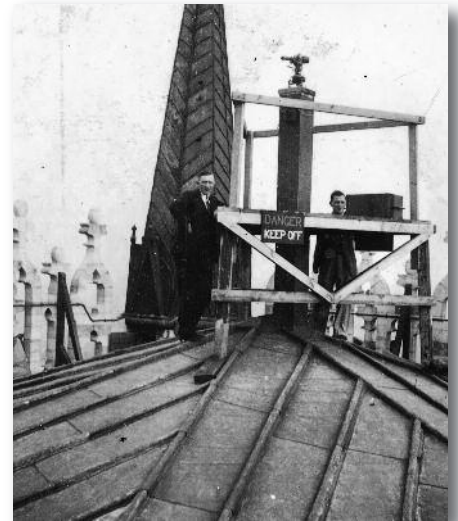
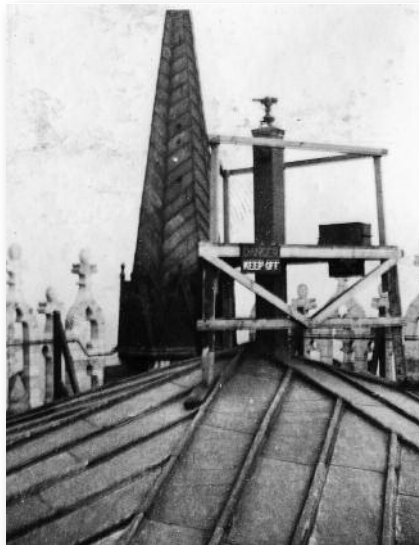


Photos taken during base measurement courtesy of David Martin.

The pillars were now coordinated from existing Ordnance Survey Control using triangulation using a Tavistock 5" geodetic theodolite on 16 zeros to primary standards. Each constructed pillar was also fixed in elevation by levelling from OS control (on at least one occasion this was done from a Fundamental Benchmark.) The terrain in Eastern England is mainly flat and most of the Ordnance Survey stations used were elevated on Church or water towers indeed during the task the towers of several Cathedrals were utilised, namely, Ely for the FELTWELL complex., Lincoln for the HEMSWELL complex and York for the DRIFFIELD complex. Each involving climbing with equipment in enclosed spaces not the easiest of tasks on narrow spiral staircases.



On several occasions it was necessary to build Bilby towers on the baseline pillars due to the terrain being flat. We were given instruction on building Bilby Towers by a team from Ordnance Survey at Hemswell.



Three pictures courtesy of Ordnance Survey showing Lincoln Cathedral Trig point.

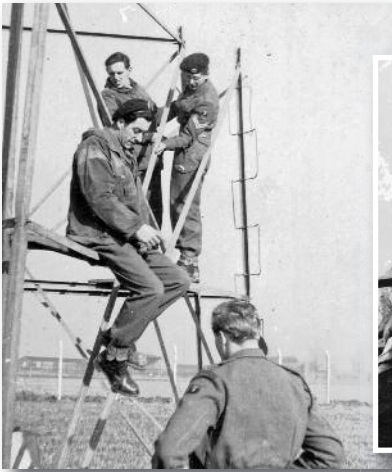


David Martin, John Boyd and driver light tower keeping.

Trig point on a church.



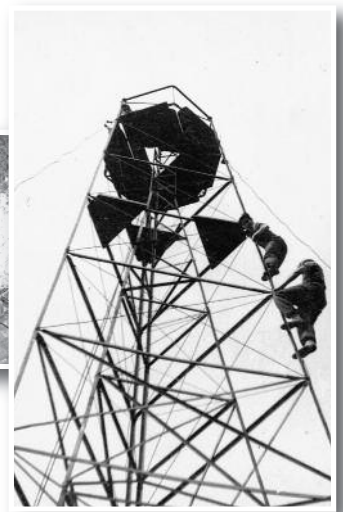
The following photographs show various stages of tower building.



Pete Riffle during construction.



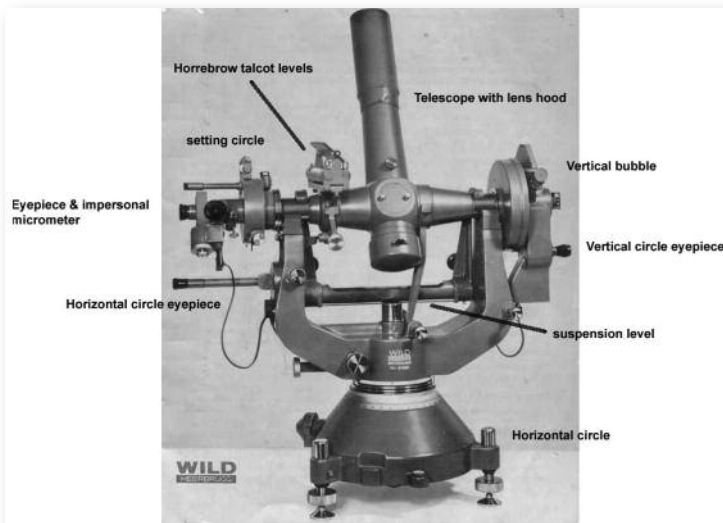
The completed tower.



Astronomy

The next stage involved astronomy with one baseline pillar being fixed by position line altitude intercepts using a Wild T4 Astronomical theodolite (now residing in the Sgts Mess at Hermitage) borrowed from Oxford University where the lecturer in surveying was Brigadier G Bomford (The Author of Geodesy) who was instrumental in the methods used. An azimuth by Polaris was also observed to the other end of the baseline. Initial calculations were completed using Facit & Brunsviga mechanical calculating machine (the latter being a double bank model), Peters Natural Trigonometrical tables and Apparent Places of Fundamental Stars. After initial checking all observations were passed to Survey Production Centre at Feltham for final calculations.

Astronomical Equipment used on Op Emily.



Wild T4 theodolite.

The **Wild T4** micrometer theodolite is the largest of the Wild theodolites and is used for angle measurements of the highest accuracy in 1st order triangulation, tunnel staking, geodetic astronomy and similar precision applications. The theodolite is of the "broken telescope" type, which means that the image formed in the telescope is viewed through an eyepiece placed at one end of the trunnion axis. Its powerful telescope, with approximately 60x magnification, allows comfortable sighting to zenith, because the eyepiece with its 'impersonal micrometer' is always at eye level. Horizontal and vertical circle readings are made with the optical micrometer directly to 0.1" and 0.2" respectively, by coincidence readings of

diametrically opposite graduations. It can determine the longitude to 0.01" of time, latitude to 0.2" of arc and the azimuth to 0.3" of arc.

The diameter of the objective lens of the telescope is 70 mm, its focal length (f) is 578 mm, and due to its powerful magnification, the shortest sighting distance is approximately 100 metres. The diameters of the horizontal and vertical circles are 240 mm and 135 mm respectively. The sensitivity of the altitude bubble for the vertical circle is 2" per 2 mm. The sensitivities of both the hanging level, and of the two Horsebox-Talcott levels supplied with the instrument are 1" per 2 mm. The circles are to the best of my recall graduated to 4' of arc

The Wild T4 is world-renowned as the ultimate in theodolites and is undoubtedly the largest among the Wild range. Weighing approximately 60 kg, it is also a heavy and solidly built instrument. The telescope assembly must be removed for transportation. There are separate cases for the alidade, telescope & suspension level.



The RCA AR88 is a superhetrodyne 20 valve receiver, the one used to have an extra circuit fitted to activate the Mercer chronograph.

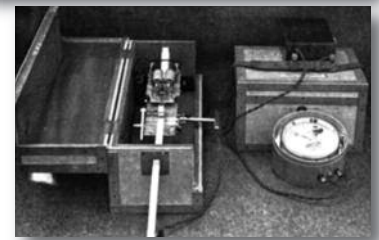
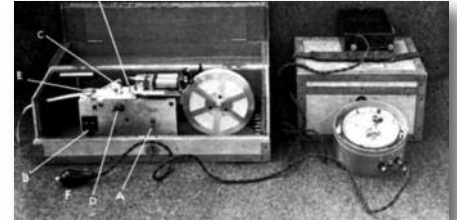
Time signals mainly used were from MSF at Rugby.

Signals from the T4 were by wire.

Radio receiver for time signals.

A Mercer half second Chronometer with a Mercer Chronograph was used for timekeeping.

The chronograph was also modified to use sideways acting pens instead of the normal needles as the signal was insufficient to perforate the paper tape.



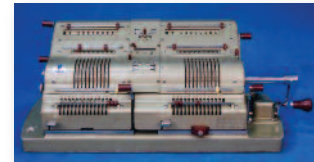
A Morris Commercial Office vehicle 4*2

The vehicle shown is in a different livery. The photo is used with the kind permission of Richard Huelin, www.planefacts.co.uk.

The Astro Equipment was housed in an Office Vehicle.

Calculations

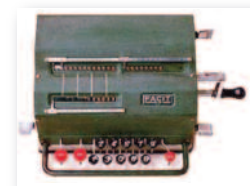
Initial calculations were performed using data from: -
 "Apparent Places of Fundamental Stars."
 Star almanac for Land Surveyors.
 Peters 8 figure table of natural trigonometric functions.



Brunsviga double bank machine.

The team returned to 13 Field Survey Squadron at Fernhurst for the winter of 1958 and during this time the OC of Op Emily changed to Capt. Pycroft RE.

During this time there were several changes in personnel with some National servicemen completing their service. Part of training involve building a Bilby tower in the camp. The Astronomical team also spent some time at Liddington Castle (grid ref SU2098279752) one end of the Ridgeway Base observing to determine for personal equation.



Facit K.

We returned to Hemswell in the spring of 1959 and completed the surveys. One memorable incident from the task was the lowering of the tripod for the Geodetic Tavistock from a water tower without checking the knots in the rope resulting in a broken tripod. Luckily a repair was carried out at the RAF workshop!

I have a vivid recollection from the period at RAF Hemswell, I was reading a book "101 nights" about a Bomber Squadron at Ludford Magna during WW 2. Ludford Magna was to be one of the Thor sites. On our first visit there we found bombs still stacked alongside the runways thirteen years after the end of the war, any smoking materials were contraband and had to be handed in at the entrance to the site!



David Martin digging for the Bilby Tower construction at Fernhurst.

After the rocket sites were constructed each rocket had monoliths on which theodolites could be mounted and internal triangulation and an astronomical azimuth was completed at each site.

At this stage a second T4 theodolite was acquired and I had the privilege of becoming the second observer alongside Bob Louden until a posting in August 1960 to Cyprus as a member of the Boundary Survey for the Sovereign Base areas.

Some photos from the time

The team in 1958

Back row - ? David Martin ?

Centre row – Neville Borley ? ? ? Albie Field, Pete Attwood, John Boyd

Front row - Chris Everett, Pete Riffle, Capt. J Henshaw, Bob Louden, ?

My apologies after 60 years memories fade!



Ely Cathedral the location of a trig point for Feltwell complex.



Typical water tower trig point on top,



Catfoss site during construction taken from Catfoss tower.



The view from the top of Goole Water tower.

Goole Water Tower, trig point on top used during Driffield complex.



Albie Fields - Worked with Middlesex County Council surveyor's department as a trainee until May 1957, then joined the Royal Engineers. Trained at SMS as a Surveyor Trigonometrical and then posted to 13 Field Survey Squadron from 1958 to 1960. Posted to Cyprus with 47 Survey Squadron & 1 ASLS, from 1960 to 1963. Returned to the UK and joined 19 Topo Squadron & SMS from 1963 to 1965. In 1965 was posted to 84 Survey Squadron, Singapore, Borneo, Malaya & Thailand. In 1968 posted to Chepstow AAC as an instructor and then moved to SMS in 1971 also as an instructor. Left the army in 1974 and joined Hydroland Surveys in Scotland as a Field Surveyor. Hydroland Surveys folded in 1975 so joined National Coal Board, Opencast as a surveyor and remained with NCB until redundancy in 1989, when he and his wife moved to Torquay.

RE Geo - what are we doing, and where are we going?

By Col Roly Cockwell MBE. CRE Geo, NCGI Dep Hd - Deployable and JFIG ACOS J5



It is some time since I or my predecessors put pen to paper for the Ranger so it is timely to provide a snapshot of what Royal Engineers (Geographic) is doing, and some thoughts about where we are headed in the future. I'll start with a brief update on how we are currently structured, and an example of recent work by RE Geo soldiers and officers in support of UK resilience, before outlining how I am characterising what we do for Defence (now and in the future), and my current priorities.

RE Geo remains much the same size and shape as it has for the past decade. Our strength on paper is around 80 officers and 470 soldiers across the Regular and Reserve components, split between 42 Engineer Regiment (Geographic) at Wyton and a 'diaspora' who are embedded in Army formations at Brigade and above, in other parts of Joint Forces Command, and with small numbers in the Navy and RAF. There are some gaps, but overall the manning position is very healthy – especially when compared to other parts of the Corps and the Army. The Regiment is now very well established at Wyton and was honoured to receive the Freedom of St Ives earlier this year. The whole RE Geo 'family' is overseen by a small HQRE Geo staff who provide the link to wider Corps, Joint Forces Command and Army structures on matters including People, Capability Development, Concepts and Doctrine, Training and Assurance. Together, HQRE Geo and 42 Engr Regt (Geo) are the 'Deployable' pillar of the National Centre for Geospatial Intelligence, known as NCGI-D. The other two 'pillars' of NCGI are NCGI-Foundation (Defence Geographic Centre and No 1 Aeronautical Information Documents Unit) and NCGI-Analysis (evolved from JARIC and then DGIFC / DIFC). For the time being, NCGI and the Joint Forces Intelligence Group remain very tightly linked, with the same 1* commander.

Within RE Geo our well-established 'plug and socket' operating model remains intact, with 42 Engr Regt configured to provide 'General support' that reinforces the embedded 'Close support' geo teams as required for exercises and operations. The Regiment provides our capability development 'engine room' and a number of essential support functions to the whole RE Geo community including system support and geospatial data management. It is also the home of our specialist capabilities, which continue to include deployable bulk replication, geospatial information dissemination, geodetic field survey and specialist support to UK resilience.

42 Engr Regt (Geo) continues to be thinly spread and very busy supporting exercises and operations across the globe. As I write this the Regiment has soldiers deployed on 5 operations, 4 of which are overseas. It has deployed people on 53 exercises so far this year including an interoperability exercise with their Australian counterparts and a major warfighting exercise in the USA. We continue to put soldiers aboard ships to augment the Royal Navy's developing cadre of geospatial analysts and, as you will have seen on the news, the Regt's Special Support Team (SST) have been deployed in support of Op MORLOP, the MOD response to the nerve agent poisonings in Salisbury.

Support to Op MORLOP. On 8 Mar 18, SST deployed with other elements of the Technical Response Force (TRF). As well as SST's well established geospatial collection and analysis capabilities this deployment was a great opportunity to showcase and test the utility of a recently procured commercial off-the-shelf Remotely Piloted Aerial System (RPAS) and camera in an operational context. The RPAS was deployed to capture high resolution geographically referenced imagery and rapidly generate photogrammetric 3D models and ortho-rectified imagery. These products were used for task planning, orders, briefings and to enable the work of a wide range of other agencies who were also supporting the investigation. Some example products are at Figures 1 and 2.

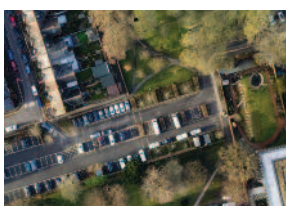


Figure 1 – Ortho-rectified aerial imagery created from 20 overlapping georeferenced high resolution images. This product was used to measure gaps between vehicles to aid vehicle recovery planning.



Figure 2 – Snapshot of a 3D model of a site of interest for the investigation, created on-site from 30 overlapping oblique high resolution images. The model was used for pre-mission briefings and to confirm dimensions of buildings and vehicles.

What we do

Over the years RE Geo and its predecessors have successfully evolved to exploit the opportunities of new technology and to meet emerging Defence requirements, and I see this ability to change and adapt as one of our core strengths. The evolution continues, and I believe it may be about to accelerate. Defence information systems are being modernised which should eventually automate or remove the need for much of the day to day routine work of geo cells, especially the transfer of geographic and battlespace geometry data between incompatible applications and air-gapped systems, and the creation of bespoke paper and/or acetate planning maps. This represents either an opportunity or a threat depending on how well we position ourselves to respond. To thrive in this new environment we will focus on delivery of 5 key outputs for Defence, primarily in the Land Environment. We will:

- underpin the Common Operational Picture by providing efficient access to authoritative geographic data, and maps and charts (both electronic and paper);
- be expert Military Geographers, able to assess and communicate the impact of physical and human geography on military operations;
- conduct geospatial, temporal, and data analysis – drawing on any data, not just geography – to provide actionable insights and distil clarity from complexity;
- facilitate reachback to the National Centre for Geospatial Intelligence for access to the full spectrum of GEOINT capabilities;
- deliver precise and assured geodetic positioning in the Land environment.

How we do these things may change, and our future role in delivering the Royal Engineers' surveying capabilities is under review, but RE Geo is uniquely well placed to deliver these outputs in the Land environment and – despite the promise of automation and the latent potential of artificial intelligence – I am confident that the Defence requirement for all of them will endure for at least the next decade, and probably much longer.

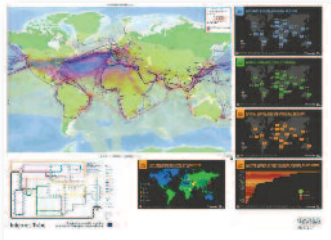


Figure 3 – Early work by 77 Bde geo section on visualisation of the Global Information Infrastructure; an example of RE Geo product drawing on data and analysis beyond what would conventionally be considered geospatial.

Priorities

In addition to enabling the continuous support to operations and training that is provided by 42 Engr Regt (Geo) and RE Geo force elements embedded across Defence, HQRE Geo is focussed on delivering progress in 5 priority areas.



CRE Geo priorities for 2018/19

The first is to maximise the benefits of HQRE Geo and 42 Engr Regt being part of NCGI, including through training and education to improve RE Geo officers' and soldiers' understanding of the full spectrum of classified GEOINT capabilities and how to task them effectively in support of operations. We are also working to improve integration between teams in 42 Engr Regt and the NCGI Analysis

pillar that have similar missions and tasks – including support to UK operations and Humanitarian Aid and Disaster Relief.

The second, which on operations would be directly supported by the first, is to optimise RE Geo's support to a warfighting Division. This is part of a wider re-set across Defence from counter-insurgency campaigning to contingent operations including state on state conflict in all its contemporary guises. This includes a review of whether RE Geo soldiers should be integrated into Battle Groups or held at Brigade level and above, which continues to promote a lively debate. This workstrand also requires sustainment and replacement of the TIGAS geo support mobility platform (pictured at Figure 4) as well as changes to the scaling of tactical radios and CIS in 42 Engr Regt.



Figure 4 – The TIGAS geo support mobility platform in action.

The third priority sounds dull and technical, and has some significant risks, but is potentially game-changing. In close cooperation with key stakeholders in JFC and Army HQ we are seeking to get the specialist Geographic Information Systems (GIS) that RE Geo uses to deliver its operational outputs hosted on 'core' MOD systems, both fixed and deployable. This will have two key benefits:

- It will enable RE Geo to move further beyond terrain analysis into data analysis, applying the power of GIS to the full range of location-based data that is available to Defence to improve the quality, range and timeliness of decision support that we can provide to Commanders and staff.
- It will also reduce or remove the requirement for RE Geo soldiers to be system and network administrators, allowing greater focus on our core geospatial role and releasing training time to enable us to get beyond terrain analysis to (geospatial) data analysis, both spatio-temporal and potentially beyond.

My fourth priority is to improve how we grow and retain specialist expertise in five key areas: remote sensing and photogrammetry; geospatial data management and web services; advanced geospatial analysis; geodetic survey; and information systems support. This includes implementation of a structured approach to specialist streaming within the single Military Engineer (Geographic Technician) trade, with an appropriately qualified and experienced Subject Matter Expert in the rank of WO2 at the head of each specialist stream. In the long term, depending on the outcomes of work against priorities 3 and 5, the last two streams may not endure in their current form but currently expertise in all five areas is essential to realising our full potential.

Lastly, with support from 8 Engineer Brigade and the Royal School of Military Engineering, we are reviewing how the Corps delivers its survey tasks, both geodetic and construction. The review will assess whether the separate ME (Survey) and ME (Geo Tech) trades as they are currently trained, equipped and organised fully meet Defence's requirements for survey in the land and littoral environments, and take a holistic look at our surveying capabilities in order to make recommendations for improving effectiveness and efficiency.

In summary, RE Geo remain in high demand across Defence and the expertise of our soldiers is as impressive and relevant as it has ever been. I have no doubt that there will be significant challenges ahead, some of which we have identified and are already grappling with, and others which have not yet emerged, but I am confident that as a core part of the National Centre for Geospatial Intelligence and with the highly educated and adaptable officers and soldiers we are so fortunate to have, RE Geo is well placed to deal with whatever the future brings us.

Allied Air Forces Memorial & Yorkshire Air Museum



By Geoff Hurst & Ian Richardson

This unique Museum is dedicated to preserving the memory of allied aircrews of all nations, from WWI to the present day and is based on the authentic WWII Bomber Command base, RAF Elvington.



Handley Page Halifax – 'Friday 13th'.

Originally constructed as a grass airfield, it was rebuilt with three concrete runways. No. 77 Squadron, formerly involved in the dropping of propaganda leaflets, or 'nickels' as they were known, were the first inhabitants of RAF Elvington, now converting to operate the Handley Page Halifax four-engine bomber. They began arriving in October 1942, with the first missions taking place on 8th February 1943. As part of 4 Group Bomber Command, Elvington was linked to the other airfields of RAF Pocklington and RAF Melbourne, with the three referred to as '42 Base'.

In October 1943, the first French Air Force airmen began arriving at Elvington, having been taken out of action in North Africa, to be integrated into the Royal Air Force. Thus, Elvington became the only such station to be operated by French RAF

Bomber Command Squadrons. Perhaps Elvington was chosen as it was the closest to No. 4 Group HQ, located at Heslington Hall, now part of the University of York campus. The first French Squadron was formed on 16th May 1944, with the formation of 346 "Guyenne" Squadron, and the tricolour was raised on this day. 346 Squadron became operational, again flying Halifax bombers, in the lead up to the D-Day Invasion, taking part in many raids on targets on the Normandy Coast – a traumatic initial task for the crews to bomb their own country.

The second French Squadron, 347 "Tunisie", formed on 20th June, and together the two Squadrons played a full role in the grinding attacks on the German industrial heartland until the Allied victory was secured. In fact, they remained operational in a peacekeeping and support role as part of 40 Group Maintenance Command, until October 1945, when the two Squadrons departed, with the remaining Halifax bombers, to Bordeaux, Base 106 Aériennes at Mérignac, forming the basis of the post war French Air Force.

Abandoned after this, the airfield was in 1952 loaned to the United States Strategic Air Command, upon which the runway was lengthened (1.92 miles) and reinforced, a new Control Tower constructed, a huge concrete apron built (49.374 acres), underground fuel storage and pipelines, in order to accommodate a new generation of mighty American B-52 jet bombers. This came to nothing as it never became operational and the site was vacated in 1958. The airfield remained as MoD property and used by various RAF bases as a training and relief landing ground and also by Blackburn Aircraft Company (now BAe Systems) for test flying the Buccaneer prototype.

In 1983, a successful campaign was launched to try and save part of the historical site of RAF Elvington, which saw the formation of the Allied Air Forces Memorial & Yorkshire Air Museum. Almost immediately, the Museum began to receive donations of artefacts, records, books, photographs, uniforms and other documents. In June 1985, the Yorkshire Air Museum & Allied Air Forces Memorial Ltd, was granted charitable status and became a Company Limited by guarantee and registered with Company House. Importantly, in March 1992, it was registered (no.66) with the Museums & Galleries Commission, now part of the Department of Culture Media and Sport. By 1993, the Yorkshire Air Museum & Allied Air Forces Memorial Ltd began to purchase the site, which it had been renting, securing 8 acres. As of Aug 2018, we now own 20 acres.

Over time, the collection has grown considerably, and in 1999, The Museum made a huge step-change to become a professionally run organisation, with properly defined departments and management structures.

The Collections (Archives) section of the Museum is an important national repository for an overwhelming array of items. The Registration of the Museum was important because it means that our curatorial staff, all volunteers, follow the National Accreditation process which ensures that most of the items donated into our care, become part of the national collection.



Aircraft camera - Type F134 Serial No 1048 complete in original box.

A Cumberland Map pencil with associated silk map, is on display detailing the intricate and devious methods used to avoid capture. Numerous navigational instruments such as Lattice Chart Interpreters, Bearing & Distance Plotters, Air Position Indicators and Map measurers, Compasses and a range of Plotters are also within the collection.

The Map Collection comprises approximately 2500 maps and charts covering a broad range of mapping requirements used by the RAF in all theatres of both war and peacetime from the early 1930s through to the 1990s. The Collection is currently being reviewed and a major updating, assessing and cataloguing exercise is underway to provide a more comprehensive platform for future researchers and historians to access the collection. The work being done will enable the Museum



Cumberland Map pencil with associated silk map.

database to provide a more detailed record of the Collection, identifying the maps in the numerous 'Geographic Section, General Staff' (GSGS) series.

The collection houses a wide range of maps from early Touring & Motoring maps utilised in the 30s to prepare Military mapping, early Ordnance Survey Aviation maps, Route and Navigation maps, Silk maps, Target maps and Operational Planning maps covering Europe, Asia, North Africa and North America, the latter primarily used by the British Flying Training Schools (BFTS) which were established all over the USA and Canada as well as other Commonwealth



Target and Operational Planning map.

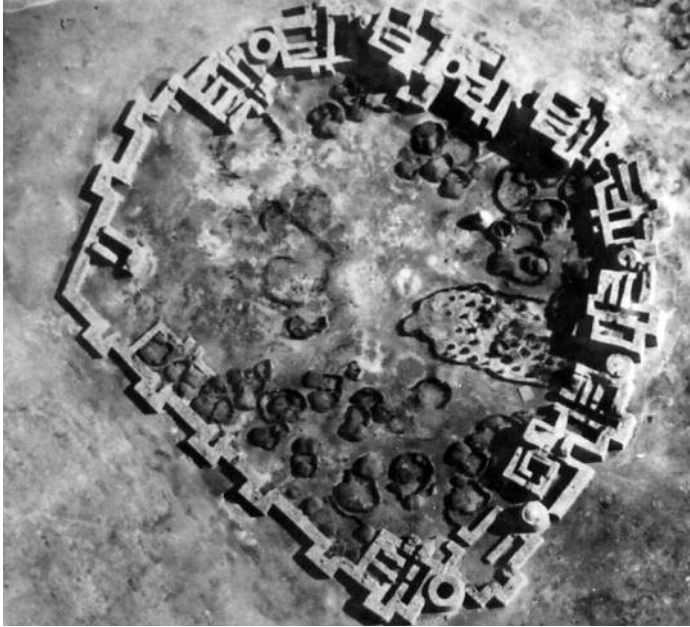
countries, to provide safe havens to train our UK Pilots (including the co-authors' own father!). Most of these maps were produced by the War Office or the Ordnance Survey.

Maps produced by the German Military, the M745 series, also form part of the collection along with a random group of maps and charts donated usually on behalf of former RAF personnel which cover such things as airfield layouts, ROC posts, restricted flight areas and naval operations.

The current list of GSGS maps include, but is not limited to the following Series: -

2465; 2555; 2758; 3906; 3907; 3908; 3957; 3978; 3982; 4042; 4072; 4080; 4338; 4369; 4370; 5012 and an Asian set in the HIND series, 5000 and 5002.

The full collection index will be produced once this overall exercise is completed.



Mystery Air Photograph

What is depicted in this Air Photo?

Answer in next years Ranger.

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Lieutenant Colonel Walter Dennis Rushworth MBE BSc FRICS RE

Dennis Rushworth who has died aged 91 was a land surveyor and cartographer and an adviser and expert witness in international border disputes. Born in Camberwell London on 14th September 1926 and was educated at the John Lyon School Harrow. He joined the Home Guard in 1941 and then went on to Cambridge University on an Army Sponsored Cadetship in 1944. He started his RE basic training at Shrewsbury in March 1945, followed by Survey Trng at Longleat in July 1946. He was awarded an emergency commission as a 2/Lt RE in August 1946; passed WOSB and awarded a regular commission as Lieut in Nov 1947. Having completed his survey training he was posted to O.S. from 1948/50.

Posted to MCS Shrivenham in 1951 he took and passed BSc Finals with First Class Honours and promoted Captain in 1954. He joined 22 Field Engr Regt in Mar 1956 with various tasks around Middle East, including getting Centurion tanks into Jordan in support of their action against Israel. After being on loan to Cyprus police in 1957, he re-joined 22 Regt as Adjutant. Dennis returned to the UK; and in 1960 did a one year Geodesy course at Oxford School of Surveying. In 1961 moved as a Major to JARIC RAF Brampton to set up "The Photogrammetric Section" later renamed the "Technical Support Squadron" and undertook many visits to US Intelligence and Mapping Agencies. He was then posted with wife Valerie to Aden, as OC 19 Topo Sqn and later posted with 19 to re-join 42 Svy Regt at Barton Stacey in Feb 1964 along with his wife and son Adrian.

From 1965 to 1967 Dennis was a Divisional Officer (Carto) at MCE Feltham and on promotion to Lt/Col was posted to AFNORTH Oslo as Chief Geographic Officer. He applied and was accepted into the Civil Service and posted to Tolworth Surrey as Principal Survey Officer. In 1970 was promoted to Ass Dir (Fd Svy) DOS Tolworth (the most satisfying job). From 1976 until retirement in 1986 he was appointed Director of the Mapping and Charting Establishment (Feltham), Ministry of Defence, responsible for the provision of maps to the Army and RAF.

During his Army service he was seconded to the Argentine-Chile (Palena) (1965) border dispute case (awarded an MBE) and after retirement had been an adviser and expert witness to Israel in the Taba case on the Israel-Jordan border - Chile in the Laguna del Desierto case - Namibia in the Kasikili Island case and to the International Court of Justice (ICJ) in the El Salvador-Honduras case. Dennis published a series of articles on the practical application of surveying and mapping techniques to the arbitration of land frontier disputes for the International Boundaries Research Unit (IBRU) – Durham University.

His funeral took place at the Chichester Crematorium, Westhampnett Road, West Sussex on Wednesday 31st January 2018 at 3.30pm, and was attended by family and friends, followed by a reception at the Chichester Park Hotel.

(Details of Dennis Rushworth's career were kindly provided by his son Adrian from his father's original notes)



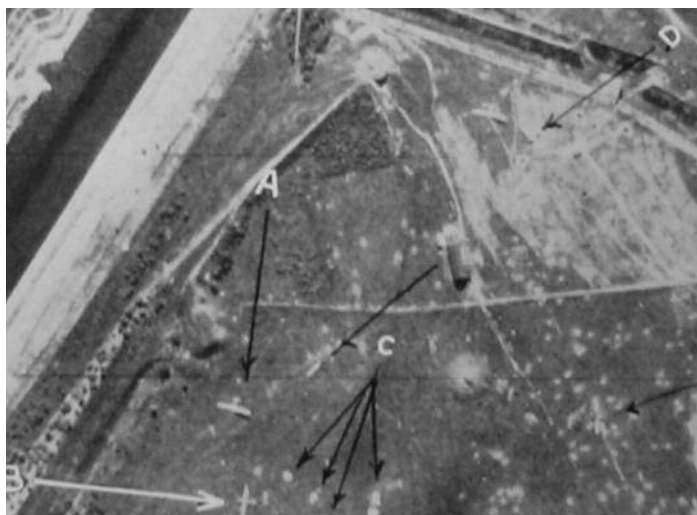
Lieutenant Colonel Walter Dennis Rushworth MBE BSc FRICS

- 1926 Born on 14th September in Camberwell (South London) 1928. Moved to Northolt Middlesex
1931 School – Northolt Primary School (Demolished 1937 to make way for Western Avenue)
1933 Boys High School Harrow Middlesex (Private Prep School)
1936 Lower School of John Lyon Harrow (Private secondary school, now a Public School)
1938 Joined School Cadet Corp (Fore runner of Army Cadet Force)
1941 Passed school certificate (With mature exemption – equivalent to ‘O’ level)
1941 Joined Home Guard
1944 Passed Intermediate BSc Exam (Equivalent to ‘A’ Levels)
Sept – Cambridge University (Army sponsored cadetship)
1945 Mar – Joined Army for primary training at Shrewsbury
May – Royal Engineer basic training at Clitheroe Lancashire
June – Scarlet Fever – 5 weeks in Isolation Hospital, Blackburn Lancashire
Sept – Completed basic training. War Office Selection Board (3 days).
Passed W.O.S.B. for officer training
1946 Jan – Pre O.C.T.U. training at Wrotham Kent (including????? ????? a lorry and a motor bike)
May – Officers training at R.E. O.C.T.U. Newark Nottinghamshire
Jul – Still as officer cadet moved to Survey Training Centre at Longleat Wiltshire
Aug – Commissioned as 2nd Lieut (Emergency Commission)
Nov – Completed Survey Training – returned as teaching staff
1947 Passed W.O.S.B. to become a Regular Officer (Lieutenant – 1/11/47)
First Aeroplane flight in an Anson at RAF Benson Oxfordshire
1948 Posted to Ordnance Survey (48-50) Chessington Surrey
1951 Posted to Military College of Science Shrivenham Wiltshire
1953 Passed Part 1 of BSc (Civil Engineering) London University
Failed promotion examination to Captain
1954 Passed BSc Finals with 1st Class Honours
Passed promotion exam - Promoted to Captain
Canada (Rocky Mountains British Columbia) with British Schools Exploring Society (3 months)
Travelled by Canadian Pacific Liner from Liverpool to Montreal. Then by Canadian National railway to Winnipeg
and then by Canadian Pacific to Jasper Alberta
Return to School of Military Survey Newbury for further Survey Training
1955 Aug – School of Military Engineering Chatham Kent for Junior Officers RE Training (6 months)
1956 Mar – 22 Field Engineering Regt Tripoli Libya via a 1 week stay in Malta. (First major plane flight to Malta in a
Manchester a civilian version of the Lancaster. Not pressurised flew at 7,000 feet – pretty cold)
Apr – Troop commander with various jobs including locust hunting in the Sahara desert
Met Valerie at Italian classes
Aug – Detached to Jordan via a short stay in Canal Zone Egypt.
Based at Zarqa near Amman at Engineer Garrison North Jordan
Had various other jobs and the assessment of the water supply of 2 Divisions of British Troops which had to be
moved in to support Jordan against Israel and trying to find a way of getting some Centurion Tanks into Jordan
whose only access to the sea is Aqaba on the Red Sea without road to Amman and no low loaders. Travel down the
Hedjaz Railway as inadequate (narrow gauge). Went across the desert with transporters it took 4 days to do a 150
miles. Managed to visit most of the famous sights such as Petra, Kerak, Galilee, Jerusalem and Damascus in Syria.
Engaged to Valerie
1957 June – Married Valerie at Hellingly Sussex, with holidays in Tunisia and Kenya
Dec – Recalled to my Regiment in Tripoli via Middle East HQ, now in Cyprus where I was ‘loaned’ to the
Cyprus Police for 2 months, based in Nicosia
1958 Jan – Re-joined 22 Engr Regt as Adjutant
During the Suez crisis the Regt was brought up to war strength but took no part in the action
1959 May – To England on leave
July – Returned to Tripoli
Aug – Moved with a half strength squadron to Homs Libya. Garrison Commander Homs keeping a barracks
occupied pending the arrival of an armoured regiment. Lived in 2 i/c quarters, with officers in CO’s
quarters
Nov – Returned to Tripoli to prepare for move of Regiment to UK. Occupied flat over Regt HQ
1960 Jan – Moved with Regiment to Chisledon Wiltshire
Valerie went with the troops in a Troopship (HMT Dunera). It was very rough in the Bay of Biscay. I went
by air as I had to stay behind for a while to sit a promotion exam for major (I passed which meant it was in
the bank for when I got the chance of promotion, which I knew would be some years away?)
June – 2 i/c HQ squadron on a 3 month tour in Limassol Cyprus for security duties during the EOKA problems
Aug – Returned to UK to take up next posting
Sept – To Oxford (School of Surveying) for one year post-graduate course in Geodesy
1961 Jul – Due for a posting to Ordnance Survey then it was cancelled in favour of a move to JARIC (UK) (Joint Air
Reconnaissance Intelligence Centre) but had to wait nearly 6 months for a security clearance.
Worked at HQ Mil Survey Feltham as a Major. Lived in flat in Surbiton.
Dec – Moved to JARIC Brampton Hunts to set up a new mini-unit called “The Photogrammetric Section”
(Now named as “The Technical Support Squadron”). Lived in a cottage at Buckden then a quarter at
Brampton
1961 Jan – Visit to US on USAF Invitation orders to liaise on the work of the new section.
Travelled in a USAF MATS (Military Air Transport Service) plane. First trans-atlantic flight
A very interesting and challenging tour of three years, including the introduction of satellite photography.
I had 3 (or maybe 4) visits to US (Pentagon) Washington, AMS (Army Map Service), ACIC St Louis
(Aeronautical Chart and Information Centre) and the USAF Research Centre Rome New York
I also had a prolonged visit to Rome Italy to be briefed in the factory on some new equipment we bought
from them. There were also visits to Ottawa Canada, Karlsruhe Germany and Stockholm Sweden to look
at new techniques and equipment. I managed a long weekend in New York during one of my American
trips

- 1963 Feb – Posted as OC (major) 19 Topographic Squadron in Aden. Mapping the Aden Protectorate (existing maps were made by the Survey of India around 1902) as the area was becoming a bit revolting leading to eventual British withdrawal. Lived in quarters at Bir Form
- 1964 Jan – Adrian born in Steamer Point Hospital Aden
Feb – Returned to UK complete with Adrian in a sort of hammock swinging from the luggage lockers above our heads. We moved in to Barton Stacey Hants where 19 Squadron re-joined the rest of 42 Survey Regt. Lived in a quarter
- 1965-67 Posted as Division Officer (Cartography) to the MCE (Mapping and Charting Establishment) Feltham Middlesex. Lived in quarters at Feltham and Shepperton
C.T.O Argentine/Chile Boundary Arbitration – (Palena case)
- Sept – Promoted to Lt Colonel as CO TSG (Technical Services Group) MCE Feltham – 30/6/67
Posted as Chief Geographic Officer, NATO HQ, Northern Europe in Oslo Norway. Co-ordination of provision of geographic data (mainly maps) for use by NATO ground and air forces in Northern Europe
Decided for various reasons to retire from the Army. I had been thinking of this for some time but the final spark came when the UK Civil Service advertised an appropriate vacancy. I applied and the Civil Service flew me home for an interview. I got the job as Principal Survey Officer with three increments
- 1967 The Army made me see out my tour in Norway and I was posted to the Overseas Surveys Dept of the Ministry of Overseas Development based at Tolworth Surrey
- 1970 Promoted to Assistant Director (Field Survey) DOS Tolworth. Probably the most satisfying job in my career; which I was very reluctant to leave. I still had direct contact with the practical side of map making, but also had to do a lot of planning and organising and overseas visiting including - Nigeria, Ghana, Sentebale, Gambia, Kenya, Malawi, Lesotho, South Africa, Botswana, Swaziland, Cayman Is, Jamaica, Belize, Anguilla, Antigua, St Lucia, Barbados, Senegal, Yemen, Lebanon, Uganda and Tanzania
- 1976 Somewhat against my will I was promoted back to the Ministry of Defence as Director of the Mapping and Charting Establishment (Now renamed the Defence Geographic Centre). I saw this made sense as I had worked for and with the MCE quite a lot and understood something of how it worked. As I expected it did not involve as much technical work as I would have wished but was mainly administration and personal management
- 1986 Final retirement
- 1987-88 Chairman of the RICS (Royal Institution of Chartered Surveyors) Panel vetting and interviewing new entrants
- 1988 Adviser to the Israeli Government (and Expert Witness) in an Arbitration (*Taba case*) held in Geneva on their border with Egypt
- 1989 Director of the “Survey and Mapping Conference” a four-yearly event for the profession at Warwick University
Adviser to the ICJ on El Salvador/Honduras dispute at The Hague Netherlands
Adviser to Israel on border with Jordan
- 1990 Adviser to Chile *Laguna del Desierto case Patagonia* (South)
- 1992 Adviser to *Kasikili Island case* (Botswana/Namibia)
- 2000 Diagnosed with Prostate cancer
- 2002 Moved to Donnington
- 2013 Jan - Anne collapsed with dementia – to St Richards
Mar - Anne moved to Weather????
Sept - Dennis moved to Weather?????
- 2014 Brain haemorrhage – 5 months recovery
- 2014 Sale of bungalow at Donnington

Mystery Air Photograph

What is this air photo detailing? - Published in Ranger 2017



Answer: The mystery image is Eben Emael - Fort Eben-Emael is an inactive Belgian fortress located between Liège and Maastricht, on the Belgian-Dutch border, near the Albert Canal. It was designed to defend Belgium from a German attack across the narrow belt of Dutch territory in the region. Constructed in 1931–1935, it was reputed to be impregnable and at the time, the largest in the world. The fort was neutralized by glider-borne German troops (85 men) on 10 May 1940 during the Second World War. The action cleared the way for German ground forces to enter Belgium, unhindered by fire from Eben-Emael. Still the property of the Belgian Army, the fort has been preserved and may be visited.

Mapping The Falklands

The Directorate of Overseas Surveys 1957-1960

By John Evans - A personal memoir

Introduction

The Directorate of Colonial Surveys (DCS) was established in 1946, its name changing in 1957 to the Directorate of Overseas Surveys (DOS). At this time about 40 surveyors worked in the field overseas while at headquarters in Tolworth, Surrey around 300 computers (human), photogrammetrists and cartographers processed the field work and drew the maps. Its remit was to provide geodetic and topographic control for subsequent mapping of territories administered by the Colonial Office. As a result of advances made during the war years original mapping was now only considered feasible over large areas when vertical air photography was available. The achievement of air photography at a distance from home base is an expensive business and only undertaken where there is a high priority for the subsequent mapping. In the immediate post-war period British Government priority was for major schemes such as the Volta Dam Basin in the Gold Coast, the Ground Nut Scheme in Tanganyika, the Kafue and Kariba Dams in Northern Rhodesia, the military emergencies in Kenya and Malaya, as well as the Central Africa Rail Link between the Copper Belt and the port of Dar es Salaam. Mapping the Falkland Islands by the DOS would have had the lowest of priorities and hardly to be considered in 1956 but for the following circumstances.

The origins of the mapping of the Falkland Islands partly lie in the upsurge after 1945 of aggressive Argentine nationalism by the Peron Government. This came to a head with the Hope Bay incident in 1952 when a FIDS (Falkland Islands Dependencies Survey) party was fired at by an Argentine group. The British Government now concluded that apart from the operations of the FIDS' bases in the Antarctic an effort to extend and validate Britain's position as administrator of the Dependencies should be made through an air survey.

Air Photography

The DCS as adviser to the Colonial Office issued a contract for air photo cover and a topographical survey of the Antarctic Peninsula to be flown by Huntings Aerosurveys during the summer of 1955-56. Taking advantage of the presence of the aircraft, photography of the Falklands was to be obtained either en route to, or on return from, the Huntings FIDASE (Falkland Islands and Dependencies Aerial Survey Expedition) base on Deception Island. Cover of the Falklands was not accomplished that season due to delays and aircraft repairs en route from Canada and damage at Deception necessitating an early return to Canada for repairs in March 1956. The two Canso aircraft arrived back in Stanley in October 1956 and successfully completed the full photographic cover of the Falklands in the following five weeks. The Canso was the Canadian amphibious version of the wartime Consolidated Catalina; they had a range of 1900 miles or over 10 hours flying time and could thus be positioned in Stanley from Montevideo avoiding all contact with Argentina. Their only disadvantage was their limited operational ceiling of 13,500 feet which with the then standard air photo camera lens of 6-inch focal length resulted in a sea level photo scale of 1:25,000 which was an unnecessarily large scale for 1:50,000 mapping and in fact even more so for the proposed 1:200,000 mapping projected for the Antarctic.

A few years later super wide-angle photography would have resulted in a much smaller scale image, fewer photographs and for the Falklands, fewer trig (triangulation) stations, especially on the offshore islets. The quality of the photography was excellent, the clarity startling, while being at such a large scale the smallest point of detail was distinct (the massed heads of the vast molly and penguin colony on South Jason can be seen with a hand stereoscope). Nevertheless, the Canso was probably the only type of aircraft that could have undertaken this work at that time presuming that a survey plane based on the nearest Argentine mainland airstrip was out of the question.

Existing Mapping

The two Admiralty charts covering East and West Falklands originated in the early 19th Century surveys of Captains King, Fitzroy and Sullivan. Later hydrographic surveys were piecemeal concentrating on soundings of passages and harbours. The interior of the islands was mostly devoid of any detail and filled with sweeping statements "Rugged mountain ranges and impassable valleys"

describing the East and “Fine valleys well-watered” for the West. Some farm managers had enlarged these charts and marked them up with their own detail, fence lines mostly. Despite, or more likely because of, having lived for so long without maps there appeared to be no great demand for topographical maps. In 1943 a Section of the Royal Engineers surveyed and published three maps covering the environs of Stanley between Mt Kent and Cape Pembroke.

Beginnings

George Reid, a senior DOS Surveyor, arrived in Stanley on the maiden voyage of the *RMS Darwin* in August 1957. His previous posting had been in hot and humid Gambia, but he had previously had several postings in East Africa. With him came DOS camping and technical equipment. I had just completed my first posting with DOS in N.W. Uganda coping with elephant grass and wild animals. I arrived in Stanley in November as a supernumerary on the *RRS John Biscoe*, the voyage memorable for the loss of the scow and motor boat in a storm off Tristan da Cunha. I joined the permanent residents at the Ship Hotel run then by Mrs Henricksen, at £4 a week full board. George had by now acquired the use of the fairly new FIG 107 Land Rover, registration number 341, also the use of most of the Government troop of horses and two experienced shepherds as horsemen, guides and companions, Frank Smith and Norman Parrin, (a young seaman Leo Berntsen also joined us for the first months of 1958). Luckily the Government troop had been built up and used extensively by Governor Arthur during the previous three years. Consisting of about a dozen well-mannered but mostly heavy riding horses, I think none had been seriously used as *cargueros*. George had also acquired the use of machine-gun pack saddles on loan from the Defence Force that were adapted for our carrying needs. The theodolite in its wooden case was lashed on top between the iron ‘bridges’ that ended in hooks, two a side; bundles of the tent hooked on one side with food, kerosene, stove, lamp and pots and pans on the other. Ideally, observation of angles by theodolite required the surveyor to be at the trig station soon after sunrise and late in the afternoon and evening when atmospheric conditions were most likely to be free of shimmer. Despite the unpolluted atmosphere, theodolite observations were often hampered by haze and shimmer, the former possibly resulting from salt particles in rough weather; shimmer was unpredictable but was only unlikely on rare dull windless days. Elsewhere we were used to camp as near as possible to the trig station for a matter of days or weeks until all observations had been completed. The same applied to the Falklands, camping with tents on hill tops was without precedent but was accepted from the start as an unfortunate necessity. A visit to the FIC (Falkland Islands Company) West Store for a set of *maoris* (are they still called that?), cost £9.4s; a pair of wellingtons completed my meagre bad-weather outfit. Introductions were made at the Secretariat where we had been provided with a spacious office. Then for me, the first time in a saddle for a trot up to the Moody Brook on *Segundo*, a tall placid skewbald, that we normally used as a *carguero* and we were ready for off. Seven days after my arrival my work diary entry read.

December 2 1957. Left Stanley for the Camp at midday with Reid and Frank Smith as guide. Arrived at the summit of Mt Kent in late evening after difficult ascent (from Estancia) with the horses over stone runs and soft ground. S. Gale with snow and sleet.

George and I put up the tent in a hollow between the summit rocks while Frank took the horses down to Estancia. We struggled to complete the angle observations in a continuous succession of gales from south, west and north, with mist and rain for much of the time. We broke camp on the 8th and retired to the relative comfort of the then unoccupied Estancia house. This was a fair introduction to life in the camp for the next two years. From Estancia observations on Smoko Mt. and Bluff Cove Peaks were made before moving the camp at Round Mt. (Mt. Misery the preferred local name). Then a night at Long Island House, and the first taste of Falklands camp hospitality, the cream for morning porridge came brimming in the largest of mixing bowls. On the next day to Rincon Grande and a camp on the summit of Salvador Mt. (French Wreck). After three days my diary read:

December 20 1957. Fine morning and started observations. Low cloud at midday cleared by evening and observations completed. First calm day this month.

Rincon hospitality with Cissie and Diana Pitaluga was a welcome interlude before next day continuing on to Johnson’s Harbour and a camp on Mt. Brisbane. The weather relented and observations were completed the same evening. A cairn was built the next day and after smoko with the three Smith brothers (their combined ages were 253 years) we rode back to Port Louis for the night. Here the two small engraved copper plaques recording the Sir James Clark Ross magnetic observations in the winter of 1842 nailed to a shaly rock on the sea shore seemed to be a miracle of

survival. [see FIJ 1984]. It was now Christmas Day and on to Stanley; *Bailey*, one of the *cargueros* sank deep in a wet patch on the Saddleback taking an hour to escape, small hoofs said Frank. The Stanley Met. Office reported that it had been the wettest December since 1874.

Lessons Learned.

The first journey raised the problem of the wind affecting the theodolite observations. The theodolites used were Cooke Troughton and Simms Tavistocks, one Geodetic reading to 0.5" of arc and two one-second instruments. Careful and accurate observations require the observer's eye to remain steady at the eyepiece of the telescope for up to 30 seconds at a time as the cross hairs of the telescope are carefully wound forward to intersect the target of the distant station; if the target is overshot the whole process has to be started again. This is difficult in a strong wind especially when the theodolite is mounted on a portable tripod. The angle is then booked in a field book, most often with numbed fingers in the Falklands without the luxury of an assistant to book for the observer. The tripod, once set up, must never be touched and the observer is balanced in a possible awkward stance keeping clear of the tripod legs whereas a concrete pillar marking a trig station in the U.K. or in most overseas territories is solid enough for the observer to brace or lean against. Furthermore, the unsheltered tripod and theodolite will vibrate in a high wind particularly when set up on solid rock. A form of windbreak was necessary for future work thus, a large number of individual angles were read and recorded at each station., for example in the case of Mt Adam, well over three hundred.

Elsewhere the target to be intersected at the distant trig station is usually some form of reflected light, the sun from helio mirrors by day and lamps by night. These require a separate tending party and thus were not an option in the Falklands. DOS manufactured in U.K. a portable lightweight quadruped beacon made from alloy Dexion with a black and white canvas hood. These were to be assembled and centred at each trig station being held down with 10-gauge fence wire. These would have been excellent targets but for the wind. The Mt. Kent beacon lasted for several months before succumbing to metal fatigue as did most of the others erected in the early days. The practical alternative was to be a stone cairn (standing man) built carefully and symmetrically and centred over the trig station mark. It was soon realized that on arrival at a previously cairned station, and the cairn having to be dismantled to expose the station mark, that as a corollary, the stones could be rebuilt into a wind-break. On completion of the observations the wall was dismantled and rebuilt as a cairn. This became standard practice at all trig stations with available rock. In stoneless Lafonia a pipe beacon was used quite successfully though the sheet-iron vanes were eventually torn off by the wind. A less successful windbreak was a canvas dodger we had made in Stanley supported by heavy bamboo poles (from *HMS Protector*), it was used with some success until a squall blew it flat along with the surveyor, tripod, theodolite and all, luckily on soft ground.

New lessons to be learned were soon to come. The full team set out early in the New Year with horses and the Land Rover for Fitzroy and Goose Green. Within 50 yards of leaving the road-head at Pony's Pass the Rover became hopelessly bogged in what turned out to be a hole recently made by the Bluff Cove's WW2 Bren Gun Carrier extricating itself from a patch of soft ground. Cross-country driving came with experience and that came with being bogged, often on a daily basis, though in time we got much better at "reading" the ground ahead.

Camping began with the tents. Our stores officer in London had a range of equipment well proven for an East African survey party, but not for a cold, wet and windy temperate zone. One standard issue was a small "A" pole mountain tent known as a "Whymper" presumably based on the pioneer Alpinist's design. It was certainly strong enough to stand up to any wind but being made of canvas; in a gale-driven rain the saturated canvas acted as a very efficient "cool-bag" causing the interior to become a sort of ice palace. It was used once on Colorado Mt. but never thereafter. Why tents used by FIDS surveyors were not supplied is not known but our stores officer did have two tents specially made by Camptors, a long defunct firm, these outlasted the worst of the weather for the whole survey. They were made of expensive *Ventile* with alloy poles in standard ridge pattern. A second interior tent could be tied up to the outer for very cold weather. Even using the outer tent only, it was completely windproof and despite its sail area it was never blown down, it was our haven in a hostile world. Many hours and days were spent in sleeping bags listening to the steady wind roar, the straining hammering tent, the ridge pole whipping and the solid block of tobacco smoke moving back and fore in sympathy with the tent. In those carefree days before the warnings of the Surgeon General, Norman smoked rolls of Capstan Medium, I smoked St. Bruno in a pipe, and sometimes violent oddities like Fair Maid or Octoroon plug tobacco still to be found in some settlement stores. Kerosine powered a Tilley lamp and a two-burner Optimus stove for kettles of tea and the daily hoosh of corned beef and vegetables.

Wickham Heights & Lafonia

As soon as the air photographs had become available from Huntings early in 1957 they were examined by DOS photogrammetrists in HQ Tolworth and marked up with areas where ground control (survey jargon for latitude, longitude and height derived from the triangulation) would be necessary to correct the inherent distortions in the air photographs. We thus had a good idea of where trig stations were needed and a preliminary recce was only necessary to prove intervisibility between hills before the trig station was marked (mostly by .303 cartridge case set in a small cement block or drill hole in rock) and beacons. Once all surrounding trig stations had been beacons then theodolite angles could be observed between each station in turn. Between every major trig station horizontal angles were read in a minimum of eight series swinging the theodolite right or clockwise then again swinging left, giving 16 answers for that particular angle; if within set limits, these were “meaned” to give the accepted angle. Four horizontal series were sufficient at minor stations. A series of four vertical angles were observed at all stations to give the difference in height between stations. Thus, a large number of individual angles were read and recorded at each station., for example in the case of Mt Adam, well over three hundred.



*Beacon being erected on First Mt., Pebble Island
10 Jan 1958.*

Early in January 1958 taking advantage of a *MV Philomel* voyage to Pebble Island I took a quadropod beacon and erected it on First Mt. On return to Stanley we then set off for Fitzroy as noted above. Stations were marked and beacons set up on Fitzroy, Darwin and Walker Creek camps. We joined forces for the first observations in this area from Mt. Wickham (Colorado), making a lower camp at a pond below Wineglass Ridge for Frank and Norman while George and I camped on the summit amongst a jumble of rocks maybe that is why we took the smaller tents (the “Whymper” as above). It started well, from my diary:

January 27 1958. *Loaded two packhorses and made camp on summit of Wickham. Put in a new concrete mark and observed horizontals until dusk. Overcast but calm.*

But the weather worsened with heavy rain and mist, the wind rising on the 31st and continuing until:

February 6. *Wind still strong but windbreak erected and completed verticals and some horizontals before heavy rain in afternoon and evening. 7th. Haze early morning, wind rising later until difficult to stand on summit. Windbreak blown down in hail squalls. 8th. Snow during the night and fine early morning but hills to the north in cloud, snow squalls during the rest of the day.*

On the 10th the weather let up and all angles were completed, Frank brought the horses up and we fled the mountain. No that that was the last of Colorado.

George now left with the horses for Stanley and the northern camps, then regarded as unfit for vehicle travel, leaving Norman and myself with the Rover, and the whole of Lafonia. Here camp driving skills were learned the hard way. We now carried two 6-ft planks for crossing the numerous narrow but deep ditches found in most valleys, a Dunlop hydraulic bumper jack for hoisting the bogged vehicle at any of the several jacking points available on the Series 1. Not having a winch, as a last resort we carried a coil of 8-gauge wire and two iron standards for winding the bogged vehicle out on the tyre face of the wheels on either axle, (as then recently seen on the film “*Wages of Fear*”); this was very effective when the wire did not slip off the tyre face and pinch the brake pipes. A modern 4x4 with limited slip differentials, balloon tyres and electric winch would have been a revelation, a couple of quad bikes even more so, but 341 did us proud, by 1960 covering 12,000 miles almost entirely in low reduction gears.

By March I was beginning to collect place names and marking them on the air photographs. In retrospect this should have been one of the objects of the mapping but at the time it had not been a normal adjunct of DOS field work in Africa. Here names were to be collected by the local administration after the publication of the preliminary edition of the map. This was probably not entirely successful and in later years DOS spent a good deal of effort in collecting place names as a separate exercise. Dick Vinson and Murdo Morrison began this process in North Arm camps but thereafter the air photographs were brought out at all houses we stopped at; the three-dimensional image of the landscape seen with a stereoscope over a pair of photos never failed to amaze. It seemed

to me at times that some names were of very local origin or significance, maybe only used by the shepherd of that camp at that time, their origins are possibly now lost, but accepted forever once on the published map. Who would know even then of “Smashers Standing Man” or “Swankies Nest”. Differential grazing showed up many sections of fence line on the photos, the non-visible sections and gates were added eventually to form the then complete picture of camp boundaries.

We were picked up from Hammond Cove by the new-looking cutter *Gleam* for work on Lively Island and the *Speedwell* from North Arm to Bleaker. Here we had a horse and cart to travel the island to add to our varying modes of travel. Memorable episodes are more often than not concerned with small disasters:

June 7, 1958. *Took on petrol and stores and sent message to Reid via Ceritos. Left Goose Green midday for Cookies Ridge. Slipped off plank bridge (on the Arm track) and bogged down twice on the track, left the track at sunset for Trap but bogged in Archies Pond. Left Rover and walked to Trap House.*

There was more than the official diary presented; it was a Saturday, we set off midday, later than we should. A passenger was the Goose Green carpenter coming along to check up on the shanty. By the time we left the track he was asleep, as it turned out suffering from lethal Carlsberg Special Brew then newly arrived in the Colony. Three miles to the Pojo Gate with no trouble but now pitch dark, I drove straight into the flooded Archies Pond, fooled by the grass growing through the water. The vehicle was abandoned and Norman and I grom-marched our friend the last two miles to the Trap.

Most of the camp houses were then occupied by shepherds and their families. We were always made welcome for smoko and discussion on the weather, the state of the track or the merits of their Eskilstuna knives. On occasion we would stay the night when observing at a nearby trig station. Most memorable in Lafonia was Dos Lomas where Jim and Tom Holland cooked in a shadro and made “winter milk” stacked high in beer bottles in the back shed; this was uncommon then and no doubt now long gone. Mrs Whitney at Egg Harbour had a music box brought out for visitors and the children, who beat me at card games. At Lion Creek house travellers sleeping in the loft could catch up with the latest news of 1921, the ceiling being papered with ancient pages of the “Illustrated News”.

Later in June hopes of observing on Mt. Osborne were abandoned after a heavy snow storm covered the mountains. George and Frank who had been waiting at the Flats Shanty for better weather came over The Gap between Osborne and Canterra Mt. leading the horses in 18 inches of snow. It was time to return to Stanley. Frank set off with the horses while George, Norman and I with Bob Moss of FIC as passenger left Darwin at first light in the now ailing Rover. By the time we reached Fitzroy the exhaust pipe and one front spring had fractured and a rear wheel bearing was groaning. Leaving Fitzroy in late afternoon after a hurried bite with Jim Clement and collecting the mail, a series of bogs eventually left the Rover immobile four wheels down in the track on the Wether Ground. We walked back to Bluff Cove in the dark where George Short found room for us for the night. Next morning in pouring rain the Bluff Cove Bren Gun Carrier was eventually started but threw a track before even leaving the settlement so we walked again, now to be picked up by Jimmy the *Buffalo* ditcher who then more or less immediately lost his drive shaft. We set off again only for the gear stick to shear off at the ball, this was dismantled and we walked back to Bluff Cove spending the rest of the day making a primitive repair. Bob Moss, now regarded as the Jonah of the party left with Jimmy. The next day we walked back in hard frost and continued to just short of Pony’s Pass where the rear wheel-bearing finally collapsed. We walked the last five miles to Stanley.



Pipe Beacon at Saladero 28 Feb 1958.

Completing the East

July and August were spent in Stanley collecting names from visiting managers and shepherds. George went off on leave. Air photos were studied and camp fences and gates annotated. Frank and George Stewart of the Agricultural Department had been to Punta Arenas on the *Darwin* to buy six horses to add to our troop. These had some time on The Canache sand grass before leaving Stanley on 13 September for a non-camping trip to complete additional heights required in the centre of East Falkland. This took in nights at Rincon and Salvador, then Estancia, Top Malo House, Teal Inlet, Hope Cottage and New House returning via Lower Malo House to Stanley on 1 October. This extended trip

in the late winter knocked the stuffing out of the new horses, even though some had been replaced half way by fresh ones. They took some time to recover and were not used again until work started on West Falkland in January 1959.

Mt Usborne remained as the last major hill to be observed on the East. Norman and I drove to the mountain fence above Ceritos on 13 October where Frank met us with the *cargueros*. On a fine afternoon the camp was packed to the summit, a route involving crossing many small stone runs however not seeming to worry the horses. There followed five days of wild weather most of the time in cloud with snow squalls and winds gusting to 50 knots. Apart from building the wind break wall to 6 feet between south and north-west sectors little was achieved until:

October 19 1958. *Cloud lifted by mid-day and began horizontal obs but far too hazy for good results. 20th. Cloud lifted by mid-day with improving visibility. Completed horizontal obs to six major stations but too hazy to sight non-skylined stations. 21. Wind rising to severe gale with heavy rain. Started to freeze at mid-day and frequent hail squalls, very cold (gusts of 70+ knots in Stanley). 22nd. Calm and dull all day with thick haze, completed obs to Track Hill but Rosalie and West Hill not visible. 23rd. Severe gale blowing all day from NW, all supplies finished. (steady 50 knots reported in Stanley). 24th. Hill-fog all morning, Smith goes down to Ceritos for more supplies. Fog cleared completely by mid-day but too hazy for observing. Walked to southern end of mountain and identified San Carlos boundary fence. Haze suddenly cleared at 16.00 and completed all obs by dusk. Broke camp and built cairn, leaving summit of Mt. Usborne by moonlight. At Ceritos for the night.*

Frank took the horses back to Stanley. Having driven the doctor from Darwin to San Carlos, Norman and I returned to Stanley on the 28th in record time for the Rover; 88 miles and only bogged twice. I believe, motor cycles excepted, this was the first time the run San Carlos to Stanley had been completed in one day.

Whilst on Usborne an attempt was made to plumb the depth of Black Tarn by means of an inflated inner-tube, a coil of ex W.D. phone wire and a remote-controlled plumb bob. The results were inconclusive – not believing at the time that the tarn could be so shallow – and have not survived. The wire was abandoned and is possibly still there (see FIJ 1981 p.26)

The Tellurometer

Trigonometry requires the length of at least one side in a triangulation scheme to be physically measured on the ground. This normally required at least four surveyors, some experienced staff and perhaps 20-30 labourers measuring by steel tape a line of 5-10 miles with extreme accuracy. When the survey was being planned in 1956 it was accepted that one of the sides of the RE triangulation of 1943 would be accepted as base length. But in 1957 the successful use by DOS in Kenya of the newly-invented Tellurometer in measuring 400 miles of traverse in four weeks arguably marked the biggest advance in field survey since the eighteenth century. The Tellurometer was the first practical EDM (Electronic Distance Measurement) instrument and its use had virtually replaced classical triangulation as a survey method by 1960. FIDS had bought two Tellurometer sets for use down south and they arrived in Stanley on *RRS Shackleton* in early November 1958. DOS had agreed that George would lead a team of newly arrived FIDS surveyors in an ambitious scheme of Tellurometer measurements between the South Shetlands and Graham Land in conjunction with *HMS Protector's* Whirlwind helicopters. Training in the use of the Tellurometer in the Stanley area culminated in a combined operation with Royal Marines, Royal Navy helicopters, FIDS and DOS surveyors in measuring the distances between the trig stations on French Wreck (Salvador Hill), Mt. Round and Sappers Hill. This was successful and further measurements were planned to connect Sea Lion Islands and Beauchene to the mainland. FIDS and DOS surveyors embarked on *HMS Protector* and sailed from Stanley on 3 December. The first Whirlwind lift off to Bleaker Island got no further than a few hundred yards astern when the



In a gully on Darwin to Fitzroy clay track near Swan Inlet 12 Dec 1958.



Operating the MRA1 Tellurometer at Wreck Gate trig point, North Arm 9 Dec 1958.



Westland Whirlwind helicopter on HMS Protector, off Bleaker Is., immediately after an emergency landing with inflated wheel floats 3 Dec 1958.

engine failed and it just managed to make an emergency landing onto the flight deck. The pilot activated a set of rubber dinghy-like emergency floats around each wheel, the first time they had been inflated in flight. The helicopter scheme was abandoned for the time being and the combined FIDS/DOS overland party measured the three sides of the largest triangle on Lafonia between trig stations Wreck Gate, Cookies Ridge and Track Hill. This was to be accepted as the scale triangle for the whole survey.

The early MRA1 model of the Tellurometer was electronically primitive being pre-transistor, full of delicate thermionic valves, prone to break-down, heavy both in weight and battery-usage and unfitted for sustained use in the field without the service of an electronics engineer. They did however provide an acceptable

answer to the later survey of the Jason Island group. Without Tellurometers the narrowness of the subtended angles from the Carcass/Westpoint base line to the outer Jasons would have made it impossible to get an acceptable result by angular observations only; the same applied to Beauchene Island.

Move to the West

In mid-November Frank and Norman accompanied twelve horses shipped to Hill Cove in the *Darwin*. I joined them on 3 January 1959. George had left on *HMS Protector* to go south with the FIDS team and the Tellurometers. He subsequently received a Royal Geographical Society award for this pioneering EDM survey in the Antarctic.

January and February were spent in reconnaissance and building cairns on trig station northwards from Fox Bay. Angle observations followed, including the major stations on Mt. Adam and Mt. Maria. The Rover was driven to the summit of Mt. Adam only after having to lay the mountain fence, the only occasion this became necessary. A period of low cloud on Adam ended memorably on:

18 March 1959. *Conditions exceptional, continuous sunshine, unlimited visibility and dead calm. Observing all day and most of observations completed.*



The Standing Man on Storm Mt., just being built 8 Mar 1959.

This was probably the best of several very fine and calm days that summer; on the 27th January the twin peaks of Steeple Jason were seen clearly 72 miles away from the summit of Mt. Sullivan. But the camp on the summit of Mt. Maria for the last ten days of March included a gale a day and a period of continuous rain for 20 hours driven by a S.E. gale.

Worse was to follow. Mt. Moody was the last major hill on the West that required the observing of connections over Falkland Sound to stations on the East. On the 7th May, despite the signs of coming winter, Norman and I left Port Howard for Shag Cove house to meet the horses brought up from Fox Bay by George and Frank. On the 9th after snow

during the night the camp was packed to the summit of Moody. The tent was pitched on the bare summit in a snow squall and Frank and Norman returned to Shag Cove. George and I were confined to the tent for most of the next ten days by a mixture of gales, sleet and snow with mist only occasionally lifting from the summit. The Tilley lamp ran continuously, in the dark of the double tent day and night were indistinguishable; combined with the Optimus stove the temperature reached 48F but more often not much above 40F. We lay in our sleeping bags wearing all the clothes we owned. After two weeks:



Frank Smith at Hill Cove, on Captain with Patience, Shan & Satan 20 Mar 1959.



Packing camp to summit of Mt. Moody 9 May 1959.



Camp on Mt. Moody 9-26 May 1959.

23rd May. Freezing hard all day. First calm weather since we camped on this hill, dull but too hazy for much observing. 24th. Mist and rain all day. 25th. Mist all day. 26th. Completed observations and built cairn. Paraffin and food finished so walked down to Shag Cove.

The camp was brought down next day and in driving rain squalls we travelled back to Port Howard atop a tractor and trailer load of wool.



Building observing wall, Mt Moody 10 May 1959.

Small Islands Interludes

Prior to this in March 1959 the Stanley Secretariat burnt down, this disaster included our office where the two sets of two thousand air photos were stored in a wooden box. Being packed tightly in the box the photos were only charred at the edges but were more affected by being doused in sea water. Prints were stuck together in blocks of 50 or so and in order to separate and salvage them the bath in "The Ship" was occupied for weeks with prints soaking in murky peat water.

In April 1959 we embarked on *MV Philomel* skippered by Jack Sollis, which was shipping cargo to settlements between Chartres and Hill Cove. In between it was made available for us to visit and place beacons on the number of small offshore islands around the West that required trig stations. In these cases the strip of overlapping air photographs was broken by at least one photograph that was entirely over the sea thus breaking the photogrammetric connection with the mainland. Empty 44-gallon drums filled and weighted down with stones centred over the station mark made an excellent beacon for intersections from surrounding trig stations. Beacons were placed on the Passage Islands, those in King George Bay, Split, the Twins, Sedge, Low, Dunbar, Keppel, Government, Pebble Islet, Passage and Golding Islands.



Landing the Tellurometer on Carcass Is. From *M.V. Philomel* (anchored offshore) 17 Apr 1959.

Split Island was the most interesting: apart from the dividing chasm, it appeared never to have been burned, the grass and flowers were different, there were large box bushes and the tussac was dense with no passages between the clumps. As we man-handled two empty drums through the tussac and 500 ft to the top of the cliffs we sweated profusely hardly noticing that it was snowing.

On Sedge Island the only remnants of the Hamilton animal introductions were some very handsome and curious Patagonian grey foxes, they watched us building the cairn from no more than two yards away. A flock of Tussac birds under our feet were taking insects as we removed the stones while a couple of Johnnie Rooks eyed my binoculars. Skeletons of cattle lay about, the seashore a fringe of dead tussac and no sign of the Skunks, rheas, parrots and guanaco.

On the evening of 22 April, we anchored in Box Harbour and rowed the dinghy across Anxious Passage to put a beacon on Passage Island. On return we were caught as the tide turned and darkness fell; we had to row hard for two hours to hold our own against a 5-knot stream just to stop being swept into Rock Harbour. It could have been worse as the night was dead calm, the moon rose, the flow declined and we made it back to the *MV Philomel* on the only two oars that remained unbroken.

Early in June the ketch *Penelope* took us to Swan Island, there was standing room only amid a deck cargo of sheep. Marking and observing two resections on Swan, then two days later *Penelope* returned and we motored down the Sound at a sedate 3 knots to arrive at Speedwell Island in the dark. The next two weeks saw the completion of observations on Great, Ruggles, Speedwell, George and Barren Islands using the *Penelope* and the *Ilen* between the islands.

Second Tour

I went on leave in July returning in November. George remained during the winter beaconing and observing the hitherto unvisited Port Stephens camp, Weddell, Beaver and New Islands.

It was not impossible to place the Jason Islands on the map by means of angular measurements only, but the practicalities of shipping in these dangerous waters were against this. Fortunately the advent of the Tellurometer and the co-operation of Captain Butler of *HMS Protector* made it possible to contemplate a survey of the whole Jason group in two days. For the new survey season south, FIDS had brought out four sets of Tellurometers and provided six surveyors for this exercise as practical experience for similar work south. At 4 a.m. in dawn light on 30 December Norman and I were lifted by helicopter from Dunbar House onto *HMS Protector* cruising off Carcass Island to join the rest of the party. George and Frank were landed on the summit of South Jason and pairs of FIDS surveyors were landed on Elephant Jason, North Fur, The Fridays, and Steeple; Norman and I were lifted to the summit of Grand Jason, at least I was, Norman had to jump out – no more than 6 ft. – half way up the hill to lighten the load. It was a fine calm day but low cloud soon capped the summits, this did not affect the Tellurometer measurements but the helicopter would not land in the mist and we had to carry about 200 lbs of equipment down the hill to below cloud level. We were then lifted onto Jason West Cay where the pilot, Lt Ball, found a place to land between a carpet of nesting birds. This was probably the first landing on the Cay since the thirties. The legendary wreck was indeed lying along the spine of the reef, or at least the massive timbers of a section of the keel, keelson and the bottom ribs. After measurements to South Jason, the helicopter landed us on Mt. Byng, Carcass Island. Here an electrical fault exhausted the 12-volt battery and final measurements to South Jason were abandoned for the day. We were lifted back to *HMS Protector* and after a short night aboard left again at 03.55 back to Carcass and then to Cliff Mt., Westpoint Island measuring from both to South Jason to complete the Jason's work.

The *HMS Protector* sailed south with the FIDS surveyors, George was landed on New Island and I continued in January to complete observations on Carcass, Westpoint and Storm Mt. shuttling between the islands on the *Foam*, *Golden Fleece* and *Philomel*. Storm Mt. did not live up to its name, we packed the camp to the summit escorted by Isobel and Roy Ross from Dunbar. The windbreak wall was built on a fine evening. The next day:

14 January 1960. Observing from 05-00, calm to 10 knots, visibility unlimited, 65F. Observed angles all day until 20.00, [including the longest ray of 37 miles to Precipice Hill, New Island]. 15th. Completed obs. Hot and calm, thunderstorm in night. 16th. On Storm Mt. Fine and calm, rebuilt standing man. 17th. Parrin brings horses to summit, broke camp and walked down to Dunbar. 18th. Arranged to be picked up at Grave Cove on RT. Drove to Grave Cove in Rover and crossed to Westpoint Island in ketch "Golden Fleece". Camp taken to summit of Cliff Mt. by tractor.

Returning to Grave Cove on the 25th the Rover drive failed halfway up the first steep hill in the middle of a penguin rookery. The splines of the front drive shaft had worn away and ceased to engage; a rubber boot to protect the splines were not fitted to early Land Rovers and two-wheel drive was not going to climb any hill. While penguins looked on, we hammered in one-inch pieces of 8-gauge wire to lock the splines, repeating this every mile or so as the wire was chewed up, until we reached Dunbar House.

Moving on to Chartres at the end of February, I enjoyed the West Sports including 3.5 seconds of steer-riding. The meeting was marred by the accidental death of Dave McKay with whom we had previously stayed at Shallow Bay. From Gun Hill Shanty we rode to Dunose Head Settlement en route to observe Narrows Hill. Arrival at Dunose was spectacular. As Mrs Paice came to the front door to welcome us, Ryvita a horse of character, our only *carguero* that did not need a *cabresto* ambled up to the house catching the tripod legs in the RT aerial mast stay-wires, feeling some resistance he put more effort into it and pulled the lot down. The mast was bent to the ground, two



Norman Parrin, Joan Plaice & Ryvita at Dunose Head.

of the three tripod legs broken, and the iron bridge was torn off the saddle. Next day was "make and mend". The very large existing cairn we found at Shallow Bluff was different from the usual "standing man"; the stones were lichen covered and had been undisturbed for many years. Out of character too were the remains of a wooden post in the centre of the cairn, its situation overlooking Queen Charlotte Bay suggests that it was built for one of the earliest hydrographic surveys. This was a fine weather camp like much of that summer dry and windy, even the luxury of bottles of milk and a tinful of eggs plus the mail, ridden out by young Joan Paice. The eggs and the tin actually blew over the cliff in one of the more violent "woollies" that developed on the Shallow Bluff cliffs.

Whilst at Chartres Keith Luxton showed me a report dating from the early 1900s originating over a boundary dispute between Chartres and Port Howard Farms. Of interest was the comment in the report on the original demarcation of farm boundaries by the Government Surveyor in the 1860s. He was an ex naval officer and appeared to regard land surveying as a branch of navigation. Using the Admiralty chart, he measured distances in terms of minutes of latitude and directions in terms of the 32 points of the mariner's compass. The former were nautical miles, of approximately 6,000 feet and the latter gave no greater directional accuracy than 11.25 degrees. By implication the calculation of acreage, say for land tax, from these measurements could be called nautical acres which would have resulted in a considerable loss in land tax to the F.I.G. Is my memory correct?

George and I occupied the empty house at Fish Creek in March in order to observe an astro-azimuth at the trig station two miles away. Observations to the southern circumpolar star Sigma Octantis were to check and correct any bearing swing in the triangulation relative to the opening bearing at Sappers Hill. Twelve consecutive cloudy nights kept us there for a fortnight. With time to spare we renovated the fish trap in the creek and lived on smelt fry-ups caught with a bucket and a string vest. Meanwhile our Director in London was anxious to see the completion of the field work in the Falklands so as to post us elsewhere. One rainy night the Fish Creek phone rang – being a little used line the code was something like six long and seven short – and faintly Charlie Maddocks read out a telegram from London: “Evans to leave Falklands immediately”. This caused a laugh and was of course impossible, the April *Darwin* was to Punta Arenas and May was fully booked.

Re-observations of rejected angles took George to Port Stephens and myself to Carcass and Pebble Islands and Port Howard. For the last run on the West, from Port Howard to Fox Bay, the Rover was blessed with a trouble-free run for 62 miles in a snow storm but over frozen ground; having Bishop Ivor Evans as a passenger may have helped. Field work ended in mid-April when horses, stores and equipment were loaded on the *Darwin* at Fox Bay for Stanley. I did in fact get a passage on the next *Darwin* on 1st May and by August was starting three years in Northern Ghana. George left a month later and after leave went to Uganda.

In the years we spent in the Falklands George and I, between us, met and received generous and welcoming hospitality at settlement and shepherd house alike. Whether a stop on the track for smoko or lodgings for a week, there was always a welcome. The farming community helped us with transport, particularly on the islands, from tractors to shipping and not least grazing for our horses. Finally, a special mention must be made of our companions Frank Smith and Norman Parrin who shared our travail, they made it all possible.

Postscript

The twenty-nine maps in the 1:50,000 series were published in 1962 and a 1:250,000 reduction in two sheets was compiled and produced in 1964. For the general public the latter possibly became the more useful of the two series, at least until 1982. At the time the 1:50,000 scale may well have seemed overlarge for these sparsely inhabited islands, but this scale was rightly regarded as the minimum for any future development. The Argentine invasion in 1982, presumably guided by a pirated Spanish version of the 1:50,000, resulted in a demand for maps by the Task Force and a second edition of the 1:50,000 series was produced by the Ministry of Defence within weeks. It was

overprinted with a military grid that must be confusing to those west of longitude 60 where two projection zones overlap. In 1984-86 a Royal Engineers team checked on the original triangulation with a doppler satellite equipment and modern more accurate EDM and the whole scheme was recomputed. By the mid 90's with satellite imagery plus the completion of the Global Positioning System, and using helicopters, our 30 months of field work could be telescoped into less than a tenth of the time. But who would have given the time to collect “Archies Pond”, Swankies Nest” and “Evans’ Shirt”.



On Smoko Mt. 9 Oct. 1958. (John Evans and Geodetic Tavistock theodolite)..

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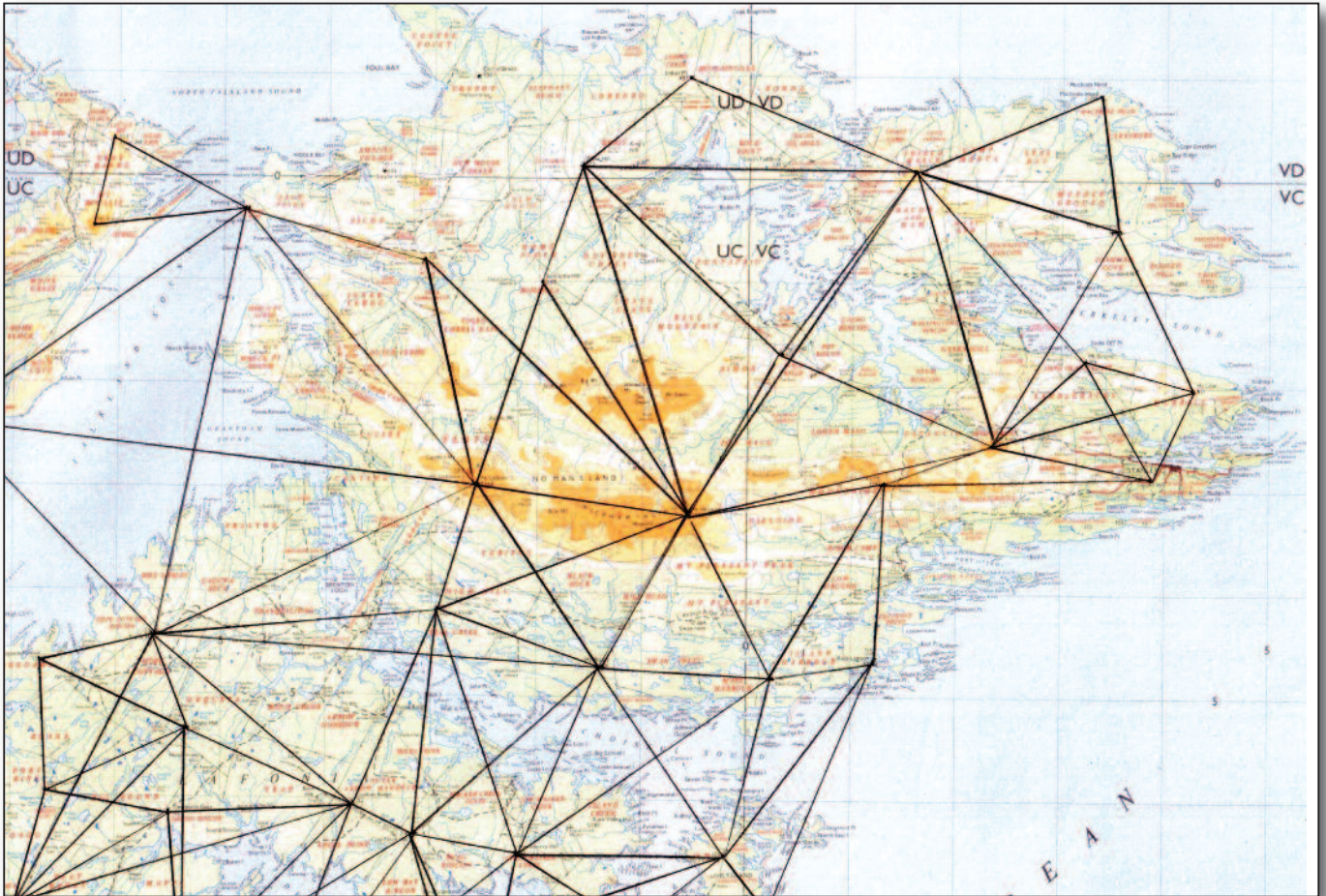
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John M Evans, Llanddeinol, Ceredigion, Wales

Editor's notes:-

FIJ is Falkland Islands Journal.
A maori was a pair of weatherproof trousers and a weatherproof jacket.
A carguero was a pack-horse.
A cabresto was a strap.
A smoko was a term used by the shepherds for a break and a smoke.
A shadro was a large iron cooking pot making stew, also used for making the pasteurised 'winter milk' mentioned in the account.
An account of the 1943 survey by 14 Field Survey Company is in Ranger 2008.

The DSA acknowledges with gratitude the permission of Mrs J. Evans to re-publish this article by her husband John Evans.

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Incomplete triangulation diagram showing most of the principal rays of the network on East Falkland. Redrawn by DSA from the diagram originally published in the FI. Journal. Base-map used was a scan of the DOS 250K Edn 1.

Letters from Sound Rangers

Introduction

This article and an associated lecture given at the Gurkha Museum on Wednesday the 7th of November 2018, together with a more comprehensive book, have arisen because in 1937, when the Head of the Manchester Physics Department, Professor William Lawrence Bragg, left for Cambridge (via the National Physical Laboratory), he inadvertently left behind a file, misfiled inside an uninteresting file which then lay forgotten in a filing cabinet for 60 years. I rescued it from a skip during a refurbishment but put it aside for a quiet moment. The quiet moment eventually came in 2013 when it turned out to contain hand written letters, from sound rangers and those associated with sound ranging, to their honoured leader Captain, later Major Bragg. They have been digitised, transcribed, and where necessary, translated from French. They appear in full in the above-mentioned book and some extracts will be used here to illustrate various aspects of the war, like the attitudes, moods, determination, numbness and stoicism of the men. And there is one letter to Bragg, six pages of undiluted pleasure from Captain Evans, newly arrived in Egypt, which was copied and circulated to all sound rangers as a morale booster.

So who were the Sound Rangers? They were new to the British Army in World War I and indeed, new to warfare. Suddenly, a group of men arrived in the midst of seasoned experienced officers and soldiers, many carrying the rank of Captain, some being promoted to Major, neither rank seeming to have been earned by any military achievement. They came with their pencils and slide-rules and funny talk, even using alien acronyms. They did not always seem to follow the same rules, but when it came to the crunch, they mucked in, and were prepared to make the same sacrifices as anyone else, suffering casualties especially during the 1918 German Spring Offensive.

The scientist in overall charge of sound ranging activities was William Lawrence Bragg, who was only 24 when war broke out. He had been born and educated in Australia but moved to England when his father, William Henry Bragg, was appointed Cavendish Professor of Physics in Leeds in 1908. The younger Bragg then entered Cambridge University, securing a prestigious scholarship by taking the exam whilst (allegedly) in bed with pneumonia, exactly the sort of stoicism and determination that he would shortly need in France. In between his studies in Cambridge, he would pop up to Leeds at weekends and vacations to help with his father's research, during the course of which he came up with an equation, now known as Bragg's Law. One consequence of this work came in October 1915, when a message came through the British Expeditionary HQ in Montreuil, that the young Bragg had been awarded the Nobel Prize for physics, jointly with his father. Bragg was out of his office at the time, probably at the French active sound ranging unit in the Vosges mountains, learning the ropes from the French.



W L Bragg in 1913.

However, it was not Bragg's initiative that brought sound ranging into the British Army's armoury. That credit goes to seasoned visionaries, especially Colonel Harold St John Loyd Winterbotham, who had become aware of the technique and discussed it with his colleague Colonel Walter Coote Hedley at MI4. In researching another project, I have discovered with mounting incredulity that if ever you need to hire the best university trained chap for a scientific job, then a trusted contact in MI4, if you have one, will consult his files and tell you whom to hire and warn you if the person is a communist. Thus it was that Bragg was plucked out of a Horse Artillery Battery in Leicestershire, where his horse rubbed shoulders with the Quorn Hunt, to an interview in Whitehall, where he was told he was going to France, where he would pick up some equipment from Lucien Bull at the Marey Institute in Paris and proceed to make it work.



W L Bragg in 1919.

Lucien Bull was born in Dublin in 1876. His father was Englishman Cornelius Bull, a manufacturer of soft and hard furnishings for Catholic churches, especially oak alters. His mother was French and when Lucien took a holiday with his aunts in France in 1894, he liked it so much that he stayed for the next 78 years until his death. He and Bragg became good friends as the letters between them reveal. The photograph taken in 1915 (Figure 2) shows Bull and Bragg seated, flanked by various Sound Rangers.



*Standing L to R: William Sansome Tucker, Arthur Henry Atkins, Edward T Paris.
Seated L to R: Ivor Garlake Gott, Lucien Bull, W L Bragg, Unknown French officer. Photo: Royal Institution of Great Britain RIIC 3887.*

Cartography and Surveying is a Science

I have read, more than once that World War I was the first occasion when scientists were taken to the front to exploit their science. Nothing could be further from the truth. Cartographers and surveyors have always been an essential

component of any army and should anyone think they are not scientists, such a notion must be rapidly discarded.

Traditionally up to World War I, cartography and surveying was carried out using the eyes and optical instruments, whether looking at church steeples or the stars. But now, for the first time in a war, and this probably has some basis in truth, sound waves were also used scientifically as well as light waves, to accurately locate objects. There was another scientific leap in World War II when radio waves were also used, but that is another story.

The noise made by a piece of artillery firing a shell or cannon ball already gives a crude indication of where that piece is located. All we need to know about sound ranging is that it is an extension of the elementary technique to ascertain how far away a storm is. You start counting when you see a flash and the number of seconds that elapse before the sound arrives, when divided by five, tells you how many miles away the source of the sound is. The direction of the flash is an extra piece of information and with these two pieces of information, you can get the bearing and range. But when it is foggy, or bright sunlight, the flash is uncertain and in order to recover the lost information, a second sound observer is needed, separated along a baseline that is of the same magnitude as the likely distance.

This is how sound ranging works. A whole array of microphones was laid out and by using appropriate mathematics, the location of enemy artillery could be determined. Since the apparatus also told you where your own artillery was, something you already knew accurately, it had a built in means of knowing how well it was doing.

Typical Sound Rangers

In 1915, when sound ranging units were being set up, the two major centres of physics in the UK were in Manchester and Cambridge. They provided many, but by no means all Sound Rangers.

Bragg used a simple expedient to recruit his staff. He attended parade grounds and uttered the simple order: 'Step forward if you have a bachelor's degree in science.'

Of the 25 people photographed in the Manchester Physics Department in 1912, shortly after the discovery of the atomic nucleus there, two were ineligible to become sound rangers in the British Army by virtue of gender, one by death (at Gallipoli), at least three by age and a further three by nationality. Indeed, Hans Geiger, of counter fame, fought for the other side. Of the remaining 16, five became Sound Rangers.



*Manchester Physics Department in 1912. Sound Rangers are marked with *.*

Back row L to R (standing in doorway): J M Nuttall, W Kay, H P Walmsley, J Chadwick.

3rd row L to R: Charles G Darwin, Joseph A Gray*, D Florance, Miss M White, Miss M Leslie, Harold Robinson*, Alexander S Russell*, W Schrader, Y Tuomokoski.*

2nd row L to R (seated): H Geiger, W Makower, A S Schuster, E Rutherford, R Beattie, H Stansfield, E J Evans.

Front row L to R (on the ground): R Rossi, H G J Moseley, J N Pring, H Gerrard, Ernest Marsden.*

Among them was Charles Darwin, grandson of the geneticist. Ernest Marsden, a 3rd year student in the photograph, together with Geiger had done the experiments that proved the existence of the atomic nucleus. The boss Ernest Rutherford, Nobel Prize winner, too old and precious to send to the front, worked on sonar in Scotland.

Other Sound Rangers came from various backgrounds that were never dull. The legendary (or infamous according to Germaine Greer) Durack family of Australian cattle drovers provided Jeremiah Joseph Ernest, who chose to pursue physics at University rather than ride horses round the perimeter of Australia. He was enlisted to accompany hundreds of horses of the Indian Cavalry to Italy. No one could accuse the British Army of hammering square pegs into round holes. He became a Sound Ranger as soon as he could.

Bertram Francis Eardley Keeling was a product of Trinity College Cambridge, an accomplished physicist, astronomer and eventual surveyor in Egypt. His father had been a strict headmaster at Bradford Grammar School, acquitted by a court of assaulting a pupil in his first year of office. Severely caning a boy for letting off caps being seen as a proportionate response. His case was helped by his solicitor using the term 'explosive devices' instead of 'caps'. Keeling was reported in John Innes' famous book 'Flash Spotters and Sound Rangers' as having died shortly after the war from the effects of wounds he had received whilst serving with the Survey. Keeling's contribution to the Egypt Survey and war effort were immense and he deserved his honours. His death, however, covered more accurately in my book, was not as thus described.

William Hope-Jones taught maths at Eton, beloved by generations of schoolboys, as many maths teachers are. I shall finish this article with a quotation of his about sound ranging, chosen because his biographer said 'He placed truth very high on the list of major virtues.'

William Sansome Tucker had beyond all reasonable doubt, very special ears, which alone helped to make sound ranging a success. He invented the 'Tucker microphone' to make the whole system work by differentiating between the boom of the cannon and the shock wave of a shell. After the war he became 'The British War Office expert on acoustics' and in 1928 wrote an article in inviting prose entitled 'London vehicles hum a crazy tune'. Walking around London he described to the nearest vibration per second, the frequencies of every petrol motor, every dynamo or electric motor, the hooting horns, the clanging tramway bells, the grinding brakes, the locomotive whistle, to the exhaust pipe of passing taxis. London hums, he concluded.

One could go on, there are many more, but space does not allow. We need to read some letters.

Extracts from some of the letters

From L Schulz, a member of the États-Major (General Staff) of the Canevas de Tir (Artillery Maps), with whom Bragg established a close camaraderie, in French:

4 October 1915

You are too kind to have taken the trouble to thank me for the welcome, which was extended to you in Markstein. I have not earned it, because your visit brought us a charming diversion and your stay, all too short, nevertheless allowed me to appreciate all the advantages that the Entente Cordiale could provide me with personally, whilst sending me kind and sympathetic friends.

If I do have a complaint about my English friends, it is that they left too soon and could it be that their haste to leave us was so that we could not then show them that the hospitality of our Highlands is a long way below that of the world-renowned Scottish hospitality? If it is serious, forgive us, we were keen to do better; but ... à la guerre comme à la guerre.

I do not want to finish without thanking you for all the gourmandise that you sent me; I invited Monsieur Bouvier to a sumptuous five o'clock, at which your plum-cake was the piece de resistance. We enjoyed talking about the excellent things we did during your far too short visit. Monsieur Bouvier has asked me to convey to you his friendly wishes for the good life.

I hope that you are now in possession of your motor car and that you are getting marvellous results. Good luck, dear friend (Camarade), and if there is any information that you need, do not hesitate to ask me. I will be happy if I can facilitate your task.

2 November 1918

Like you, we are applauding the events of recent days, and our only regret, like you, is not being able to take part in chasing the Boche in this triumphant chivy.

My comrades have good memories of you. And as for me, I beg you: de croire à mes sentiments les plus dévoués.

25 November 1918

In the joy of victory, we must guard against forgetting our loyal allies, who were with us from the first hour and our sincere hope is that this fraternity made of common interests, especially esteem and confidence, survives the conclusion of peace and is even strengthened by the constant exchange of ideas and sympathies, all in favour of a common ideal.

For me, one of the good memories of this campaign is the far too short hours I spent with you, and I hope that we do not stop there!

From Lt JS Collingwood, who had been trying without success to alter the strategy embedded in the mind of his superior officer Major Charles Savile Reid, strategy that had been put there by GHQ at Montreuil. Collingwood had requisitioned a box car, Daimler or Napier, having disparaged a Ford, which he was duly allocated. He made an appointment to see Bragg at GHQ. I think we all know a Collingwood or two.

16 April 1917

Dear Bragge (sic)

I much regret failing to turn up yesterday afternoon as arranged, but I got lost and made for a place on the map by the same name, but not the right one. I rang you up from Arques but could get no reply. From what I know now, I almost think you are too far away for me to risk in a 'Ford' Bread Van but if you could arrange to see me when you are nearer this part I will come like a shot. Please let me know.

I enclose the Major's reply and my own reply to that.

It is ghastly that one cannot arouse interest in this matter, as from what I can see of things the whole of the Sections in this Army will be left in the 'Blue' in a few weeks.

What can you do?

In a few words he ended up by throwing the problem back at Bragg. Arques is 30 miles from GHQ Montreuil, his own HQ. He blamed his bread van. There remains the distinct possibility that he ended up at another Arques (there are many) 155 miles from Montreuil which has another Montreuil, only a few miles away, both wrong places being near Paris instead of on the coast near St Omer.

From Lucien Bull:**18th Nov 1918**

I hope you are not too sorry that the war is over, after all nothing prevents you from going on with the Sound Ranging in peacetime. When are you coming to Paris? Hurry up or all the flags will be down again.

7th February 1919

It seems strange to write to you as Bragg Esq, without any military titles & to be obliged to put 2 1/2d on my letter. I wonder if I should recognise you on the street in civilian clothes & if your marraine would be disappointed or not if she saw you.

It was very good of you to write & say such nice things about what I did for Sound Ranging, but I am sadly afraid that your friendship has allowed you to greatly exaggerate my part in the show.

The 'piece de resistance' the top of the bill letter was written by T Allen Evans. It is too long to include in its entirety and I have taken the editor's blue pencil to most of it. What remains is a glimpse of a few days in the life of a Sound Ranger in Egypt in 1918.



L to R: Capt T Allen Evans, Capt J R Cockburn and possibly 2 Lieut J G Taylor. Photo: Royal Institution of Great Britain RIIC 3889.

20 January 1918

Dear Bragg,

I got a letter today from A.J.P. who is up the line while we are still rustivating on (and sometimes in) the Wadi Ghuzzie. He said he had heard from you, and that you were contemplating writing to me, so I'm anticipating that honour, and taking the liberty of returning the implied compliment. I expect you hear all the technical news from Messrs Cockburn & Gott, so I will try to give you some of the lighter sides of life in the land of milk and honey.

Philpot and I are as thick as thieves. The bond was quite firmly established in France, and was cemented on board the "Saxon" by a lot of very sporty hospital sisters (late friends of Philpot) who required a great deal of looking after. Well we looked after them alright. Of course we decided to go to Alex, where the same sisters were to our certain knowledge, to be found. We

saw Cairo en route for Alex, as we spent about 4 hours there. Luckily we saw the Pyramids from the train as we were approaching Cairo which relieved us of any further responsibility in that direction. We got to Alex the same night, and stayed at a Casino at San Stephano 6 miles out of Alex. The next day we went into the town and got in touch with the sisters.

Phil only met his girl in the evening, but she promised to meet him at our hotel the next morning at 9~A.M. which was very sporting of her as she was on duty all night. At 9-30~A.M.~Phil came into my room and woke me up. He did not look at his best as he had had a bad night trying to quell a mosquito bite on his eye-lid. I believe he had been bathing it all night. I never saw a man in such an absolute funk in all my life. He dressed and shaved in record time!! and went down to meet her if she had waited. P told me afterwards that she only turned up about ten minutes after he got down & he had the cheek to tell her off for being late! That day we advanced our HQ and moved to the Savoy hotel in Alex which was a good deal nearer the seat of operations being in the same street as the hotel in which the sisters were billeted.

I can assure you that two young fellows never had such a concentrated good time as Phil & I had that week. Two of the jolliest girls I have ever seen. They were on night duty. Our second day was as follows. Breakfast (they joined us at our hotel at 9~A.M.). Then drove in a gari to where they bathed usually and we bathed together!! In the afternoon we yachted in the harbour. Tea at the club. Then a special dinner, about which we had primed the head waiter who did us proud with the whole of the centre of the table a mass of roses (which appeared on the bill). Then we took them to the hospital in garis -- cabs just made for two.

Soon after I went along with "W" chiefly as companion to Gott who had a lot of scouting around in advance to do. They seized an enemy house which they made their HQ -- turning out -- much to my regret -- a real live harem. They (the harem) lived in mud huts attached to the house like outbuildings and apparently were only invited in when the boss felt so inclined. Anyhow they all had to go. The harem did the removing carrying away beds and tables and wardrobes on their heads in true Eastern style. The ladies in those parts all wear the harem skirt -- the real thing tho' -- and looks rather fetching. One night walking thro' one of the villages at dusk, I was determined to try to speak to some, as we had never attempted to do so (!!!).

You should have seen the cold reception of our advances!! Phil was certain we should be 'debollocked', as he put it, before we could get away from the place.

You heard about our being arrested as spies out here? Well it has since come to light that Cockburn has appeared in print in the Toronto papers as having been arrested by the Turk as a spy. I can personally vouch for the fact that he has not yet been shot at dawn or any other time. We are a most happy family and Cockburn & Phillips are dear fatherly old things.

Best of fuss to all your progeny in the SR world, and my particular love to Dixon if you ever see him or write him.

Give my best (& respectful) wishes to Col Jack, Major Keeling, Freeland, Allingham, Gerald, Carlyle, etc, etc.

Yours Ever, T. Allen Evans

Finale

'And when we had found the guns, what then? Perhaps you might expect that we would immediately shell them. That would have been the best way of killing as many Germans as we could. But even in war there are better things to do than killing Germans: we used our knowledge more for protecting our own men. Just before our infantry went over the top, we turned the hose on to every German battery we had located, and kept their gunners underground out of harm's way – and a very good place for them too so none of their batteries could open fire, and nobody got hurt. When the last great advance began on the 4th of November, 1918, the Flash-spotters, Airmen and Sound-rangers had marked down every German gun so accurately that on that occasion on the whole front of the Fourth British Army not one of our infantrymen was killed by German artillery fire. And that was a result worth working for.'

William Hope-Jones 1928.

The book *Physicists at War*, by Robin Marshall is available from Amazon as a paperback and e-book.

Robin Marshall FRS - is an Emeritus Professor of Physics & Biology in the School of Physics and Astronomy at the University of Manchester. Marshall was educated at Ermysted's Grammar School in Skipton and the University of Manchester where he was awarded a BSc degree in 1962, followed by a PhD in 1965. Marshall was an innovator in the field of high-energy electron-positron annihilation, making many personal contributions for which he was elected a Fellow of the Royal Society in 1995. He was a group leader at the Rutherford Appleton Laboratory in the 1980s, and was appointed Professor of Experimental Physics at Manchester in 1992. In 1997, he was awarded the Max Born Medal and Prize by the German Physical Society for his contributions to German Science at their National Laboratory in Hamburg.



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The photo-montage below encapsulates some of the events and visits made in recent years.

2014

Visit to IWM Duxford and RAF Wyton.



Mosquito and Roy Wood.



A briefing on the Lancaster Bomber.

2011

DSA Visit to REME Museum.



The Phoenix UAV, with an infra-red camera mounted in a stabilised pod, was launched from a truck-mounted hydraulic ramp. It was deployed to Kosovo, Macedonia and Iraq.



The O.C. briefing DSA visitors in the cabin of HMSML Gleaner.

2015

Visit to Polish military museum.



Briefing on Polish military history and the work of the Polish Field Survey Company in World War Two.



HMSML Gleaner alongside at Gosport.



2015
DSA Seminar & Visit to the Gurkha Museum.

Rob Lyman's presentation to DSA on the Battle of Kohima.