

THE RANGER

Journal of the Defence Surveyors' Association
Summer 2010

Volume 3 Number 1



1990 - 20 Years of Deployed Operations - 2010



Registered Charity No. 221816

Sponsored by ESRI UK

PROUD TO SUPPORT OUR ARMED FORCES.

Require High Res

MADE IN BRITAIN

BAE Systems congratulates 42 Engineer Regiment (Survey) on achieving 20 years of continuous service on operations and looks forward to continuing supporting the Regiment in the future.

DEFENCE
MATTERS



www.defencematters.co.uk

www.baesystems.com

BAE SYSTEMS

REAL PRIDE. REAL ADVANTAGE.

Contents - 2010

Item	Page
Editorial	2
Officers of the Association	2
Defence Surveyors' Association	3
The Future of Ranger	3
AGM 2010 notice	3
DSA Prizewinners 2009	4
9th International Conference on Military Geosciences	9
The 'Maps and Surveys' Seminar 2011	10
Report on the 'Maps and Surveys' Seminar 2010	10
AGM 2010 Details	15
DGI 2010	16
Barton Stacey 25 Years On	19
A View from The Waterfront	20
Non Stop Ops 1990 - 2010	22
Op Granby: The First Gulf War	26
An Aspect of Terrain Analysis and the Gulf War	32
The Yugoslav Wars 1992 - 1996	34
We May Be Gone Some Time	46
Rapid Environmental Assessment – Al Faw 2003	68
Deployable Geographic Involvement in Op Telic	76
Herrick Afghanistan 2002 - ?	90
Chase the Dragon	92
The Fleet HM Unit – One Year On	96
Too Many Sensors - Not Enough Receptors	98
HMS Scott Does Go To The Antarctic	101
Operation Giraffe: The Cumbria Flood	104
The DMGIC Exploits the Power of the VORF	107
Report on the US – UK MOU	107
GISIG Goes From Strength To Strength	108
The DMGIC Exploits The Power of The VORF	110
Geo People	111
The Worshipful Company of Instrument Makers Annual Awards	114
80 Years Ago	116
Senior Army Chaplain at Sandham Memorial Chapel	117
Obituaries	118

In this edition of Ranger...

.....in addition to the usual mix of articles across time and technologies we tell the story of twenty years of non-stop operational deployments.

There have been Military Survey/Geographic troops deployed overseas on operations on every single day since 1990 when Saddam Hussein invaded Kuwait and British Forces joined the international coalition that was put together to liberate that country. With a soldier's full career being 22 years and the first two of those taken up with training, there is now a generation whose entire military career has comprised training for and deploying on operations – witness to this situation are the arrays of medals on SNCOs chests. It is amazing but not since the Napoleonic Wars has the nation seen twenty years of continual operational involvement.

Whilst, as ever, I am grateful to all authors for their contributions I would like to give particular thanks to Andy Swain, Stuart Fairnington and Hamish MacMillan – very busy Officers Commanding FOST HM, 13 and 14 Geographic Squadrons respectively at the time of writing very detailed accounts of *HMS Roebuck's* work during the Second Iraq War, the deployments on the various Balkans operations and to Iraq on Operation Telic. This edition of Ranger will act as a record of all the deployments of the last twenty years and, to a certain extent, chronicle the advances in operational concepts and technology during that period.

However, not all operations have been overseas. 16 Geographic Support Squadron's Special Support Team deployed at short notice to Cumbria to provide much needed geographic support to the emergency services battling the catastrophic floods last November. David White's article on Operation Giraffe shows clearly how advanced military geographic support is as regards techniques and training and how it can add value to any emergency situation.

On Association topics we detail the impressive contributions made by our annual prize winners towards advancing geospatial support to Defence and report on another successful 'Maps and Surveys' seminar on historic matters.

We try to balance our content between the three services and so on the HM front we hear of the new Fleet HM Unit and of *Scott's* deployment to Antarctica whilst Charles Howard-Vyse, Officer Commanding 1 AIDU, discusses the challenges posed by the ever increasing demands for Air Information. Staying with today's issues, being swamped by data is a problem examined by Intergraph's Richard Goodman and Rob Oliver gives his view of the highlights of the annual DGI conference which showcased the very latest geospatial technology.

And finally, this really is the last issue of Ranger that I will edit. It has been enjoyable although a far bigger task than I imagined when I was talked into the role. I wish Peter Walker every success with Volume 3 and will as usual – look forward to a good read.

Alan Gordon

Crown copyright material reproduced with the permission of the Controller, HMSO.

Officers of the Association

President

Major General PF Fagan CB MBE FRICS FCMI

Chairman

Peter Walker

Vice Chairman

John Knight

Royal Navy Representative

Commander D Tilley RN

Royal Artillery Representative

Lieutenant Colonel L McCormack RA

RE (Geo) Representative

Lieutenant Colonel AR Wilby RE

UK Hydrographic Office Representative

Defence Geographic Centre Representative

Mandy Warrington Brown

Hon Secretary

Tony Keeley
Royal School of Military Survey
Denison Barracks
Hermitage
Thatcham RG18 9TP
Tel: 01635 204 244
Email: secretary@defencesurveyors.org.uk

Hon Treasurer

Roy Wood
Tel: 01635 32167
Email: treasurer@defencesurveyors.org.uk

Membership Secretary

James Prain
Tel: 01225 834 733
Email: membership@defencesurveyors.org.uk

Editor of the Ranger

Alan Gordon
Tel: 07765 577 754
Email: editor@defencesurveyors.org.uk

Desktop Publishing: David Johnson

Email: d.johnson838@btinternet.com

Official Address

Defence Surveyors' Association
c/o Royal School of Military Survey
Denison Barracks
Hermitage
Berkshire RG18 9TP

Web Site:

www.defencesurveyors.org.uk

Registered Charity 221816

© Copyright Defence Surveyors' Association 2010

DEFENCE SURVEYORS' ASSOCIATION

Formerly the Field Survey Association

The DSA is a registered charity which maintains liaison between officers, warrant officers and senior non-commissioned officers, both serving and retired, and civilians who are working or who have worked in the Defence domain where the focus is environmental information, hydrographic, oceanographic and geographic surveys, locating and target acquisition, navigation, and geospatial intelligence.

The Association provides a variety of services to its members which include:

- A copy of each edition of Ranger magazine, published annually.
- Visits to a technical, military and historical sites, often not available to the general public.
- Opportunities to attend technical and historical seminars, including an annual seminar run by the DSA covering both historical and current issues.
- Opportunities to attend events organised by other professional organisations working in related fields.
- Opportunities to network with senior personnel in the Defence environmental and geospatial sector.

If you would like to join the Association please complete the application form on the last page of this magazine or visit the Association's website (www.defencesurveyors.org.uk) where you can complete an application on line.

The Future of Ranger

By Peter Walker, Chairman DSA

In 2009 Alan Gordon completed ten years as the Editor of Ranger, during which he has taken our magazine from strength to strength. At that time he requested that he should stand down from his duties but we were unable to find a replacement for him. Since no one came forward I agreed to take on the job as Editor but only when someone had been found to replace me as Chairman. Fortunately, Alan agreed to stay on for an extra year and Nick Rigby has now kindly offered to be our next Chairman. Therefore, unless other candidates come forward Nick will be voted in as our Chairman and me as the Editor of Ranger at our AGM in October.

Furthermore, as I am still in full time employment I also felt that I would be unable to edit two editions of Ranger per year. Thus, from 2010 onwards a single edition will be published in September or October each year. Whilst it is regretted that only one edition will be published each year, the Council took the view that it was essential that we retain the quality of the magazine as the top priority, something that I felt I could only achieve once per year with the time I can devote to this task. However, if someone else would like the job, especially if that person has the time to edit two copies of the magazine each year, I would be delighted to hear from them!

DSA Annual General Meeting 2010

Saturday 30th of October

This year's AGM will take place in what is almost certainly the most attractive location yet – the Cathedral Close in Salisbury - and so it is an occasion not to be missed.

People come from all over the World to see the Cathedral's 402 foot spire and stunning West Front and this is the view from the venue for our AGM - the Rifles Museum, known as 'The Wardrobe'. For details see the notice on page 15.

Opinions expressed in Ranger do not necessarily reflect those of the DSA or the editor.

DSA Prizewinners 2009

The annual DSA prizes are open to all military personnel, civil servants and civilians who, in the opinion of the relevant Head of Profession and the DSA Council, have made a significant contribution to the advancement of the technology or management associated with targeting, locating, environmental support, mapping and the acquisition and management of geospatial data. Some received their awards at this year's Maps and Surveys seminar in June and the remainder will be invited to the Annual General Meeting where the President will present them with their awards.

The citations of the winners are as follows:

Royal Navy

Petty Officer PT Glover

"Danny" Glover joined *HMS Enterprise* in March 2008 during the Commanding Officer's supersession and a handover between Operations Officers whilst the ship was alongside in Gibraltar. During this transitional phase for the ship and Survey Department it was evident from a very early



Petty Officer Danny Glover receiving his prize from DSA Chairman Peter Walker.

stage that his system knowledge and expertise in the use, analysis and interpretation of modern Multi-Beam Echo Sounders and their data was far superior to that of his contemporaries. He quickly gained the complete confidence of Command and became the principal Senior Rating in the Survey Department in this field. His importance to the Department increased further when the Operations Officer was rendered Sick on Shore at the start of a survey in the approaches to Belfast leading PO Glover to adopt a wider planning, supervisory and data analysis role,

Petty Officer Glover responded excellently to his new responsibilities and challenges, labouring tirelessly to maintain the efficient progression of survey operations and ensure the collection and quality control of bathymetry, tidal and geodetic data completely fulfilled the requirements of the Hydrographic Instruction.

He has demonstrated an excellent level of technical ability, professional competence and management skill with unsurpassed enthusiasm and initiative

in fulfilling the Command aim. As a direct result of his hard work and persistence, *Enterprise* has successfully rendered all surveys in a timely fashion and he has helped to establish and maintain a flexible data gathering, processing and training regime onboard.

Royal Artillery

Sergeant HC Taylor RA

Sergeant Harry Taylor of 22 (Gibraltar 1779 -1783) Battery, 32nd Regiment Royal Artillery deployed on Operation HERRICK 10 as an Unmanned Aerial Vehicle (UAV) Tactical Party Commander with the Joint Force Explosive Ordnance Disposal Group (JFEOD Gp) in the summer of 2009. Throughout this tour of duty Improvised Explosive Devices (IEDs) took a heavy toll on both coalition and Afghan forces. Sergeant Taylor's skilful and innovative use of UAVs and the exploitation of their product played a vital part in the nascent Counter-IED battle. Often deploying on the ground and imbedded within the Counter-IED teams to provide live imagery of devices, Sergeant Taylor became an indispensable member of the JFEOD Gp.



Sergeant Harry Taylor, the Royal Artillery prizewinner.

Quickly recognising the limitations of what was then current practice, Sergeant Taylor developed a number of innovative techniques and procedures to support C-IED operations, which have endured to underpin what has become standard practice. During the planning stages of operations Sergeant Taylor developed a web based map system with hyperlinks to UAV imagery, linking them to other products such as Synthetic Aperture Radar (SAR), Ground Moving Target Indicator (GMTI) and Imagery Intelligence (IMINT). It was a huge piece of work, amounting to several terabytes of data, but the final result was an outstanding success. He later produced similar products for all major operations within Helmand in Afghanistan during his tour.

The highlight of Sergeant Taylor's tour was Operation PANTHER'S CLAW to clear the Babaji area of Helmand of insurgents in preparation for the elections. He worked tirelessly in the weeks leading up to D-Day preparing products for use on the ground by the Battlegroups. His workload was extraordinary and he could be found up at all hours communicating with airborne platforms to ensure they gathered exactly the right imagery at the right

point and to the right effect. Over the first few days of the operation well over one hundred IEDs were found by ground troops in the areas surveyed and prepared by Sergeant Taylor.

There is no doubt that Sergeant Taylor's exceptional technical proficiency in getting the best out of UAVs and his innovative creation of mapping products contributed to saving countless coalition and Afghan lives over the last six months.

Royal Engineers (Geographic)

Dataman Overtask Network Geospatial Support (ONGS) Implementation Team

Mr Keith Mosley, WO2 E Simmonds, WO2 J McCurry, SSgt AD Giles, SSgt Tennant

The ONGS Implementation Team successfully deployed and implemented the JAGO DataMan Geoserver capability onto the Afghanistan Mission SECRET network, to provide essential Geographic Information and Web Map Services to deployed UK forces. This represents a huge step forward in capability and underpins a number of other developments that will improve Situational Awareness on the ground.

Together the team were responsible for designing and constructing the physical servers, building the software, designing the data storage structure, loading the geospatial data and developing front end user applications. Three of the team then deployed forward to physically connect the server to the network and set up the initial services. SSgt Giles has remained in Theatre as the Data Manager for Op HERRICK 12 and is now providing tailored Geospatial Services and Web applications to Headquarters Staff and front line troops in Forward Operating Bases (FOBs).

The DataMan capability is arguably the most significant Royal Engineer (Geographic) operational support development since the introduction of Geographic Information Systems. It paves the way for the enhanced delivery of digital geospatial data to future operations and significantly empowers users of command and control (C2) networks.

To meet the OVERTASK aspirations the DataMan server had to be redesigned to a new architecture that demanded an understanding of extremely complex connection interfaces. A new standardised data storage structure was created and new imagery server software has been introduced that provides considerably improved functionality to both the Geo Analyst and the customer. To provide a user interface that is intelligible to the non-Geo specialist a new application programming interface extension has been employed, allowing the Data Manager to create what is now known as 'Geoviewer' in Theatre. All of this new software has been self-taught with the team spending many hours on the internet learning how to use it to best effect.



The DATAMAN Team: John McCurry, Daniel Tennant, Keith Mosley, Eric Simmonds, with Chairman DSA, Peter Walker. SSgt Giles was unable to attend as he was in Afghanistan.

On Op HERRICK SSgt Giles has recently conducted a series of demonstrations to inform potential users of the capability. The demonstrations were received with a ‘series of gasps’ from the Commander Joint Force Support and his staff officers and the Task Force Helmand J3/5 Branch ‘applauded and congratulated’ the Geo team on their achievements. Such is the importance of Geoviewer within the deployed HQ, that when services were recently lost due to a network issue the team were given 48 hours to reinstate the services to the Staff; all this from a capability that has only actually been in Theatre for one month.

Ably led and advised by Mr Mosley, the team has demonstrated initiative, determination and impressive intellect throughout the project. The ability of Op HERRICK Headquarters staff officers and other users to achieve situational awareness, manage the battlespace and view the combined operating picture has been significantly improved. Hence, the profile of the Defence Geospatial Community has undoubtedly been raised as a result of their endeavours.

Royal School of Military Survey

Mr Anthony Jan Borkowski

Mr Jan Borkowski (known affectionately throughout the British Army as, ‘Boris’) is employed as a Higher Instructional Officer (HIO) in the Geospatial Information Management Wing of the Royal School of Military Survey (RSMS) at Hermitage. He is the subject matter lead for the All Arms Map Reading Instructor Course (MAPRIC) and also contributes to the teaching of hand-held GPS and advanced navigation techniques to All Arms courses. In this capacity he represents the RSMS at the Army Training Directorate Working Group as the Mandatory Army Training Test (MATT) advisor and subject matter expert for all Army Map Reading and Navigation training and testing.

Land navigation, map reading and survival navigation techniques are key components of the training which the Field Army now requires as part of the enduring requirement for operations in Afghanistan under Operation Entirety. In this context, Boris was recently approached by the Land Warfare Centre to re-write the ‘Survival Navigation Techniques’ element of the Electronic Battle Box for Unit Commanders. The narrative he provided has now been published in the new 2010 edition. In addition, Boris is the technical author for the Manual of Map Reading and Land Navigation which is widely adopted as the pan-Army ‘bible’ for all matters regarding map reading and navigation. Indeed, the MAPRIC office phone number is regularly used by deployed instructors in all theatres of Operations, as the ‘Map Reading and Navigation’ help-line.

These are by no means isolated examples of how Boris’ subject matter knowledge has been called upon over the years. In 1990 he led a small team to deliver specialist desert navigation training to units deploying on Op Granby (1st Gulf War). In 2001 he and his team developed a new desert

navigation instructor's pack for Op Telic (Desert Storm). He has continued to act as the SME of choice to the Special Forces community and provides the map reading and navigation element for the Special Forces selection aide memoire. His technical knowledge has also allowed him to provide advice for procurement of the new generation of in-service light weight compasses and roamers.

In terms of anecdotal approbation, the Army Rumour Service (ARSE) website (an e-forum where Service personal swap opinions and experiences regarding all military matters) contains numerous comments and citations regarding the extremely high regard in which Boris and the MAPRIC course is held. An example of a typical comment reads:

"Ahhh Boris.....

Spending 3 mins trying frantically to work out your position post blindfold, only to queue up with the answer and have your pride demolished by Boris, "Close, try again".....The worst part was the "Nav Ex" through that horrible little wood, with nothing but a compass and a sheet of A4 with just contour lines on it.....Great course and pub lunches.....

Boris - that guy knows his stuff"

[Army SNCO - ARSE website, accessed May 2010](#)

Since he started as a MAPRIC instructor in January 1984, Boris has trained in the region of 6,000 MAPRIC instructors for the Field Army and delivered the MAPRIC course as far afield as Hong Kong, Cyprus and the Gulf under operational and peace time conditions. In short, there isn't a single unit in the British Army that hasn't benefited from his subject matter knowledge and expertise in delivering the very highest quality of map reading and navigation instructors. Boris retires in early 2011 and the DSA prize will be a fitting recognition of his significant contribution to the advancement of map reading and land navigation.

Royal Air Force Air Cartography

Sergeant S Thayre

Sergeant Simon Thayre's main project over the past year has been the MilFLIP web service which allows all MoD end users to access Flight Information Publications (FLIPs) on a 24/7 basis from anywhere in the world. He has taken the embryonic MilFLIP project, which previously only had a limited and made it into a complete solution in that all of AIDU's products can now be accessed and downloaded. In addition to the access benefits the improved system is saving a great deal of money.

The MilFLIP web service is using state of the art technologies, emerging web based development programming languages and web standards to deliver Aeronautical Information (AI), ensuring customer data requirements are met in a secure and robust environment. Sergeant Thayre's approach to this involved him leading his team writing complex conversion software programmes to convert the bespoke chart formats into web ready PDF files, compressing file sizes suitable for web delivery, design creation and management of the systems back end database, design and creation of the web based graphical user interface. He was also able to incorporate the next edition of temporal changes to products in accordance with the Aeronautical Information Regulation and Control (AIRAC) cycle. The proof of his outstanding work has been that to date MilFLIP has over 1100 individual accounts and has been hailed as a huge success and excellent tool by all who use it. Indeed it has also been seen as the standard in web delivery by our Allied partners, who now want to use this system to display their own products to their own user community.

All of the success above can be attributed to Sergeant Thayre's immense technical and analytical skills as well as his Cartographic experience, determination, enthusiasm and pride in the product and the Unit. In similar vein, Sergeant Thayre has proven to be extremely innovative with some excellent ideas to improve efficiency and increase AIDU's digital data portfolio. There are two notable initiatives he has led on, the first being the creation of a library of Digital Instrument Approach Procedures (DIAPs) that could be ingested into our AI database which would be used to support the C17 fleet. Simon made the initial contact with a production company discussing all the technical issues, negotiated sample data and was called upon for input into the Business Case for the procurement process. This idea also had the extra benefit of making these DIAPs available to our Quint partners, due to the data format being a common military standard. The second idea built on the back of the DIAP project was to procure a piece of software to convert DIAPs into the

correct format for other MOD aircraft fleets. This efficient re-use of data instantly allowed AIDU's DIAP library to become available to a wider customer base such as Nimrod MRA4, Tristar, C130J and E-3D.

Another area of mention in which Simon has contributed enormously to the AI arena is his involvement in the Allied Aero Sub Group. In this he directly supports OC AIDU on technical discussions. He discusses matters concerning joint AI ventures with senior officers and group members with great confidence and is widely respected within this group as an authority on key areas such as digital data standards and the technological developments that can be used to exploit them. Indeed the trust that the OC AIDU places in him is such that he has been selected as the AIDU sole representative at an NGA annual technical exchange visit. The significant leaps in international cooperation are largely down to Sergenat Thayre's proven record of technical expertise.

Defence Geographic Centre

Mrs Sue Illsley

The Defence Geographic Centre has been developing techniques to enhance the foundation data context with significant new data layers describing many aspects of geography that are not usually provided in Defence geographic databases and products. The data has included open-source and theatre-collected data on a wide range of subjects including significant events and activities. Much of the data has been in non-standard formats and Sue persevered in developing solutions to integrate and georeference it to traditional foundation data.

She built upon this enhanced foundation to develop analyses and visualisations of the significant events and activities within the context of the geography of the areas in which they occurred, thus creating new opportunities for subject specialists to enhance their analysis of the relationships between events, actors and geography.

This work has been part of an effort to develop the concepts for presentation to senior UK and international officers concerned with efforts to improve the collection and analysis of data in support of current operations in Afghanistan. The visualisation outputs Sue has prepared have been essential to the success of this wider presentational effort.

UK Hydrographic Office

Paul Marks - Beach Intelligence & Survey Database (BISD) Beach Gradient Spreadsheet

Paul Marks joined the Beach Intelligence and Survey Database (BISD) team within Defence at UK Hydrographic Office in October 2009. He quickly saw potential improvements to refine and automate the beach landing gradient production. In conjunction with the new Rapid Beach Profiling System these products provide critical reference information and improved support to the amphibious community.

Knowledge of the environmental and physical conditions is a pre-requisite if amphibious landings are to be carried out efficiently and safely. Data about the beach gradient is probably the most useful information that can be obtained. The purpose of the beach gradient diagram is to assist amphibious planners with the selection of the most suitable time and location for a proposed landing. Historically, beach gradients were hand-drawn on UKHO-supplied A3 forms. These were used in conjunction with clear plastic overlays showing scaled silhouettes of the fore and aft draft of different landing craft.

The initial requirement - to migrate from paper forms to spreadsheet graphics - emerged from 539 Assault Squadron Royal Marines (539 ASRM) and Commander Amphibious Task Group (COMATG). Paul was part of the BISD team that created the initial spreadsheet to display the surveyed gradient line and include TotalTide values enabling the water level at time of survey (WLTS) to be set. This automatically establishes chart datum and reduces manual data input. The spreadsheet allows the user to try various time/position scenarios using different types of landing craft selected from a "drop-down" list. The fore and aft drafts of the vessel are displayed on the beach gradient (corrected for the tidal level at time of assault) as are the vessel dimensions. A prototype has been used by 539 ASRM on a recent exercise and results returned to the BISD team along with positive feedback.

Paul took the original spreadsheet further following an important advancement in beach gradient production. The introduction of the Rapid Beach Profiling System (RBPS) has resulted in a dramatic increase in data captured in a new format. The RBPS is a combination of echo sounder, GPS unit and computer. It can be fixed to a boat or, for covert surveys, attached to a float and manoeuvred by a swimmer. However, when inputting the RBPS datasets into the beach gradient spreadsheet a number of problems emerged but Paul took it upon himself to develop several formulae to change the data formats and apply the correction for deviations from a straight line correctly. The complex formulas are hidden from the user, who is presented with a clutter-free and intuitive to use display.

An important feature of the spreadsheet is that the user input is kept to a minimum and that all calculations and the gradient diagrams are produced independently of the user. This makes for a spreadsheet which is easy to use and produces an instant result significantly reducing the time spent on creating beach gradient diagrams.

The spreadsheet has been very well received and has been used on recent Exercises. Lieutenant Colonel Anthony de Reya RM of COMATG ISTAR said *“This will represent a significant advantage to the Amphibious Task Group, enabling beaches to be selected more quickly and on the basis of more accurate data interrogation. The significance of this increased capability should not be underestimated...”*

9th International Conference on Military Geosciences Las Vegas - June 2011

The Winter 2009 issue of ‘The Ranger’ carried a report on the 8th International Conference on Military Geosciences, held in Vienna in June 2009. Details of the 9th Conference, to be held in the USA at Las Vegas from 20th to 24th June 2011, are now being posted on its website at <http://www.dri.edu/icmg>.

The conference is being hosted by the Desert Research Institute of the Nevada System of Higher Education in cooperation with the US Army Research Office, and its ‘overarching theme’ is the role of deserts in past and modern warfare. However, the site lists nine possible topics and areas of interest, including historical military geography and military cartography.

There will local excursions within the conference framework and optional excursions across parts of California both before and after the conference itself. A book containing selected papers presented will be published subsequently. A ‘call for papers’ and details of conference registration will be found on the website.

Get it in Print

Do you have a story to tell that you think would be appreciated by Ranger readers? Were you involved in something that, thinking about it now was quite significant at the time and should perhaps be recorded somewhere? Do you think that you have a good idea on how something that is happening today in the Defence geospatial world could be done better? Would you just like to give your thoughts on things to Ranger’s readership and hear what they think? If the answer to any of these is a ‘Yes’ then write it up and send it to the editor for the next issue of Ranger.

The "Maps and Surveys" Seminar 2011

Royal School of Military Survey - Saturday 11 June 2011

The Defence Surveyors' Association will run the fifth in its series of annual seminars at Denison Barracks, Hermitage, on Saturday the 11th of June 2011.

As for previous seminars, the six or seven presentations will cover a variety of subjects presented in generally chronological order, hopefully ending with something on geospatial support to current operations.

New speakers and fresh subjects are always welcome. Informal shorter presentations based on experiences in the defence surveying sphere or on equipments or techniques employed would be welcomed. Anyone feeling that they might offer a subject, or having any enquiries, should contact Mike Nolan at maptnolan@googlemail.com or call 01635 253167.

It is too early to give details of likely presentations but once these have been decided in the autumn full details of the programme will be advertised on the DSA website, in appropriate journals and by email to previous attendees whose email addresses are known.



"16 gentlemen leaving the church will put their left foot one after the other, large and small, and 1/16th part of the total length will be the local foot standard for the local land surveyor."

The cartoon is taken from Jacob Köbel's "Von Ursprung der Teilung" 1522. Jacob Köbel, 1460-1533, was born in Heidelberg. He studied mathematics in Cracow University and worked as a printer in Oppenheim publishing many calendars and books including several on mathematics and instruments and a treatise on surveying and metrology which included descriptions of the quadrant and Jacobstaff.

The "Maps and Surveys" Seminar 2010

There was almost a full house for the fourth annual Maps and Surveys seminar which was held at Hermitage on the 19th of June and, judging by the comments as the day wrapped up, the high standard of previous years had been maintained. Presentations ranged across a broader spectrum than ever with, interestingly, no Royal Engineers Geo/Military Survey speaker this year.

As usual, the 250th Anniversary display was of interest to newcomers to the seminar and an innovation this year was the inclusion of displays of some members' memorabilia. Hugh Luxmoore-Peake had provided a display of about 60 photographs taken at dispersed Ordnance Survey factories towards the end of World War 2 which showed the cartographic, photo-mechanical and lithographic printing equipment of the day. Gerry Zierler and John Battersby displayed some examples from their collection of military mapping and several of the originals from Peter Collier and John Donaldson's presentations were on show.

Wartime Experience, Peace-time Opportunity, and the Emergence of the RN Hydrographic Service, 1803 to 1823

In 1814 the Admiralty Digest quoted that: '*scientific soldiers were an absolute necessity for successful warfare*' (and therefore seamen): so started Captain Mike Barritt's talk. In 1814 20% of the wartime fleet was in commission and only 10% of the officer corps were on the active list; hardly the right time to start a hydrographic service; but when is the right time to propose anything new in the services?

The talk took us on a global exploration with Hurd and Holland to Barbados; the Red sea in 1801, the River Plate and Buenos Aires in 1806; Copenhagen in 1807 but it was in the Peninsula war when Wellington retreated that he capitalised on his Engineers and asked for an evacuation map in 1809. In 1811 Lieutenant Colonel Howard Douglas RA returned to Spain as a military agent sending advice to Wellington that Arosa would be a good base and subsequent bathymetric surveys were made. It seems that Rear Admiral Cochrane's plea (in 1804) for a hydrographic survey off Corunna was not done until the 1880s'.

So what of the people involved? It seems that the ship's Master, although not commissioned, was the fount of good seamanship and navigational nous: it was usual for one of the senior ship's officers, if not the Captain, together with the Master to make such hydrographic surveys as required. It was later that other hydrographic data from the Spanish charts were used in conjunction with the Navy's surveys. Captain Hurd saw that surveys ashore by the OS should be matched by the RN and in 1813 he has getting onshore detail from Colonel Mudge.

The talk wove together the various strands of history, both of personnel and methods, which culminated in a hydrographic service.

Carl Calvert

The Report on the Military Map of the UK 1892

Dr Peter Collier's presentation covered the background to what was to become the "classic" Ordnance Survey 1 inch map. In the 19th Century the military had used the standard OS maps (which were much the same as those used by other continental armies) but it was felt that a map more specific to military needs was required. To arrive at a design for the new map, it was decided to establish an Army committee, which reported in 1892 on "A Military Map of Great Britain".

Dr Collier remarked that "if you want a particular decision carefully select the committee". The Committee was carefully selected and composed of experienced military personnel (senior officers who had experience in both intelligence and mapping – and this mirrors today's military geographic organisation) and took evidence for a range of experienced end users. However Dr Collier did point out that not all of the committee were in agreement and many of the end users had differences of opinion regarding contours, hachuring and hill shading. Wilson, the Director General of the Ordnance Survey, was one of the committee members, and was the least inclined to support a radical new design for the new map. Wilson was over-ruled, and the committee decided in favour of a coloured map with relief being shown by contours and spot heights.

Military needs tended towards movement and administrative support to deployment. The recommendations led to a clean and clear map. Roads were clearly delineated and land marks such as churches with spires and towers shown by symbols. Public houses were included because they provided a source of drinking water.

The new military map was in production for the Army when, in 1897, the Treasury sanctioned the experimental production of a colour edition of the Ordnance Survey's 1 inch (1:63,360) map and became the OS 3rd Series.

The Army Committee established to design a better military map, ended up defining the look of Ordnance Survey maps for more than a century. To paraphrase Winston Churchill – “should the OS last a thousand years the “Army Committee” may have provided their finest hour”.

Christopher Nash

Making Africa Uninteresting: Charles Close and British Boundary Commissions in Africa

Texan John Donaldson captivated the audience from the minute go. The title was intriguing and the story that unfolded was in many ways an eye opener. Dr John Donaldson is a member of the International Boundaries Research Unit at Durham University and spends his days wrestling with current boundary issues, all of which have their roots embedded in historical documents. Those relating to African boundaries read like the ‘deeds of daring do’ that used to entrance schoolboys in years gone by. However, John started his presentation with a disconcerting quote from Major Charles Close who in 1906 stated, perhaps tongue in cheek, “*Our explorers and surveyors, like Captain Smith, do their best to make Africa uninteresting.*” this being due to the elaborate surveys that were in his view “*making the continent as well known as the UK.*”

We then walked in Charles Close's footsteps as John led us around the Africa of the end of the 19th and beginning of the 20th centuries – a very well narrated tale.

There were several highlights for me. I was surprised to hear that for the boundary commissions, mapping was considered more important than actually permanently marking the boundary on the ground, indeed the textual description was the definitive boundary descriptor. The boundary marks were often relatively fragile and even when made of more robust materials such as stone cairns or metal markers, they were then considered as a ‘resource’ by the locals and taken away for other uses.

In addition to detailing the boundary itself many commission reports contained a wealth of meticulous details. For example, Close's report on the Nyasa-Tanganyika Commission contained details of 156 villages in the border area (including population, tribal affiliation, water supply and even number of cattle) and descriptions of the border region including: geographical features and the native tribes including their attitude to white men. How much notice was taken of this additional information was a matter of chance.

Another surprise was that contrary to the standard belief that the 1885 Berlin Congress decisions that divided Africa arbitrarily along straight lines irrespective of local geography or population were always rigorously implemented on the ground, it transpires that there was often a common sense approach as many British commissions were allowed considerable leeway in choosing a sensible route; to quote Close, “*aspects of both physical and human landscape influenced the boundary on the ground.*”

Interesting and enlightening – John would be warmly welcomed back another year.

Alan Gordon

The Links between Photo Interpretation, Intelligence and Photogrammetry

Chris Halsall spoke from wide experience within the Joint Air Reconnaissance Intelligence Centre and Joint School of Photo Interpretation. He traced the beginnings of photographic interpretation from the use of hand held and outside-mounted plate cameras used in biplanes on the Western Front in World War 1 to the present day. After describing the rapid development of the use of aerial photography for both mapping and photographic interpretation in World War 1 he emphasised the inter-war neglect and general unpreparedness for World War 2, a situation saved by the clandestine photography of much of Germany taken by Sidney Cotton in his now famous Electra aircraft working under MI6 control.



The presenters: Richard Goodman, Peter Collier, Jim Smith, Mike Barritt, Chris Halsall, Alan Wright, John Donaldson

At the outbreak of World War 2 the Photographic Reconnaissance Unit, had to make do with the inadequate obsolescent Bristol Blenheim until the advent of the photo-recce Supermarine Spitfire, and later the De Havilland Mosquito, transformed the acquisition of reconnaissance and mapping photography. Numerous examples of successful interpretation in World War 2 were given with, much emphasis on the interpretation “battle” “fought” at Medmenham against the German V Weapons including some previously unseen imagery and diagrams of La Coupole, the V2 Bunker in northern France.

The use of the Wild A5 belonging to the Air Operating Company in W Section provided the link between interpretation and aerial survey. A variety of World War 2 cameras of varying focal length, primarily the F52, were described but unfortunately there was little description of more modern camera systems and sensors.

The links between Interpretation and Photogrammetry were confined mainly to the use of the Wild A5 for accurate mensuration of equipment and facilities in World War 2 and in preparations for D-Day with some reference to German equipment. Unfortunately, parallels were not drawn with the extensive use of photogrammetric techniques by British, Canadian and American military surveyors in, for example, producing the numerous beach surveys and detailed large-scale contoured plans for the vital rapid construction of airfields in the Normandy bridgehead and the Rivers Seine and Rhine crossings.

The Cold War period, Nuneham Courtenay and Brampton, was also described including mention of the covert intelligence gained along the Berlin air corridors, a subject which may be elaborated in next year’s seminar. Regrettably, for some in the audience, the use of photogrammetry in the Cold War and the integration of Air Surveyors in JARIC was not touched upon at all.

During the course of his excellently-illustrated presentation Chris also displayed and described the brilliant collection of Interpretation equipment and memorabilia in the Medmenham Club collection or “museum” housed at DISC Chicksands an example of how a few enthusiasts in that Club have created a viable Service museum virtually from scratch with the benign support of a host military unit; food for thought, perhaps, for us “Surveyors”. The talk was complemented by a fascinating static display of imagery from the collection brought along by Mike Mockford and, by coincidence, an example of a First World War interpretation manual brought along to the seminar by John Battersby.

Mike Nolan

Accurate Distance Measurement Before EDM by Jim Smith and the History of The Tellurometer by Alan Wright and Brian Sturman

With GPS now almost universal for control surveys and much else, these two presentations took us back to those days when obtaining an accurate distance was a major challenge both of technique and logistics. And, having practised catenary taping at Hermitage and used Tellurometers in the field, Jim Smith and Alan Wright made your reviewer, and probably other surveyors of a certain age in the audience, feel as though we were also a part of history.

Jim started with the first recorded measurements in Egypt using ropes and then described Eratosthenes' derivation of the size of the earth which depended on the distance between Alexandria and Syene as well as the better known observations of the sun's elevation. There is no agreement on how the measurement was made but theories of standard camel days or standard surveyor paces (achieved with surprising accuracy by the Pundits in the 19th Century "Great Game" in Central Asia) showed the need for dependable units. We moved on via counting carriage wheel revolutions to the concept of measuring a shorter base accurately and using triangulation for the bigger picture whether for defining the size and shape of the earth as in the 18thC expeditions to Lapland and Peru or for mapping. Standard rods were now the method of measurement and Jim described the developments through wood, iron and glass to bi-metal compensating designs and the methods to deal with level, direction and the join between adjacent rods. He also reminded us that results beyond the base were dependent on the increasing accuracy of angular measurement.

From rods Jim took us through the introduction of tapes and their development both in terms of materials leading to the use of invar from 1896 and of techniques such as catenary under a standard tension. These remained standard until the 1950s with the 1951 OS Ridgeway base taking 24 days and 42 staff for the 11.2km distance. Jim also cited the Isiolo base in Kenya in 1957 which took 6 weeks and a small army to measure 21 km.

All this was about to change with the development of electronics during the WW2. The Geodimeter, invented in Sweden and introduced in 1947, was first in the field but, while good for shorter distances in good visibility, its optical system had limitations for geodetic applications. Alan Wright then took up the story of how in 1954 the Director of the South African Department of Trigonometrical Survey, who was familiar with radar, set a specification for a system to achieve an accuracy of better than 1:100,000 at up to 30 miles. Trevor Wadley took up the challenge and on the 14th of June 1955 made his first "routine" measurement of 50 km using his prototype Tellurometer. Discrepancies with the existing value caused concern until it was realised that the comparison was being made between South African and English feet. Once that was corrected the agreement approached 1:200,000, the specification was exceeded and the Tellurometer started a revolution in distance measurement. Alan cited the DOS Malindi to Isiolo link in Kenya as a demonstration of the vast improvement in productivity which could be achieved. This task, planned to take 2½ years by triangulation, was completed by Tellurometer trilateration in just 28 days.

Alan then catalogued the introduction and characteristics of the many models of Tellurometer adopted for control surveys by military and civilian organisations around the world until GPS triggered the next survey revolution. However, Alan reported that variants of the MRA, are still in use as continuous recording depth monitors for the cages in the deep mines in South Africa. With inevitable falls of rock in the shafts and the systems mounted on top of the cages, it seems that there will be a steady demand for spares and replacements for many years to come. So the Tellurometer lives on and perhaps those of us whose survey memories are closely tied to it have not quite reached the dustbin of history.

Roy Wood

Technologies for Fusing GIS, Terrain and UAV Data in Realtime Intelligence Support

Richard Goodman, a Principal Application Engineer with Intergraph, started his presentation by cleverly linking it to the first talk of the day when Mike Barritt told of the problems of charts that existed but nobody knew about them and so they were not used when needed. And it appears that the same situation could occur today with so much data now available that it is swamping users. Richard used the coming of video to highlight the problem – where traditional air surveys acquired a still frame every few seconds, video can generate over 30 frames each second – all of which has to be georeferenced, indexed and advertised to users.

After a day of looking at the past it was good to end the session with a glimpse of the 21st century and to realise that 'surveyors' still have challenges but continue to develop the technology to meet them. An article based on Richard's presentation appears in this issue of Ranger.

Alan Gordon

To finish this short review of a very good day at Hermitage it is worth reflecting that the quote that Mike Barritt started the day with is still very much valid today as it was during the Napoleonic Wars:

"scientific soldiers...an absolute necessity for successful warfare."

Defence Surveyors' Association AGM and Visit to The Rifles (Berkshire And Wiltshire) Museum on Saturday 30th October 2010

This year our Annual General Meeting and Award Ceremony is to be held at the Rifles (Berkshire and Wiltshire) Museum in Salisbury. The programme will be as follows:

- 1130 Arrival; coffee and biscuits available
- 1145 Lt Col Michael Cornwell, the Curator of the Rifles (Berkshire and Wiltshire) Museum, will give a short presentation on the history of the Museum
- 1200 DSA Annual General Meeting
- 1245 Awards Ceremony
- 1300 Lunch (two courses and coffee)

The AGM will take place in the Regimental Room which is on the upper floor of the Museum.

DSA members and their guests are welcome to tour the Museum, before and after the AGM for members and at any time for guests. In addition, as the Museum is in Cathedral Close, Salisbury Cathedral and other local attractions are also open for members and their guests to visit.

The total cost of the day at the Rifles Museum, including lunch is £15 pp.



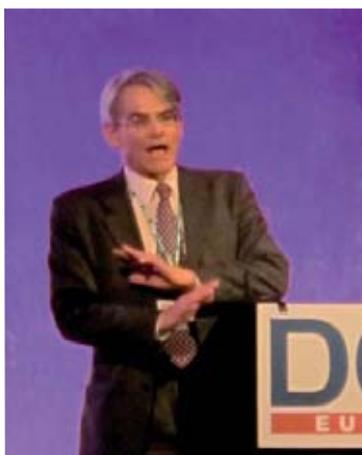
DGI 2010

The Sixth Annual European Geospatial Intelligence Conference

A Personal View By WO1 Rob Oliver

Over 600 senior GIS executives (and one rather bewildered and crusty old WO1) from defence and national security organisations from 35 countries gathered at the Queen Elizabeth II Conference Centre in London during 25 – 28 January 2010 for the Sixth Annual European Geospatial Intelligence Conference. There were over 60 speakers who gave presentations on the latest GIS initiatives and discussed their latest strategies, solutions and future plans. It was also a chance for IT firms to show off their latest offerings and for Geo professionals to catch up with colleagues old and new. In the present financial climate it was good to see that there were a large number of military surveyors past and present attending, although the austerity measures were biting and meant long days for some having to travel to and from London each day.

The conference kicked off with a welcome address by Jill Smith, president of DigitalGlobe (main conference sponsor) after which she introduced the other keynote speakers, Major General Jerry Thomas and former Deputy Supreme Allied Commander Europe General Sir Rupert Smith. As part of her own keynote speech she explained how DigitalGlobe with its constellation of different satellites and with the recent launch of their new WorldView-2 platform, were able to provide an unprecedented level of imagery support. Jill demonstrated this by showing their capacity to provide large amounts of imagery every day over Haiti to support the recent humanitarian relief effort. Jill however argued that it was this proliferation of large amounts of data that was causing some of the current problems, the main one being how people can gain access to all this data. She described DigitalGlobe's efforts to move into cloud computing and the ability to provide what she called "Agile GeoInt", the amalgamation of *Speed*, *Change Detection* and an *Open Architecture*, which will enable DigitalGlobe to get the right information rapidly to the user, when, where and how they need it. She argued that this will lead to improvements in the understanding of the problem, better decision making and the monitoring of the effect of those decisions.



General Sir Rupert Smith

General Sir Rupert Smith was the guest speaker for the opening address. His talk was entitled "Assessing the Role of GIS in Current Warfare", and in it he explained why in his view, the best military forces in the world win their battles but lose the wars. He argued that this is due to the change in military activity; from "industrial war" to a paradigm he identified as "war among the people" - a situation in which an outcome cannot be resolved directly by military force. He went on to say that in reality, the people in the streets, the people in their houses, the people working in their fields, in fact all the people, everywhere - are part of the battlefield. War in fact takes place with civilians around, or against civilians, or in defence of civilians, indeed civilians are often the objectives that have to be won, and so modern warfare is indeed a "war among the people".

But how can the Intelligence community help with this apparent paradigm shift in focus? Sir Rupert explained that we needed to start by understanding the people, as understanding their pattern of life is essential if we are to identify any abnormalities that are present, and therefore probably identify who our opponents are. We therefore need to gather intelligence about the people. These thoughts obviously have resonance with Afghanistan at the moment with General McChrystal's attempt to change the mindset and focus of the Operation. General McChrystal has stated that there are five principal actors in the conflict the first of which are the Afghan population, followed by the Government, ISAF, the insurgency and the 'external players'. He says it's important to begin with an understanding of each of these actors, starting with the most important: the people.

But how do we gather that intelligence – that is a question Sir Rupert and others asked for help with. We don't simply need better and smaller pixels that just give us a more detailed image, what we want to know is what can those pixels tell us? It became apparent that Geospatial Intelligence alone cannot answer all of the questions asked, the intelligence required needs us to work with the other intelligence collectors, i.e. SIGINT, MASINT, HUMINT, etc and provide a fused view of the "people" environment.

Major General Jerry Thomas, (Assistant Chief of Defence Staff (Intelligence Capability)) the other keynote speaker, echoed Sir Rupert's thoughts and asked the vendors present to help provide the means or indeed the answers to, intelligence questions and not just to keep providing more pixels. He reeled off an enormous "wish list" of intelligence requests, some of which we can probably answer now, others will require a more "fused" effort by the various Intelligence Staffs, and some will need technological innovations, but the vast majority of the questions related to the human geography, and echoed Sir Rupert's views about needing to know about the people among whom you are conducting operations.

General Thomas explained how the UK MOD was trying to move forward and develop a better Intelligence capability by fusing together several capabilities with the creation of the Defence Geospatial Intelligence Fusion Centre (DGIFC) at RAF Wyton which will see JARIC, JAGO and 42 Engineer Regiment (Geo) co-locating in a purpose built site.

Once the keynotes were over, the conference broke down into three different streams, each focused on a slightly different area; they were:

- Stream A – Strategy, Policy & Architecture: Exploiting GIS across your organisation
- Stream B – Defence Operational: Supporting Users In-Theatre
- Stream C – National Security Focus: GIS in Olympics and other National Security Projects

It was good to see lots of current and former RE (Geo) personnel presenting on a variety of topics which ranged from overview and high level planning presentations such as "The Future of NATO GIS Capability – Challenges Ahead" by Lieutenant Colonel Pat Fryer, to the application of spatial analysis methodology such as the support to the counter narcotics operations in Afghanistan by former Sergeant Tim Buckley. Each session was interspersed with plenty of tea and coffee and gave time to explore the exhibition stands, and talk at length to some of the presenters.

There were several other presentations that attracted my attention; the first was by e-geos, an Italian company specialising in high resolution optical and radar missions. They presented on a new collection asset they have called COSMO-Skymed. COSMO-Skymed is not a single satellite but a constellation of three (soon to be four), identical satellites all following the same orbital plan. This unique arrangement means that the same point on the earth's surface is imaged at very short intervals with a standard interferometric revisit period of four days. One interesting point discussed was that by using all four satellites and using different beams and ascending and descending passes, together with left looking passes, e-geos believe they can collect interferometric imagery every day, very often twice a day and on some days as much as four collects.

This quickly repeating imaging of the same place with the same sensor is quite unique, and can be used in some very useful and novel ways. The research into the uses of the datasets is still being developed but they showed a very impressive change detection methodology using the coherence values of two images, collected at different times, combined to produce an incoherence map. They showed examples of incoherence maps where things colored red were present in the older image, but not in the new image, and parts colored blue when present in the newer image, but not in the older one. Amongst other things, they could identify if a track had been used, or if fields had been cropped or ploughed between imagery dates.

This has obvious uses in the Counter-IED world, as its not too far a stretch of the imagination that, if they could image every day, we could start to identify tracks that had been used in the previous 24 hrs and possibly identify disturbed ground where IEDs could have been deployed. The system has many limiting factors, coverage, resolution, usage on different types of terrain, etc, and needs to be proved and ground truthed. However, it is possible that a system like this will not simply be delivering more pixels, it could possibly, as Generals Thomas and Smith requested, deliver real intelligence. It could be answering questions such as "has this track been used since the last patrol", or "how are the local population using the tracks", "do they avoid certain tracks", "How do they get to their fields", "what crops have been harvested" etc.

Colonel John Kedar, (Commander JAGO), gave a presentation that was very well received by all attendees. He starting by giving an insight into the geographic support provided by JAGO in response to the flooding in Workington last year, and then went on to concentrate on the Geo support to Task Force Helmand (TFH) in Afghanistan. This included introducing two of his soldiers who had been on Operations in Afghanistan recently to give their views and experiences of life delivering geospatial intelligence on Operations. First up was Captain Anthony Barton who, as the



Colonel John Kedar, Commander JAGO

SO3 Geo in TFH, was the senior UK Geo officer and was responsible for the overall provision of Geospatial Support to TFH. He concentrated on the recent OPERATION PANCHAI PALANG, which was designed to drive the Taliban out of a large area of Helmand province. He described how the planning and conduct of the operation was supported by a large and concerted effort by all the Geo staff in theatre and resulted in many thousands of products being produced and distributed to both the front line troops as well as the HQ planning staff.

The second speaker was Sapper Martin Williams who, even though a very junior Geographic Technician, was solely responsible for providing the geographic support to Battle Group Centre including the during period of OP PANCHAI PALANG. This was quite an occasion for this young Sapper as its not every day you get to share a stage with such distinguished company, and Sapper Williams did not disappoint. He started by describing his responsibilities and the type of tasking he was regularly asked to provide, especially during the operation. He then went on to describe in a very open and frank way, what life was really like in a Forward Operating Base (FOB). This went down very well and really brought home to the audience what Geospatial Support was like at the sharp end. Spr Williams had made quite an impression and several of the later speakers took the time to

publically congratulate him on his presentation and the work that he and his peers were doing, and stated that we, as a community, must do all we can to support the likes of Spr Williams.

Other things that caught my eye were all the talks and presentations that centered on the recent earthquake in Haiti. There appeared to be very little mapping and imagery available before the quake but this was quickly rectified by a number of agencies and data providers who made their services and products available for the humanitarian relief effort. Very interestingly the original sparsely populated datasets were soon augmented in real time by information supplied by the multitude of relief support personnel on the ground in Haiti. One very interesting way of collecting information and intelligence about the locations of all the aid and food points was by monitoring the social websites, like Facebook, Bebo, and especially Twitter. With the proliferation of these services, and the immediacy of the information transmitted, it was shown that "Geo Tweeting" could be of great use as an intelligence-gathering tool of the future.

DGI 2011 GLOBAL

The Seventh Global Geospatial Intelligence Conference

ACHIEVING TRUE INTEGRATION OF GIS INTO EVERY PART OF YOUR ORGANISATION TO ENABLE EFFECTIVE IN-THEATRE SUPPORT & DECISION-MAKING

Technology Focus Day:
24 January 2011
Main Conference Days & Exhibition:
25 - 26 January 2011
Special Human Terrain Analysis Focus Day:
27 January 2011

www.DefenceGeospatial.com

NEW

For 2011!
LOWER PRICES FOR MILITARY / GOVERNMENTAL PERSONNEL TO ENSURE THAT YOU ARE ABLE TO ATTEND THIS INTEGRAL MEETING FOR THE GIS COMMUNITY

TOP-LINE STRATEGIES FOR 2011

- New Geospatial Intelligence strategies to implement across your entire organisation
- Enabling full Geospatial Intelligence support for soliders in-theatre
- NEW** Geospatial Intelligence in C4ISR – Enabling effective decision making in-theatre - Over 10 presentations on Geospatial Intelligence in C4ISR for 2011
- NEW** Find the latest human terrain analysis strategies from the leaders in the field
- NEW** Get to grips with true interoperability nationally and internationally
- NEW** Get new ideas on how to cut costs and do more with less
- See the latest solutions, forward looking ideas and technologies – Lots of new technology providers showcasing their latest ideas at the DGI 2011 Exhibition

"The selection of case studies is perfect and delivers a valuable review of the critical geo-information challenges we all face."

Lt. Col. Richard Nicklin, National Military Expert (Geospatial), EU Military Staff



CONTACT US TO RECEIVE YOUR OWN COPY OF THE NEW DGI 2011 AGENDA AND TO STAY UPDATED WITH THE LATEST DEVELOPMENTS



+44 (0) 20 7365 9465



dgi@wbr.co.uk



www.DefenceGeospatial.com



+44 (0) 20 7368 9401

Another presentation dealt with modeling the effects of the quake on the various different building types and construction materials. The premise was that by identifying the building materials and construction type from high-resolution imagery and other sources, they could predict the degree of building collapse and therefore be able to target the emergency responders more efficiently. Although the research was all conducted after the quake and was not actually used, the predicted results stood up well to the high degree of ground truthed data that was obviously available. It was hoped to develop a system that may be used in future earthquake responses.

Overall, the conference had provided a real insight into the technologies we might start to see deployed in the near future. It also provided a real insight into how other geo professionals, especially in the national security arena, are moving forward in the ever-changing world of Geospatial Intelligence.

Barton Stacey 25 Years On

42 Survey Engineer Regiment moved from Cyprus to A Camp Barton Stacey during the summer of 1963 as a temporary measure until more modern accommodation could be found. Twenty two years later in September 1985 the Regiment was disbanded and its two squadrons, 13 and 19, moved from Barton Stacey to Hermitage to join 42 Survey Engineer Group. A small rear party remained closing down the camp until February 1986 when the old wartime buildings were all demolished and shortly afterwards thousands of deciduous trees were planted across A and B Camps. Twenty five years on they make a very pleasing landscape and it is difficult to imagine that it was once the home of several hundred soldiers.

A quarter guard in front of the guardroom and the same spot today.



*RHQ building opposite the guardroom.
Photo: Nick Collins.*



View from the Waterfront

By Captain Vaughan Nail Royal Navy – Captain HM(Ops) and Hydrographer of the Navy

Having recently assumed office after four years away from Fleet activities, I thought I might start by reminding myself and, with their forbearance, *Ranger* readers, of what we are trying to achieve with the naval HM capability. With SDSR in full swing, there is no better time to look at our fundamental purpose, examine some of the challenges ahead and record some of our recent successes.

Information superiority has often been a deciding factor in naval operations and, with much of this connected to the physical environment, a capability which delivers this superiority in a military exploitable manner is essential to modern warfare. For over 200 years, hydrographers, oceanographers and meteorologists have been providing environmental information to the Royal Navy which has on many occasions proved a critical factor in a successful operational outcome, as previous articles in this magazine have demonstrated.

There is a commonly held misconception that the sea is fully surveyed and weather and ocean forecasts are so advanced that a central repository can promulgate understandable information for all worldwide operations. As far as surface charting to cover major commercial shipping routes this is certainly the case, but this amounts to a small percentage of the Oceans' topography and even less of their oceanography. Likewise, we have access to raw meteorological data for the globe, but with its complexity and highly dynamic nature there is never a single answer, only a range of probabilities. Inevitably our best information and modelling exists in regions where it was most needed in the past, not necessarily those identified as future risks.

The production of surface charting for commercial shipping is naturally focused on depths only down to 40m and the narrow routes joining the 800 largest international ports. Often defence areas of interest are not included. This is even more critical for submarine operations where there are even less areas of the globe in which our environmental knowledge offers tactical advantage over an enemy. Raw meteorological data requires considerable processing and modelling before it can be used and, more importantly, its military effect interpreted or weapons and sensors to achieve mission success. Key allies and potential hostile navies of the world realise the benefit of specialists in this field and currently resource a significant effort to provide maritime geospatial intelligence (GEOINT) in order to reduce the risk on operations.

However, while other navies match, and in some cases surpass, our level of effort, none possess the integrated and highly effective enabling capability of the RN's HM specialisation and the supporting national infrastructure. The operational aspect of the capability is predominantly delivered by the ships and boats of the Hydrographic Survey Squadron, the Joint Oceanographic and Meteorological Operations Centre, Northwood (JOMOC) and the Fleet HM Cadre (consisting of the HMs in the Devonport Flotilla deployable teams, the Naval Air Stations, Capital Ships, Naval Strike Wing and MASF). At a tactical and operational level, these specialist capabilities provide direct support to the Command, but they are underpinned by higher level analysis conducted by the extraordinary national assets of the UK Hydrographic and Meteorological Offices. Data gathered from a wide range of sources is assessed, processed and compiled into products that, in turn, specialists at sea translate into operational advantage.

The current capability has the ability to conduct the full spectrum of HM operations from deep ocean to the high water mark and collect, process and exploit environmental data

HMS Scott on patrol in Antarctica at the beginning of 2010.



both on an enduring basis and ‘in stride’ with maritime operations. In the near term HM is likely to utilise ship borne systems, but it is expected that advances in technology may result in a greater utility of remote systems that are optimised to provide the survey capability. We are already working alongside counterparts in the mine warfare specialisation in developing techniques for operational use of these increasingly reliable vehicles.

Maritime operations, perhaps to a greater degree than those in other domains, are totally dependent on accurate products, services and advice, which supply a description of the global physical environment and an ability to exploit it. The RN HM has a longstanding and proven capability that supports a wide range of defence military tasks and, especially in the maritime sphere, those tasks relating to littoral manoeuvre, theatre access, carrier strike and deterrent operations. The HM’s influence is present across all levels of command, from strategic planning to the delivery of a valued added, tactical edge to individual commanders in the field. The persistence and global reach of the capability also offers unique “soft” power opportunities as well as significant presence.

Within the context of this sound *raison d’etre*, there are undoubtedly sizeable hurdles to overcome. Our relatively small size as a specialisation allows high flexibility and responsiveness, but leaves us with limited resilience to strategic “shock” events. We seem particularly susceptible to the vagaries of funding decisions, especially as the HM capability stretches over several Top Level Budgets. With the recent withdrawal of *HMS Roebuck* and the temporary gap in the Ice Patrol Ship capability (caused by a flood in *HMS Endurance*) our data gathering resources are limited and possibly below critical mass. There have also been secondary effects on career development with the loss of the associated sea billets, at a time when there are still healthy intakes of new entrants passing through the training system. Funding pressures are already bearing down on both UKHO and UKMO support, notwithstanding the SDSR effects to come. Our vision for the future and operational concepts are constrained by the operational reality of limited communications bandwidth; although, conversely, this provides good collateral for the provision of the trained specialist teams at the front line. So we face a number of challenges, but I have great confidence in the determination and imagination of the people we have managing them.

There are many positive signs as well. Under my predecessor, considerable efforts were made to improve coordination of the diverse elements throughout the HM capability and we will work to consolidate this initiative. The JOMOC facility, which is manned by naval and Met Office staff, has settled into a most effective team, supporting the operations of UK Forces across the world with a diverse range of sometimes highly specialised products. I have been encouraged by the highly positive feedback from Commanding Officers of units that have been supported by our specialist deployable teams, particularly in addressing the ASW challenge of tracking submarines in the North Atlantic and Indian Ocean. We simply do not have enough people to meet the demand. The recent AURIGA deployment to the Eastern Seaboard of the USA has allowed us to refresh and develop tactical skills in the amphibious arena – we will build further on these hard-won skills in the forthcoming Joint Warrior, with significant HM presence through *HMS Echo* and deployable survey teams. *HMS Scott* has successfully conducted her first deployment to Antarctica as the interim Ice Patrol Ship and will deploy again for the 10/11 Austral Summer. *HMS Enterprise* is providing valuable support to the Oman in her surveys of the approaches to the brand new major port of Al Duq’m. We are also providing meteorological support for remote airborne vehicles from massive distance, as well as building forecasting capability for the introduction of the QUEEN ELIZABETH Class carriers. Our greatest strength remains in our people and I am fully committed to providing the best possible opportunities for them to develop their talent and to deliver their capability to best effect.



The dynamics and challenges of the HM specialisation continue to provide a fascinating career for many very talented officers and ratings. I hope to provide a report of proceedings next year and to mark our scorecard of achievement.

Exercise AURIGA - cross-pol training off the US Eastern Seaboard – introduction to the USN jet-ski survey craft.

Non Stop Ops: 1990 to 2010

By Alan Gordon

On the second of August 1990 the world was astounded and horrified to learn that Iraqi forces were surging across their southeastern border and were busy occupying Kuwait. This unprovoked attack was to lead to a chain of events that changed the political direction of the world and over the next two decades would impact upon the lives of untold millions.



Op Granby: GPS goes to war for the first time.

At the time the western countries had been basking in the feeling of a job well done for it was only a year since the seemingly indestructible Berlin Wall had been torn down, communism was collapsing and the forty-year Cold War was clearly won. For the Armed Forces, four decades of facing east with a clear purpose and practised plans were over and the only certainty was that the government was keen to cash in on a peace dividend at their expense.

The response from the western powers and Iraq's Arab neighbours to the invasion was to form a coalition with the intention of liberating Kuwait, if necessary, by armed force. Britain's contribution to the coalition was formed up under Operation Granby and the land element was drawn from formations based in Germany. This posed problems as for forty years they had been

equipped and trained to fight in the temperate climate of Western Europe amid feature rich, very familiar and well mapped landscape. Now instead of the Einbeck Bowl and the Minden Gap, talk was of sabkha and the Wadi al Batin and they were faced with operating in the totally alien terrain of a vast featureless desert.

Today, after over twenty years of 'hot' operations played out almost nightly on television news, it is difficult to remember just how unbelievable it seemed that we were suddenly actually deploying for almost certainly a real shooting war.

After a long slow build up Op Granby was to be short, sharp and successful. The attack was mounted on the 24th of February 1991 and 66 hours later a cease-fire was in place. The story of Military Survey's contribution to the operation is told elsewhere in this issue but the impact on Military Survey, particularly the military element, and how it would respond to future operations

Op Haven: the Theatre Map Depot at Incirlik Air Base. Ground dumped map stocks in a temporary shelter was to become a familiar sight in the ensuing years.





Op Veritas: TACIPRINT and TACISYS in Kabul. Photo: John Adlington.

was profound. As a result of the lessons learnt soldiers no longer worked on standard production tasks and instead a far closer involvement with the Field Army was developed and, to provide the best possible support, a new mobile map production system was rapidly produced, the evolving IT technology, especially GIS, was enthusiastically embraced, and the soldier trade structure was changed to meet the new role and requirements.

However, immediately after signing the cease fire Saddam Hussein put down a revolt by the Shiites in the south of the country and then turned on the Kurds in the north who were attempting to withdraw their territory from Iraq. His response was swift and brutal but this time a coalition of western nations quickly mounted Operation Haven with the aim of providing a degree of protection for the Kurds.

3 Commando Brigade deployed in April 1991 with their assigned TACIPRINT, MAPSP and terrain analysis personnel, and a Geographic Section comprising a TACIPRINT with map supply and terrain analysis personnel supported the Joint Forces HQ. Immediately on arrival in theatre, the Geographic Section was seconded to support the multi-national Combined Task Force. The major effort throughout the operation was in the field of map supply. A Theatre Map Depot was set up at Incirlik Air Base in Turkey from which the 42 Group personnel, along with soldiers from the United States 649th Engineer Topographic Battalion, supplied all the nations involved as well as the civilian aid agencies. The operation ended within the year.

Meanwhile, trouble was brewing elsewhere. It was not only communism and its empire that was collapsing but with it began the falling apart of several forced unions; the USSR itself, Czechoslovakia and Yugoslavia, the latter troubles having their origins in the break-up of a previous empire, that of the Romans. When it was divided into two parts, the Western and Eastern Empires with the boundary running through the Balkans, the Emperor, with one stroke of his stylus laid the foundations of a problem that would endure into the 21st century.

In the previous issue of Ranger Nick Rigby told the story of the Inter Entity Boundary that came from the Dayton Agreement and in this issue we have articles over viewing the strategic level of Military Survey involvement in the Balkans and another detailing 42 Regiment's deployments there over the years.

Op Telic: 14 Squadron's desert camp.



In April 2001 *HMS Beagle* was dispatched to Sierra Leone to support Op Silkman and a Geo team deployed there from May until October.

January 2002 saw Geo personnel deploy to one of Britain's historic battlefields: Afghanistan. In response to the September 11th terror attacks western forces moved against the Taliban in Afghanistan, UK forces made up a significant element of those deployed and Geo staff from HQ 3 (UK) Division, led by Captain, now Lieutenant Colonel, John Adlington augmented with a team from 42 Regiment deployed along with Geo staff from HQ 16 Light Air Assault Brigade on Operation Veritas. The winter 2002 issue of *Ranger* details the story of that deployment which saw the original Geo personnel replaced in April by a team from 42 Regiment led by Captain, now major, Hamish MacCarthy who in turn handed over the Geo role to a German team thus ending UK's involvement in Afghanistan...for a while that is!

Op Herrick: 14 Squadron personnel building the Theatre Map Depot.



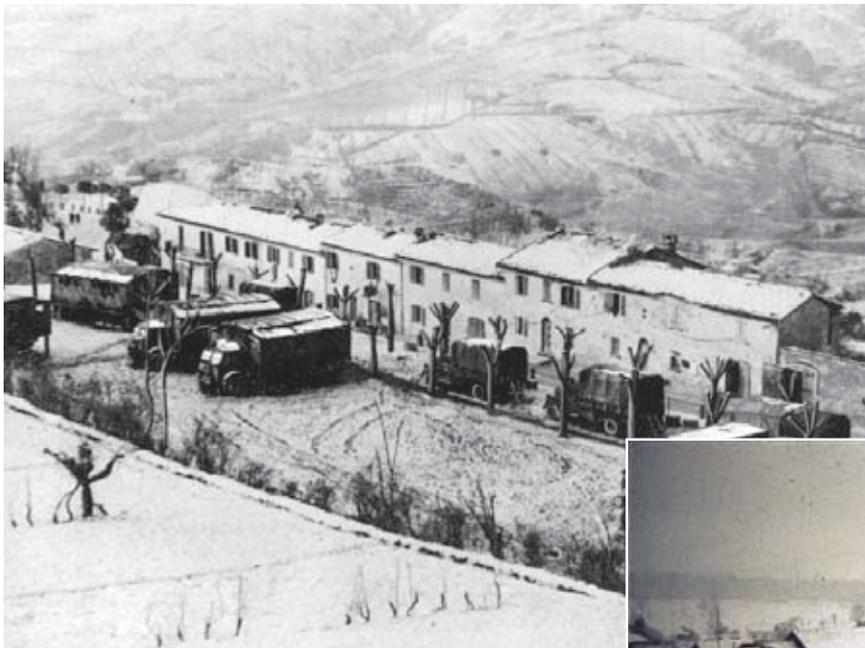
Later that year saw the planning for Op Telic commence with the invasion of Iraq taking place the following year. Hamish MacMillan relates in this issue the Geo involvement in Iraq from the very first thoughts until the withdrawal of the final Geo soldier in summer 2009 and Andy Swain tells the story of *HMS Roebuck's* invaluable contribution.

Then in 2006, with roulement to Telic becoming almost routine, forces returned in strength to Afghanistan under Op Herrick and have been operating there ever since in even greater numbers. The Geo effort in theatre has increased tremendously with representation at all levels down to junior soldiers in Battlegroups. The conflict is ongoing and will be reported in a future edition of *Ranger*.

Meanwhile, concurrent with all the operations mentioned above, the UK's longest running operation – Op Banner in Northern Ireland – continued to receive considerable geo support until it finally ended at midnight on the 31st of July 2007. However, this support was provided in a different way to the operations discussed above in that there was only ever a small Military Survey/Geo presence in the Province which was a small team under a WO2 based at HQNI, later a Geo sergeant was added to each brigade and then a few years ago the Reconnaissance Intelligence and Geographic Centre (Northern Ireland) was set up. The HQNI posts were filled by means of routine accompanied postings and their tasks were liaison, identification and definition of requirements, collection of revision data and manning the map store. All production work was carried out either at Feltham or by 42 Regiment.

Whilst it is the geographic support provided in the field by servicemen and women that is the subject of the various articles in this issue of *Ranger*, the role of the Defence Geographic Centre and UK Hydrographic Office have been absolutely fundamental in the provision of that support. It is hoped to detail their roles in operations in the next issue.

Veteran military surveyors of the Second World War would have recognised the geographic contribution to Op Granby – military survey staff in formation headquarters, a squadron deployed into the field printing maps including specialist 'goings' products and providing field surveys to the Gunners and static production centres back in the UK supporting the operation. The same veteran would never have imagined today's geographic support where technology is utilised at every level and the 'military surveyors' are embedded in small numbers right across the deployed forces including singleton sappers or JNCOs in Forward Operating Bases providing very close support to the teeth arms and at the same time taking their turn in the sangers guarding the base.



518 Field Survey Company's print train in Italy in 1944 looks remarkably similar to the Geographic Support Group deployed at the brickworks in Kiseljak in 1996.

And so, what was unthinkable to readers of the Cold War era has happened, 42 Engineer Regiment (Geographic) and its predecessor organisations have been continuously deployed on overseas operations since 1991 and are likely to remain so for the foreseeable future. We wish them all safe deployments.





Op Granby: The First Gulf War When Everything Changed

By Alan Gordon

An indication of how extremely unlikely a war seemed in 1989 is that during my meticulous and detailed handover from John Day as Officer i/c Systems and Production Management Team (SPMT) at 42 Survey Engineer Group, the fact that in the event of a war the post became the Group Operations Officer was mentioned in only a sentence or two late on the Friday afternoon – an almost irrelevance! Hence, I went off on holiday to west Wales the following summer without a care in the world...until I caught sight of a placard outside a newsagent that screamed, “*Saddam takes Kuwait*”. Being the pre-mobile phone age, I used a call box to ring Phil Maye in SPMT who said nothing much was happening – enjoy the holiday! But things were to change dramatically over ensuing months.

Iraq’s invasion of Kuwait triggered Military Survey’s standard initial response to any developing international crisis situation; the MOD-based General Staff Map Branch commenced production of desktop briefing maps and staff at the Map Library started an immediate review of its holdings of relevant geographic information. These early actions were fairly frequently initiated but generally never progressed beyond this stage as some means other than the deployment of British military forces averted the crisis. However, this time that was not to be the case and soon the largest Military Survey operation since the Second World War began to unfold. The geographic support to what became known as the First Gulf War was provided in a number of different forms; map and air chart production, map supply, terrain analysis, field survey and desert navigation training. The map production and supply functions were much affected by close international liaison.

International Agreement, Operational Organisation and Deployed Forces

Immediately deployment became a possibility there was intense activity on the international front with three main aims; to acquire mapping and related geographic intelligence, arrange for the release of maps that were on restricted issue and to coordinate the production programme with the United States. It was soon agreed that the two nations would provide the mapping needs of all coalition forces with the Americans supplying the bulk of the cartographic effort and Military Survey compensating by taking the major reproduction role. This close liaison with the US was not only evident in Washington and Feltham but was to be reflected on the ground in the Middle East. When the British Forces in theatre were increased to divisional strength, a Joint US/UK Geographic Cell was established in Headquarters British Forces Middle East/US Central Command headed by the Chief Instructor attached from the School of Military Survey. There were Survey soldiers attached to Headquarters VII(US) Corps, 30 US Engineer Battalion (Topographic), US Central Command Theatre Map Depot and 1st and 2nd US Marine Divisions.

42 Group Ops Room: Dave Cannings updates production figures, WO1 Tony Harder uses the Manning Board to select personnel for deployment and Captain Claude Bellerose, the Canadian exchange officer, wrestles with the logistics system to get men and equipment transported to the Gulf.





Camp Roy, 14 Squadron's base in the Forward Force Maintenance Area. The obsolete print train trailers taking centre stage. Photo: Nick Collins.

Military Survey's operational response was controlled from the Military Survey Operations Room at Feltham with a subordinate Operations Room dealing with the detailed military aspects at 42 Group at Hermitage. 14 Independent Topographic Squadron deployed from Germany to the Gulf with 7th Armoured Brigade and provided all aspects of field geographic support including acting as the staff function until the creation of the Joint Geographic Cell. As the in-theatre requirement grew so did the need for reinforcements to 14 Squadron and the various headquarters. These were provided by 42 Survey Engineer Group and 512 Specialist Team RE to such an extent that by the end of the conflict 114 officers and soldiers were in theatre, over one quarter of all military surveyors, and 50 more were undergoing pre-deployment training to join them when, unexpectedly quickly, the fighting stopped.

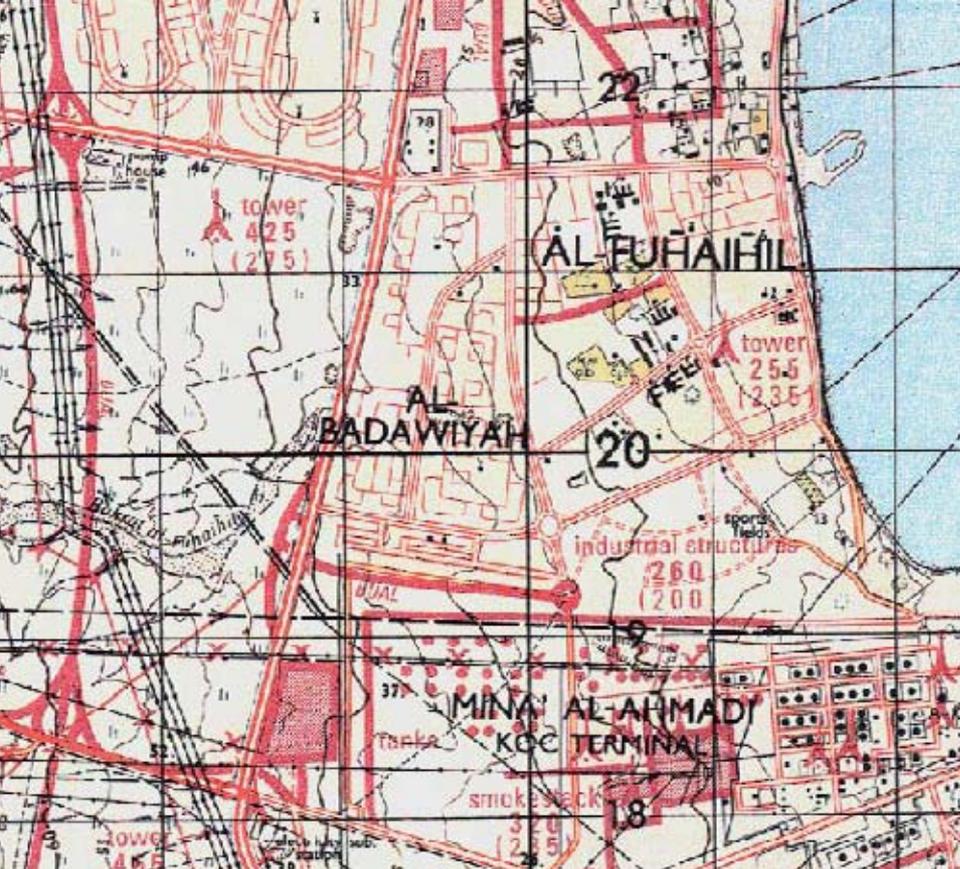
Map and Air Chart Production

At this time mapping was only produced to meet NATO requirements and pre-identified contingency plans and the latter did not involve options for full-scale land-air manoeuvre warfare. At the start of the campaign Kuwait was well mapped but the medium scale coverage of Iraq that did exist was dated and large areas were unmapped. There were no large-scale plans and the Moving Map



Hectic activity in 13 Squadron's print finishing section at Hermitage.

Display films essential for aircraft navigation had not been produced. Saudi Arabian mapping was also dated or not held. The situation was further aggravated by the use of different spheroids and grids, a UTM grid zone junction running through the area and the mapping of each country being drawn to different specifications. Such was the mapping start state at the beginning of Operation GRANBY. This existing mapping was to represent less than 1% of the requirement for geographic materials by the end of the war.



Example of a typical overprint revision; a method widely used to rapidly update the mapping.

needs of the air forces. An indication of the size of the map production challenge is that the area of interest to be covered was more than twice the geographical area of Western Europe... all required within a period of weeks!



Loading map stocks onto a Lynx helicopter; the quickest means of moving them forward.

in BAOR the German printers at the Survey Production Centre were swapped to GRANBY work and the Survey Directorate arranged for the Belgian Army to print tasks. In all, over three times the typical annual production output was achieved in a little over four months, some 14.6 million map sheets. Allied to the map production was the task of providing materials and data for the precision targeting of the so-called 'smart' bombs used in the air campaign. In all well over 13,000 sets of precise coordinates were provided.

Whilst the vast bulk of the printing was done in the United Kingdom and Germany, there was a limited in-theatre capability once 14 Squadron and HQ 1 Armoured Division arrived in Saudi Arabia with their TACIPRINT equipment. However, the need for a larger format capability soon became apparent and, as a result of strenuous efforts by logistics staff, the print and guillotine semi-trailers from the vintage print train that had been grounded at Ratingen since the early Eighties were moved to the Gulf and set up at the Squadron's desert base in the Forward Force Maintenance Area. Here the old press performed well, providing a much quicker turn around than had previously been possible.

Once the decision to deploy combat aircraft into the area was made, the well-oiled air chart production process was switched from routine tasking to preparing the many charts and Moving Map Display filmstrips for the Tornado and Jaguar cockpit displays that would be essential for the air operation. At this stage the resources committed were the production facilities at Feltham and Tolworth and the printing capacity in 13 Map Production Squadron at Hermitage. So it continued until the 14th of September when the decision to send 7th Armoured Brigade was made. This increased the mapping bill alarmingly; 1,200 map sheets at 1:50,000 scale and 85 at 1:250,000 scale would be needed to cover the area of operational interest, all in addition to the

The agreement for the United Kingdom to print sufficient copies to meet the needs of all coalition forces led to print runs of over 80,000 for some sheets. To meet this huge reproduction tasking every possible resource was pressed into service. 42 Group and the Mapping and Charting Establishment worked around the clock but this could still not meet the demand. Apprentices at Chepstow and soldiers on courses at the School of Military Survey were thrust onto production work, permanent staff and Reserve soldiers from 135 Squadron assisted operations, the long-standing Memorandum of Understanding with the Ordnance Survey was invoked causing the national mapping programme to be set aside in favour of printing Gulf mapping and, commercial printers were contracted at short notice. Simultaneously,



After the conflict: returned mapping awaits salvaging at 8 Map and Air Chart Depot at Guildford.

Map Supply

The vast stocks issuing from the multitude of presses had to be distributed quickly, not just because they were needed in theatre but also as storage space in the production centres and at the map depots was limited. Bulk stocks were dispatched into the combat map supply system from Guildford using UK and US aircraft via RAF Lyneham or RAF Molesworth respectively and from the BAOR Map Depot via the Defense Mapping Agency's Combat Support

Center (Europe). The mapping arrived at a map depot set up by 14 Squadron in the Force Maintenance Area at Al Jubayl that fed a forward depot in the Forward Force Maintenance Area and MAPSPs deployed with formations. The US experienced problems with their map supply system and so Military Survey soldiers were placed in the US Theatre Map Depot in Bahrain which in time became a joint asset. In addition, 14 Squadron provided MAPSPs to the two US Marine Divisions who in return attached Marine personnel to the Squadron. By the end of the conflict, 8 Map and Air Chart Depot at Guildford had received into stock 19.5 million map sheets and issued 13.6 million – which equates to 21 C130 Hercules loads! As part of the withdrawal of forces, all bulk stocks in theatre were returned to Guildford for salvage.

Terrain Analysis

The ground was totally unfamiliar to the deployed forces and so terrain analysis became of even greater importance than it had been in Western Europe. Geographic information on the area of operations was gathered from all possible sources including terrain reconnaissance along the Kuwait border by military surveyors. This information was then used by cartographers at the School of Military Survey and the Mapping and Charting Establishment, who had quickly become expert in interpreting the alien landscape, to produce a huge range of terrain products that were used in conjunction with intelligence and other information by terrain teams to provide advice to commanders on the ground. The vital part that terrain analysis played in the conflict was highlighted by General Schwarzkopf who, when asked what had been the most important factor in planning the Gulf War replied, *“The terrain, once we knew where we could move, the rest of the planning fell into place.”*



General de la Billière is greeted by 14 Squadron's OC, Nick Rigby, during a visit to the unit's desert base. Photo: Nick Collins.



Field Survey

The field surveyors of 14 Squadron reverted to the role of their First World War predecessors, providing control for the Royal Artillery. Initially they deployed with 7 Brigade but with the arrival of 1 Armoured Division, they were reinforced from 19 Topographic Squadron and 512 Specialist Team RE and formed into a Divisional Survey Team whose

A field surveyor's 'bivvy' in the desert.



WO 1 Jim Starbuck training soldiers in the use of the new in service hand held GPS.

task was to use their geodetic GPS receivers to provide a survey control network. Each survey point was marked with a picket annotated with the ground coordinates which the Gunners used to update their PADS equipment. During the ground offensive the field survey teams travelled ahead of the guns setting up survey points through Iraq until the cease-fire, by which time they were 20 km north of Kuwait City.

Desert Navigation

An Army that had for more than 40 years exercised on the same well-known, heavily signposted,

feature-rich landscape of north-west Europe was now faced with navigating across unfamiliar, featureless terrain, at night and probably under fire. Small Desert Navigation Training Teams were set up using staff from the School of Military Survey, later reinforced from other Survey units, to train troops in basic desert navigation techniques and the use of the sun compass and the hand-held GPS receiver. The introduction into service of this navigation aid, only very recently available in the commercial market and capable of providing position fixes to ± 20 metres, allowed troops to manoeuvre across the desert with confidence and accuracy and was, to again quote General Schwarzkopf, "...a war-winning factor." The teams operated in Germany and then Saudi Arabia where 14 Squadron's field surveyors erected a network of pillars annotated with their coordinates in the training areas so that units could practise their new found skills and build confidence in their navigation abilities. By the start of the ground offensive, 15 military surveyors had trained over 6,000 troops to map read and navigate in the desert.



42 Group Commander, Colonel Andy Hoon, presenting Major James Prain with the award that he won together with WO1 Jim Starbuck for improvement to the sun compass – initially the best means of desert navigation available.



Lieutenant Colonel Geoff Parkes, COS 42 Group, chairs the daily Group Ops Meeting on what turned out to be the last day of land operations in Iraq.



ABF

THE SOLDIERS'

CHARITY

WHO ARE WE?

WE ARE THE SOLDIERS' CHARITY

WHAT ARE WE?

THE MOST EFFECTIVE AND RELIABLE
CHARITY FOR THE ARMY FAMILY

WHAT DO WE DO?

WE CURRENTLY HELP OVER 4,000
INDIVIDUALS ANNUALLY

WHO FOR?

SOLDIERS, FORMER SOLDIERS AND THEIR
FAMILIES IN NEED

HOW DO WE DO IT?

GRANT GIVING TO INDIVIDUALS IN PARTNERSHIP
WITH REGIMENTS, CORPS AND OTHER
SERVICE-RELATED CHARITIES

HOW CAN YOU HELP?

DONATING, VOLUNTEERING, LEGACIES, FUNDRAISING
EVENTS AND SPONSORSHIP

A LIFETIME OF SUPPORT

CALL **0845 241 4820** OR VISIT soldierscharity.org

FOR SOLDIERS ► FOR LIFE

An Aspect of Terrain Analysis and the Gulf War

By Christopher Nash OBE

A brief look at one aspect of Military Survey Support

Shortly after the invasion of Kuwait, Colonel AJ (Andrew) Hoon, Commander Production Planning Control Unit Military Survey, set up an operations room in Feltham. Lieutenant Colonel CGA (Chris) Nash headed the operations planning and coordinated priorities for work, assisted by Major MJ (Mick) Perry. The operations room, a temporary measure in principle at the outset of the war, was to become a permanent feature.

UK-based units, civilian and military staff, were operating round the clock and managing other department and other nation resources to boot. The Gulf War forced a profound and ultimately highly beneficial re-thinking of the Military Survey concept for support to the armed forces. One aspect of the work was Terrain Analysis.

In the 1980s Terrain Analysis methods were being developed to provide more comprehensive geographic information to commanders in the field. Large libraries of paper thematic mapping such as geological and cross-country movement maps, and other documentation covering the British area of responsibility in Germany were built up. In BAOR a series of Terrain Maps were produced and added to the Map Catalogue.

Terrain analysis was an area ripe for computerisation and a trial project, Pilot TERAS, was authorised. In 1989, it was demonstrated in Germany where, apart from evaluation, its main function was to show staffs the benefits of automated terrain analysis. The concept was accepted and a contract let to provide a system to create a digital terrain analysis database covering the Corps operational area. However, the critical factor was that the Royal Engineers had supported the development of Terrain Analysis and their staffs were well aware of the benefits and uses of terrain information.

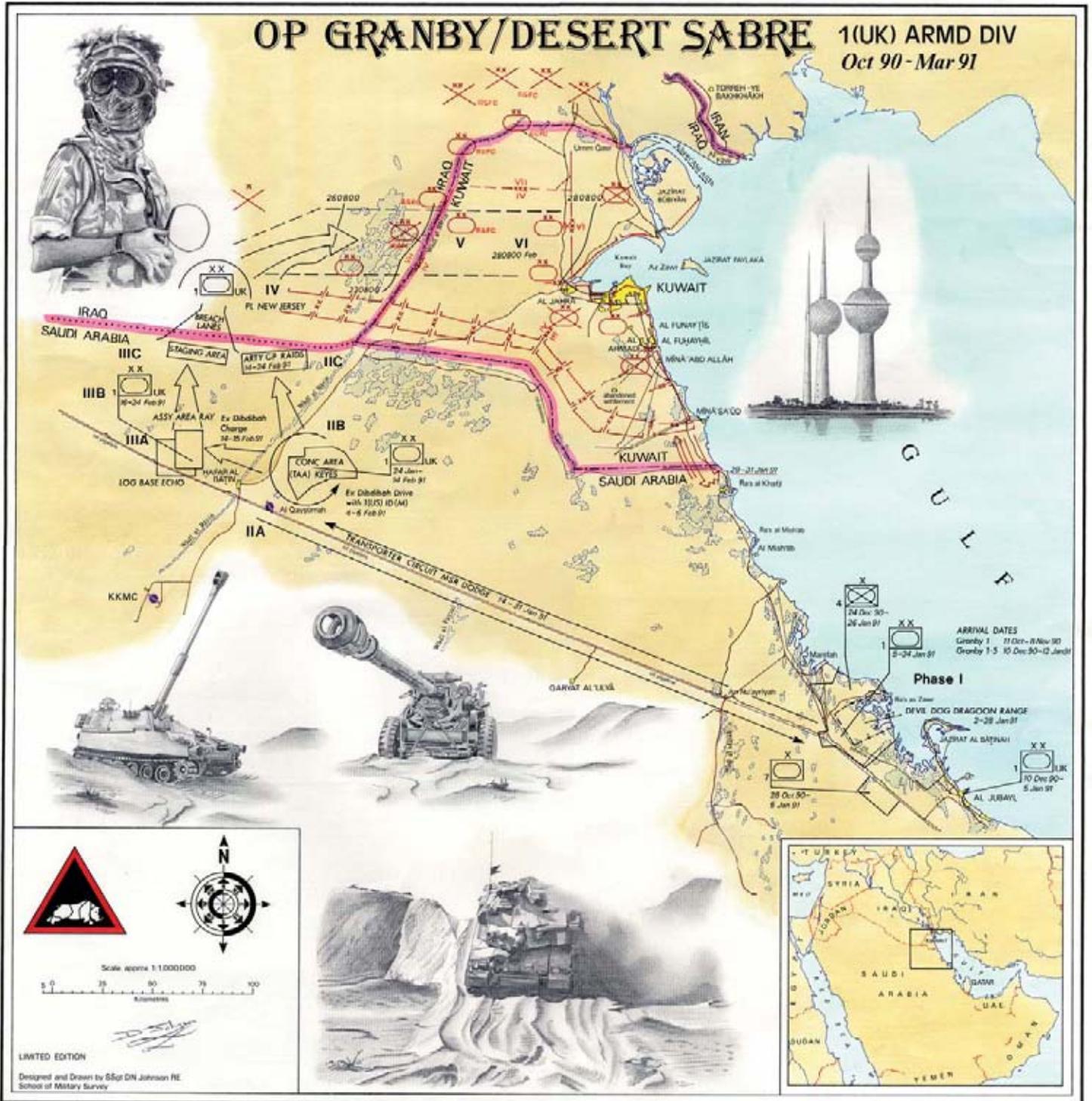
In the Gulf, for the first time, terrain analysis was put to the test in an area that had not been practised, ad nauseam, in annual exercises. New terms had to be learned and understood; such as *Sabkha*, the flat sand-cum-salt features that littered the desert and represented a risk to goings for both tracks and wheels, especially when wet. Terrain Analysis became the subject of interaction between staffs in UK and theatre. Priorities for analysis were driven closely by the requirements of the ground forces, communicated both by Principal War Headquarters (PWHQ) in High Wycombe, and from the theatre itself by the Chief Geographic Officer of the coalition force, Lieutenant Colonel NF (Nick) Fickling.

Importantly there was close collaboration between Engineer Intelligence and Military Survey on the subject of Terrain Analysis. When the Engineer in Chief, Major General Richard Peck, was concerned about the implications of the nature and location of enemy positions, Lieutenant Colonel SKE (Steen) Clarke was tasked with visiting the Military Survey operations room at Feltham and took with him map overlays showing these dispositions in some detail. Military Survey had been plotting pipelines and other obstacles and had also examined the terrain to look for *Sabkha* and other risks to good going for Main Battle Tanks. Lieutenant Colonels Clarke and Nash consulted together and concluded that the combination of the terrain and enemy dispositions represented a significant issue and took this conclusion to the Engineer in Chief. The concerns were based on the then concept for the taking of Kuwait by a sea invasion. The natural, commercial man-made and Iraq defences indicated that the proposed plan could run into major difficulties.

Colonels Nash and Clarke developed the terrain and engineer intelligence (the Military Survey personnel at Feltham and Hermitage undertook the detailed terrain analysis work) and a number of options were prepared and staffs briefed at PJHQ and in theatre by Colonel AA (Alasdair) Wilson. The "Engineer Intelligence and Terrain Evaluation Study" had a significant impact on the decision to use a left hook though Wadi el Batin as the main effort of the assault to liberate Kuwait.

A follow on from the above was the change of plan but there were still concerns, particularly in relation to the goings and the impact of *Sabkha* in wet weather. At very short notice Lieutenant Colonel Nash was called to MoD to brief the Secretary of State for Defence – Tom King. With a bundle of maps and overlays he was rushed up to MoD in the DG Military Survey's staff car. A short overview briefing followed a quick setting up of the maps. A major concern of the Minister

was the *Sabkha*. He enquired about rainfall and kept pressing the point until finally asking whether the day the rain was going to start could be given. At this stage the PUS stepped in and said; “Minister I think that only the absolute highest authority would know the exact date but we have a very good idea and plans have taken into account the potential problems”. Soon thereafter the briefing concluded.





The Yugoslav Wars 1992 to 1996

Geographic Support To UNPROFOR from the perspective of Commanders Geographic

*Compiled by Christopher Nash from input provided
by the Commanders Geographic UNPROFOR*

Preface

This article looks at geographic support from an HQ UNPROFOR perspective. It is a compilation of reminiscences from the Commanders Geographic. All ex Commanders Geographic UNPROFOR provided, at very short notice, input and their contributions were then collated. It is not intended as a definitive historical document or record.

The Wars

The Yugoslav Wars were a complex series of violent conflicts fought in the former Socialist Federal Republic of Yugoslavia between 1991 and 1995. The wars ended in various stages, mostly resulting in full international recognition of new sovereign territories.

There were three separate but related wars:

War in Slovenia (1991)

A 10-day war, post the declaration of independence.

Croatian War of Independence (1991–1995)

A war fought in Croatia from 1991 to 1995. It was fought between the Croatian government, having declared independence from the Socialist Federal Republic of Yugoslavia, and both the Serbia-controlled Yugoslav People's Army (JNA) and local Serb forces, which established the self-proclaimed Republic of Serbian Krajina (RSK) within Croatia.

Bosnia War (1992–1995)

The "Bosnian War" or the "War in Bosnia and Herzegovina" was an international armed conflict that took place in Bosnia and Herzegovina between March 1992 and November 1995. The war involved several sides. Because the war in Bosnia and Herzegovina was a consequence of the instability in the wider region of the former Yugoslavia, and due to the involvement of neighbouring countries Croatia and Serbia, there was long-standing debate as to whether the conflict was a civil war or a war of aggression. Bosniaks, many Croats, western politicians and human rights organisations claimed that the war was a war of Serbian and Croatian (to a lesser extent) aggression based on the Karadžević agreement, while Serbs often considered it a civil war.

The Geography of the Former Yugoslavia

Rugged mountains dominate the 255,892 square kilometres of the former Yugoslavia and separate the fertile inland plain from a narrow, rocky Adriatic coastline. The Julian Alps of Slovenia, an extension of the Italian and Austrian Alps, include Yugoslavia's highest peaks. The Dinaric Alps rise dramatically along the entire 640-kilometer Adriatic coast. Finally, spurs extend southward from the Carpathian and Balkan Mountains through Serbia from the Danube River's Iron Gate near the Romanian-Bulgarian border, intersecting with the Dinaric Alps in Macedonia.

Farther south is the Neretva River; a centuries-old trading link between the Adriatic and Bosnia. Finally, the port of Bar connected with the interior of Montenegro and Serbia by means of the Belgrade-Bar Railway, giving Serbia access to the Adriatic.

The terrain is difficult and ideal for guerrilla type tactics and warfare. Because of the diversity and spread of the ethnic populations travel by UN forces often necessitated crossing frontlines where fighting was in progress.

International Involvement

From an international perspective involvement was based on Peace Keeping – the involvement was in two phases: the United Nations and then NATO.

UNPROFOR (United Nations Protection Force) was the United Nations peacekeeping / projection force in Croatia and in Bosnia and Herzegovina during the Yugoslav wars. NATO was responsible for the implementation of the peace accord.

UNPROFOR

UN Security Council Resolution 743 created UNPROFOR on the 21st of February 1992. The initial mandate was to ensure conditions for peace talks, and security in three demilitarised “safe-haven” enclaves designated as United Nations Protected Areas (UNPAs) located in the Republic of Croatia: Eastern Slavonia, Western Slavonia and Krajina. In 1992, the mandate was extended to so-called “pink zones” controlling access to the UNPAs, some border control and monitoring of civilian access to the Pink Zones, and control of the demilitarisation of the Prevlaka peninsula near Dubrovnik. (The term “Pink Zone” was used because a staff officer had highlighted the area on a briefing map with a pink highlighter pen).

Other extensions of the mandate included protection for Sarajevo Airport from June 1992 in Resolution 758, and, from September 1992, protection for humanitarian aid in the whole of Bosnia and Herzegovina, and protection of civilian refugees when required by the International Committee of the Red Cross in Resolution 770.

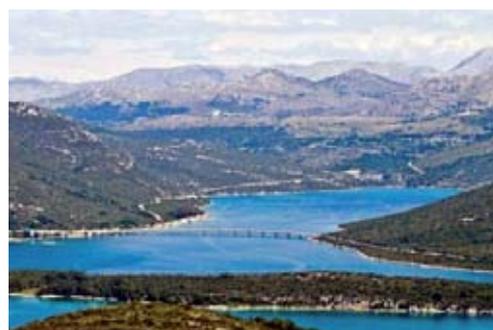
UNPROFOR was in charge of air interdiction for military aircraft in the Bosnia and Herzegovina airspace (as ordered by the UN Security Council); in coordination with NATO forces (air interdiction missions were the first use of force by NATO).

It also monitored Bihać, Sarajevo, Goražde, Žepa, Srebrenica and Tuzla, which were defined as “security zones” by the UN Security Council. UNPROFOR was authorised to use force to protect these zones if necessary, in coordination with NATO air forces. Eventually, UNPROFOR monitored cease-fires in Bosnia in February 1994 and January 1995.

On the 31st of March 1995, UNPROFOR was restructured into three coordinated peace operations. On the 20th of December 1995 the forces of the UNPROFOR were reflagged under the NATO led Implementation Force (IFOR) whose task was to implement the General Framework Agreement for Peace in Bosnia and Herzegovina (GFAP — otherwise known as the Dayton Accords or Dayton Agreement). IFOR was a NATO-led multinational force in Bosnia and Herzegovina under a one-year mandate from 20 December 1995 to 20 December 1996 under the codename Operation Joint *Endeavour*. Its task was to implement the military Annexes of *The General Framework Agreement for Peace (GFAP) in Bosnia and Herzegovina*. It relieved the UN peacekeeping force UNPROFOR, and the transfer of authority was discussed in Security Council Resolution 1031. Almost 60,000 NATO troops in addition to forces from non-NATO nations were deployed to Bosnia. Operation Decisive *Endeavor* (SACEUR OPLAN 40105), beginning 6 December 1995, was a subcomponent of Joint *Endeavor*.

Military Survey Involvement

The story of UNPROFOR is one of rapid development, consolidation and implementation in a very difficult geo-political environment. Not only were there troops deployed but also observers (UNMOs – UN



A land of mountains, valleys, coastal inlets, villages and towns.



Military Observers, EU Observers), aid convoys manned by contract staff, public relations teams, aircraft logistics, contractors providing a range of services and an administration of professional UN personnel. All travelled, all needed to know where they were, and UNPROFOR personnel needed common maps to enable communication, understanding and agreement.

The provision of the UNPROFOR force was a huge challenge. With no infrastructure, command and control mechanism, the receiving of troops, the operational planning, implementation of plans, monitoring, reporting and providing aid and support all had to be introduced, developed and sustained. From a Military Survey, perspective involvement in the wars was in three areas: the provision of professional geographic staff to HQ UNPROFOR, UN HQ Bosnia - Herzegovina and the provision of British Forces to the Mission – *Operation Grapple*.

In October 1992, the British Force (BRITFOR) deployed in the form of a brigade staff, infantry battalion, logistics battalion, reconnaissance squadron, and an engineer squadron. Royal Navy Sea Kings provided helicopter support. With a headquarters (HQ) and logistics base at Split on the Croatian Coast other units deployed throughout central Bosnia. The 2,400 troops deployed to Bosnia and Croatia became operational on 13th November 1992, tasked to provide armed escort to humanitarian aid convoys. Attached to HQ BRITFOR was a geographic cell from Military Survey.

HQ UNPROFOR Geographic Support

The UN was not prepared for the role in Yugoslavia and historically map support was in the main related to providing briefing maps and wall maps – big hands on small maps. When UNPROFOR was established in February 1992 the UN HQ New York obtained from the US limited stocks of series M709, 1:50,000. Under NATO arrangements Yugoslavia maps was a responsibility of the USA. Series M709 was very old and based on a somewhat inaccurate 1934 Yugoslav survey updated by 1942 aerial photography. The US Army Map Service printed stocks in the late 1950s / yearly 1960s. The charge to the UN was US \$9.00 per sheet.

The troops on the ground very soon became aware of the lack of geographic information and the serious inadequacies of the M709 series. The problem was addressed in a number of ways: by local procurement of some topographic maps; national contingents turned to their own military geographic staff for support and then, when Bosnia-Herzegovina (BH) command was formed in October 1992, contributing nations recognised the geographic support need and a 10 nation production programme, initially coordinated by SHAPE, resulted in one million maps produced but only of BH. There was some overlap and troops in Croatia gained some benefit.

The Establishment of Geographic Branch HQ UNPROFOR (Geo Branch)

HQ BH Command at Kiseljak and HQ BRITFOR at Split deployed with small geographic sections including TACIPRINT. The HQ UNPROFOR staff finally understood the need for the coordination of geographic support for the whole of the theatre. In outline the role was to *“develop geographic policy and procedures and to arrange formal geographic materials supply agreements with the principal providing nations”* – USA and UK.

Work to establish the Geo Branch was started in November 1992 but the process was slow and the Chief Geographic Officer, Colonel A P Walker OBE, did not arrive in theatre until the 4th of March 1993. The Branch became fully manned on the 2nd of June 1993.

UK Military Survey had for many years held a number of senior NATO Geographic posts and staff appointments in British HQs and Commands. This experience and professional training fitted Military Survey officers well for the post of Commander Geo. UK agreed to fill the post and over the course of the life of UNPROFOR, through agreement with NATO and British HQs, met this commitment.

The Role of HQ UNPROFOR Geo Branch

The role was very straight forward in principle but difficult in execution: *“The Geographic Staff are responsible for the provision of all types of geographic advice and materials necessary to support operations in the UNPROFOR area of interest.”*

Organisation

The geo organisation in theatre and theoretically on call to Commander Geo was:

- Geographic Branch HQ UNPROFOR based in Zagreb.

- Geographic Section HQ BH Commander based at Kiseljak headed by a major and 5 soldiers.
- Geo Section HQ BRITFOR based at Split as part of G3 with a captain and seven soldiers.

In reality Geo HQ BH Commander and Geo HQ BRITFOR were in direct support of their HQ and acted in the main as a conduit for map supply on behalf of HQ UNPROFOR. From time to time they were able to provide technical support to Commander Geo. They produced a variety of special products for their commands using TACIPRINT, TACICAM and computer graphics facilities. The TACIMAPS were cartographically to a high standard with 4 colours and often runs of 500 or more. Distribution was wide and included: national MODs, UN Geneva and HQ UN NY.

The production of the TACIMAPS and their distribution brought a dawning of a better understanding by the UNPROFOR staff of the potential of geographic support to the UN operations. It did not necessarily make life any easier for the Commander Geo and the politics of the UN and national interests had to be managed to enable each geographic support building block to be put in place. Professional experience and competence as well as political adroitness and resilience were required of the Commander Geo.

Map supply of standard map series to commands and units in UNPROFOR was a fundamental task. A Theatre Map Depot (TMD) was established in Zagreb and two Map Supply Points were constituted at Kiseljak and Split. At the outset a Central Map Depot (CMD) was established in Frankfurt and transportation of stocks from the CMD to the TMD was by US aircraft. Maps went forward by the BFPO mail system and on UN flights. The arrangements worked well.

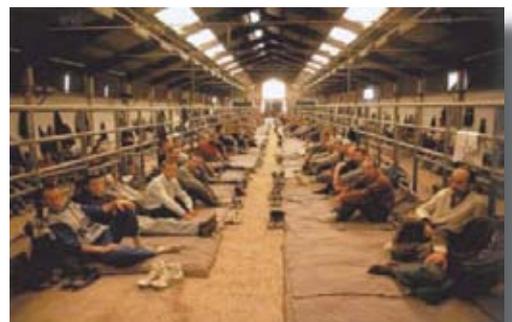
Terrain Analysis (TERA) support was required and provision initiated. Products included: terrain visualization for helicopter pilots, line of sight evaluations and route analysis. The lack of terrain data tested the skills of the analysts to make best use of what was available in any form. The UN procured a TERA system for HQ UNPROFOR and Canada provided a second "Fulcrum" system that was familiar to the TERA team. The US agreed to provide a number of products under the terms of a "US Government Letter of Assist" A problem with acquiring and holding some geographic data was the security classifications. HQ BRITFOR was in a position to hold such data and it became the focus for TERA data and products. Geographic Information System software was ordered through the UN procurement pipeline – ARC/INFO and ERDAS.

BH Commander control and financial arrangements were passed to the contributing nations and new arrangements were staffed to enable the UN to obtain geographic materials direct from the US and UK. Because of the change in supply arrangements the CMD holdings were run down.

By August 1993 geographic support had been established in UNPROFOR and there was a programme of procurement and development in place which included orders for maps supplied by the US (US \$400,000) and a smaller order from the UK which concentrated on town plans in Bosnia Herzegovina, obstina boundary maps and additional stocks of the 1:100,000 series GSGS5726. Many new geographic requirements had been identified and the next phases in the development of the geographic support would need priorities, schedules and costs to be agreed. The Geo budget for materials and systems up to July 1994 was set at US \$1.5m.



The consequences of the fighting: refugees, homeless, prisoners and the dead.





A major shortfall in geographic capability at HQ UNPROFOR was TACIPRINT capability support. Procurement of equipment to the value of circa US \$250,000 had been initiated but the full capability would take time to get in place.

Getting the Processes and Procedures in Place

In August 1993 there was a change in Commander Geo; Colonel I F G Whittington. HQ UNPROFOR was expanding and there were organisational and structural changes afoot. His arrival coincided with the withdrawal of the UK field hospital from Zagreb, which had been providing the basic national support functions such as pay, post and supply – reducing the UK contingent at Zagreb to a couple of geographic staff, a Royal Engineer postal sapper and a British UNMO – later to be augmented by the new British UNHQ Chief of Staff and his ADC – with the British support relegated to “beg-borrow-steal” or ask BRITFOR in Split “nicely”.



With the basic spadework for the bricks and mortar side of the first ever UN Force Geographic Branch completed the main “establishment” task was to fill in all the paperwork gaps, such as formal plans and national support arrangement for the provision of the maps for the UN troops and people in the Balkans theatre. Fortunately, Commander Geo coming from a NATO HQ was well aware that the bi-lateral “barter” system, long used between individual nations, did not apply to “international” organisations such the UN and NATO. He started, in parallel to the military staff work of the geographic support plans, the formal procedures for the procurement by the UN of maps of the UNPROFOR area – primarily from US & UK. As these negotiations progressed, it quickly became apparent that, due to UK & US procedures for UN funding, the initial funding figures for UN map supply (which had been based on prices charged to NATO) would have to be increased tenfold – quickly escalating the required staff work to UN HQ in New York. In recognition of the funding levels the post of Commander Geo was formally established as a Colonel.



To provide light relief from the politics and staff work at Zagreb, the job allowed for routine visits to the deployed Geographic Staffs at HQ BRITFOR and the TACIPRINT team at the UNHQ in Bosnia at Lieutenant-General Sir Michael Rose’s HQ at Kiseljak together with liaison trips to the major national contingents. This early period for the UN in the Balkans, was perceived by the Commander Geo to be a massive learning curve for both diplomatic and military staffs in Whitehall, who clearly lacked a basic understanding of the mechanisms, never mind the politics of the UN in the field, together with the international staff at UNHQ New York, who had no experience of generating or funding such a large military force.



UNPROFOR at work.

The technical work was well within the remit of the UK specialist staffs deployed by all three services, but the lack of a workable “national support” organisation for the disparate “individual reinforcements” inserted, apparently randomly, from NATO appointments into UN international staffs at Zagreb, Kiseljak and Sarajevo caused unnecessary administrative problems for both the individuals and their families left behind with NATO. This generated an “ex-officio” job for Commander Geo as liaison between the various individuals, the sending UK Support Unit at their NATO location and BRITFOR/UKLF, to iron out some of the glaring anomalies. For example, an individual returning to his family for mid-tour leave in Oslo from Kiseljak was officially required to request UK transport to coincide with his start of UN leave; with luck he would be in Split within a day to await the RAF flight to UK the next day.

By the end of the tour the UN geographic support procedures were embedded and working.

Improving the Geographic Material

Early in the New Year (1994) it was time for another Commander Geo; Colonel C G A Nash OBE. An appreciation of the situation suggested that the following areas needed addressing: the currency, accuracy and completeness of the geographic data; how to ensure that all sides – UN and warring factions – had common material and could therefore agree and negotiate situations related to the ground i.e. boundaries, confrontation lines and common names for locations; ease of use of products; the efficiency of the staff – a number were approaching a year in theatre; and perhaps above all understanding and meeting changing requirements and keeping a high profile. However there was one need that if met would make operational and geographic support much more effective and this was for a military staffed operational HQ in New York with a military geo specialist.

Manning in the UN was very much on a 12 month contract basis. Contract personnel were hired on this basis and many nations posted their personnel on 12 month tours. The geo staff, less the Commander Geo (UK) and the WO Geo (Maps) (UK), was on long tours. Mistakes were being made and one member simply failed to check on confrontation lines before going on a visit and spent some time with Croatian forces whilst his release was negotiated. In fairness 12 month UN postings were the norm but the circumstances of UNPROFOR had not been realised. UK probably had the length of tour right but it raised the question of ability to meet the manning requirements particularly if, as assessed at the time there would be a long term requirement up to year 2000. Man management and good personnel relations within a mixed international/military/civilian/UN staff/contractor HQ and branch were pillars to successful geographic support.

Liaison throughout the theatre and certainly within HQ UNPROFOR was part of the daily routine and visiting units and HQs took up about 50 percent of the time. This was done by most of the geo staff with a series of coordinated visits. However liaison was not simply to the UN. Local agencies held a lot of detailed geographic information such as large scale maps, plans and boundary information. A very popular Serbian product was a plastic relief map. Nonetheless it was the Topografska-Karta (TK) Yugoslav national 1:50,000 scale series that held tactical interest – a common product across the region, in date and an accurate series.

After a progression of visits, including Serbia and the Former Yugoslav Republic of Macedonia (FYROM), agreement was obtained to reproduce the maps for issue to the UN. It was agreed by Commander Geo that stocks would be provided to the mapping agencies and by implication to the warring factions. This agreement was based on a pragmatic approach in that the maps would provide a common geographic reference for all enabling better communication and negotiation. A contract was placed with the Mapping and Charting Establishment at Feltham who regridged the maps and printed copies. The maps were very well received and issued as a replacement for map series M709 – but not always. One consequence of the supply of the TK 1:50K maps was that at a cost of 38 pence per sheet as against the M709 at US \$9.00 per sheet an UN accountant decided to cut the budget and downgrade the branch because of the reduced financial requirement. This led to a battle to retain the budget, maintain the branch and the position of Commander Geo. Another political skirmish was won.



Wanton destruction.





One more example of improvement to geographic support was that on a daily basis convoys, liaison teams and individuals moved throughout the UNPROFOR area of interest. “Freytag und Berndt” an Austrian map publisher produced a very acceptable single sheet road map of the theatre. In due course the maps were issued, greatly easing the burden on drivers and also providing a very acceptable briefing map. This was the first occasion that a civil contractor had produced maps for the UN.



In May 1994 Commander Geo went to HQ UN in New York to meet with UN staff and brief on the need for geographic support and the presence of a specialist military geographic staff officer in the forming HQ UN Operations Cell. He was drawn into discussions regarding mines both in the Balkans and also in the wider context and how to record mined areas. Sappers had a good procedure for minefield recording and mine maps were well established. The major agenda item became the need to find an important person to head up “Mine Awareness”. A number of names were put forward including HRH Princess Diana.



From a G2/G3/Geo perspective a number of key players such as BRITFOR maintained much closer contact with their MODs than with HQ UNPROFOR or even the HQ BH Command. The UN arrangements, its real lack of operational experience and the fact that often national MODs had in place excellent communications with supporting operational and logistic staff created this outcome. There were therefore several communication loops: unit or national formation back to its national MOD, then information was passed to the Sector or Commander HQ and through the filter system it reached HQ UNPROFOR. Nevertheless there was another unofficial approach whereby staff in HQ UNPROFOR used their personal networks to glean information both in theatre and back to their national MOD. Throughout 1994 the problem was never really solved and given the political nature of the UN and the circumstances in theatre what was achieved by the UNPROFOR G2/G3 staff with geo support was highly commendable.



Geo Branch in conjunction with G2 set about consolidating the daily intelligence and produced traces for staff briefings and planning. In time the traces moved from being a display of information to agreements in relation to confrontation and boundary lines.

Manning became a bit of an issue and Commander Geo was extended in theatre. Towards the end of the tour the Army announced the next tranche of redundancies. Posting Branch 7 (PB7) wrote to Commander Geo along the lines that as the senior Royal Engineer in theatre any queries, concerns and appeals should be passed through him. Redundees were rapidly posted back to UK and no action was needed but it did again highlight the anomaly of those contracted to the UN on an individual basis and units and formations provided on a national basis.

The road to Sarajevo – 43 month siege and the dead.

The Middle Period Maintaining Momentum

In terms of time it took some 18 months to establish the Branch, procure initial map stocks, put in place procedures and then upgrade the products. Integration into the HQ and theatre and acceptance by the formation HQs, units and staff had happened. As autumn 1994 approached a new Commander Geo; Colonel I A M Ross, arrived and he decided that the best way to understand the geographic needs was to continue the programme of visits. A major advantage to the Branch was that it was established with its own Land Cruiser and that enabled personnel to go wherever and whenever the need arose. The early visits were always stimulating and the run down to Split continued to be interesting: dodging the trucks on the road or being

held up by Serb/Croat/Bosnian checkpoints. Commander Geo visited all commands and was gratefully received by each Commander who were impressed that Geo could look after their needs and generate better products for them.

A significant achievement was to get £1.3M out of the UN to purchase a GIS and to up rate the establishment with a civilian GIS technician (Croatian). The civilian survey establishment in Sarajevo was visited and Commander Geo gave them support to obtain equipment as everything they had had been destroyed or looted. It was arranged for them to undertake cooperative work within their limited capacity.

The problems relating to communication were common and the following highlights some of his experiences which were familiar to all Commanders Geo. On visiting the Russian Sector, Commander Geo was kept outside for half an hour while the local commander hid all evidence of illegal activity before he could go in to see the Russian Commander. (The previous Commander Geo had arrived early just as a fleet of Serbian military trucks arrived at the Russian fuel point). A brief from an Argentinean was in Spanish in arc of fire etc (Commander Geo understood not a word!) In FYROM the Norwegians briefed on how they patrolled and got information from the locals. From their highly secure and fortified base the US contingent explained their arcs of fire. Apparently Commander Geo was treated as if he came from planet Zog when asked what patrolling and discussion they had with the locals, (they were the enemy, you didn't leave your base unless tooled up and locked down - you certainly didn't get near anyone local!)

The HQ too had its problems. By way of example, Commander Geo on returning to Zagreb arrived just in time for Branch Chiefs meetings where there was some vague discussion on how UN was containing the locals with road blocks etc. He then pointed out that they by-passed these using various donkey tracks. He was told that this was insignificant to which he promptly slapped down a series of Polaroid pictures taken from a geo helicopter reconnaissance along the whole border two hours previously which clearly showed long donkey trains of locals carrying heavily laden beasts with all manner of items. The reply was that he should not have taken the photographs as that was against the agreement! No mention of taking action.

Commander Geo was tasked to provide support to Holbrooke and produced the first cut of the green line for initial negotiations. The base map used was about 1:500M and was big hand stuff – this was refined over time and as the negotiations continued and the detail improved so the map scale was enlarged. (From 1993–1994, he was U.S. Ambassador to Germany. Although long well-known in diplomatic and journalistic circles, Holbrooke achieved great public prominence only when he brokered a peace agreement among the warring factions in Bosnia that led to the signing of the Dayton Peace Accords, in 1995).

Taking into account the security situation, the people and places visited, the distances travelled and the time spent in travelling the Geo staff were perhaps very lucky to escape without any serious injury. However danger was never far away and one incident highlights the ever present risk that was being taken. A Canadian Geo Sergeant was returning from Sarajevo on a Russian cargo plane. The plane took small arms fire as it left and an American civilian sitting next to the Sergeant was hit. The Sergeant saved his life.

Some 1000 days into the life of HQ UNPROFOR another experienced Military Survey officer arrived and took over as Commander Geo; Colonel A P Cross. The geographic support process was performing



Logistic operations were critical to success.





to a very high standard within the limitations of the capability and resources generally meeting the requirements. Maintenance and development of existing product types continued: mine maps, inter entity boundaries and keeping the pressure on Feltham, and to a certain extent the US, for updating the topographic maps and town plans were basic activities.



The NATO Planning Group established a permanent presence and of course geo worked with and supported them where possible. Within each tour each Commander Geo was tasked with activities outside the normal geographic support arena. This time Commander Geo was tasked with a board of inquiry to investigate the death of a Finnish UNMO. The investigation team had to get into Gorazda at a time when it was virtually impossible to travel that road but it was achieved. It was concluded that the Finn was murdered by a Nigerian UNMO on the road from Gorazda to Sarajevo in the Serb held area.



In typical fashion Commander Geo was tasked to go to Sector West when the Croats started retaking it and ethnic cleansing the area by shipping people south over the inter entity boundary. The orders given were along the lines of: "Get yourself up to Sector West, the Croats are clearing it out and as you're a sapper go and see if there is anything we can do to help those poor sods like screw on a few bog doors or something." Commander Geo understood this was referring to those being shifted out not the Croats. On arrival the scene was pitiful, streets full of peoples' possessions which had just been turned out of the houses, livestock was roaming around free and the people were being herded onto buses. Outside Sector West a queue of people who had been displaced about two years before waiting to get back in and reclaim their old houses. He was unable to do anything as he didn't have any equipment and in fact the Croats who were controlling the area did not welcome his presence. As the Croats were all fully armed and he was only had a 9mm pistol he was unable to press his cause. After a day driving around the area and getting in where possible he reported back to UNPROFOR on what he had seen and the situation as far as he could garner.



Political pressure on manning and establishments once again was building. Commander Geo went to brief the COS who apparently fell asleep before the briefing began. It would appear that the dye was already cast and the decision to downgrade the post of Commander Geo taken. In the UN executive decisions and budget control is dealt with by Colonels and above. Losing this control diminishes the departmental decision and support process. However, in relative terms, there was probably a limited impact on the quality of the geographic support because geo had been able to fight its corner from the outset with the appropriate level of appointment and the post was retained as Commander Geo although the rank was downgraded. Politics were never far beneath the surface. (On reflection some 15 years after the event it may be that Military Survey was experiencing difficulties in manning the post with those qualified to hold the rank of colonel and there had been a meeting at the cross roads to which Commander Geo was not privy!)

Control is established and UNPROFOR settles in.



NATO Handover Begins

In the Spring of 1995 a replacement Commander Geo; Lieutenant Colonel J F Prain, arrived and was somewhat apprehensive as there had been a couple of mortar attacks in the city a few weeks earlier. However these events were isolated and Zagreb was now very much back to normal

Turning to the technical issues, his first interesting excursion was to go to Belgrade with \$2,000 in cash to acquire 25 sets of the 3D plastic map tiles from the Serbian Geographic Department. After

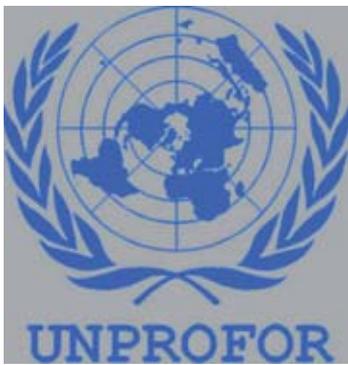


much toasting the Serbs eventually concluded the deal, which had been initially brokered by his predecessor. He was anticipating collecting 9 map boxes – one for each tile in the 3x3 matrix that made the complete map. However the Serbians had kindly assembled these into 25 maps, individually rolled up like carpet and wrapped in paper standing 2m tall – it was like going into a carpet warehouse! After some hasty and pragmatic repacking, Commander Geo was able to squeeze the consignment into the minibus. With much struggling and discussions with those in authority (they had guns) the mini bus arrived at the airport, onto the plane and back to the map depot in Zagreb. The maps were certainly well received by the COS.

As NATO air operations began to intensify, Commander Geo started to receive reports from the British GPS Survey teams that their results were being corrupted and that jamming or interference from Italian TV was suspected. There was a NATO LO in the UN HQ however the incumbent was a US officer who was very reluctant to disclose anything about NATO (from his perspective it was solely a US operation!). He was therefore reduced to asking formal questions. Initially Commander Geo asked if it was possible that US Air Force was jamming GPS. 24 hours later came the response “Possibly”. He then asked if the US was aware that its allies were using GPS to fix artillery positions to support accurate targeting in the Sarajevo area. 24 hours later the jamming stopped!

One of the earliest decisions was to ditch all historic, map based information products such as troop disposition maps. Literally the following day, there was a visit from the representative of the International War Crimes Commission at The Hague asking if Geo could show where there warring factions were back in 1993. Luckily some historic products were still held and Commander Geo was able to provide a map and a signed statement as to its accuracy based on the intelligence sources. This event bought home the value of archiving such non- geospatial information.

The introduction of the updated M709 US map series also caused some concern. By this stage of the UN deployment, ground forces were using the TK 1:50,000 scale maps with a WGS84 UTM overprinted grid by MCE at Feltham. The advantage was that it was quality maps in terms of topography and cartography, and most crucially, it was familiar to the warring factions. When Carl Bildt, EU Special Envoy to Former Yugoslavia, visited Zagreb in the late summer, Commander Geo stressed the benefits of any settlement being based on native maps. The same point was made to Chief Geo, HQ ARRC which was earmarked to take over from UN PF HQ after the Dayton Peace Accord. In spite of these arguments, the NATO mission was eventually conducted on the US maps.



Visits continued and included the UK contingent at the Metal Factory at Gornij Vakuf and Mostar; once the scene of heavy fighting, and the shrine at Medjugorje. They were beautiful places which showed the savage scars of fighting. Commander Geo also travelled in a convoluted route involving various ex-soviet military aircraft in less than pristine condition to Macedonia and the Albanian border.

The last Chief Geo; Lieutenant Colonel R M P Nicklin, reported to UNPROFOR and became directly involved with closing down and transferring UNPROFOR Geo responsibility to NATO. Kofi Annan arrived in October 1995, as the special envoy for the last three months of UNPROFOR with responsibility to close down UNPROFOR and transfer responsibility to NATO.

The maps held by UNPROFOR had a nominal value of approximately £2 million. However Commander Geo convinced UN New York that all maps should be transferred, at no cost, to NATO who would then take on responsibility for providing geographic coverage to the residual UN administration. It was purely a “paper” transaction as NATO immediately assumed responsibility for the Zagreb Map Depot and employed the storeman. Initially UN New York were not happy but after briefing Kofi Annan about the NATO (US) production of the ‘GOLDEN’ map coverage showing the ceasefire lines, and that all the maps held were out of date he agreed to support the proposal, especially as such a gesture ensured a free supply of geo information to his administration.

The UN Operations Cell had been established in New York with a UK Military Survey officer on the establishment; Lieutenant Colonel B Olley. A raster scan of a map of the UNPROFOR area had been sent from Geo UNPROFOR to the Cell and each evening Commander Geo sent by email the vector data of the latest ceasefire lines. The digital map and ceasefire lines were combined and used to the two to brief Boutros Boutros-Ghali each morning at the situation update. This worked very well.

Before Commander Geo departed Zagreb he moved some of the map stock to Split into a shoe factory which he had already acquired for UNPROFOR. 14 Topographic Squadron advance party landed at Split, which was one of the NATO Air Hubs and subsequently took over map distribution for NATO troops. The OC of the Squadron then moved up to Sarajevo to the brick factory.

Having cleared Zagreb and written an input for the final UNPROFOR report Commander Geo discovered that this was not to be the end of his stay in the Balkans. He then filled a NATO post in the Residency in Sarajevo within the 4 star AFSOUTH Forward Command, as Chief Geo within J2/J3 Plans. Commander Geo had the TACIPRINT and UN Geo team based in Sarajevo, plus a Canadian terrain analysis section who had joined him from Zagreb but had no home to go to and when Commander Geo left they moved on to the French sector in the south.

During the negotiations in Sarajevo for the Dayton ceasefire line there were many minor changes agreed on the ground and marked on the maps. Each map (with changes) was agreed and signed by the warring parties and each party demanded a copy. At the time Commander Geo held the only scanner to do the job in Zagreb and after briefing this to the negotiating team, the originals were flown to Zagreb, scanned and copied, and returned to Sarajevo within a 24 hr period. Deadlines were met and momentum restored for the team to fly back to Dayton. The lesson to learn is perhaps

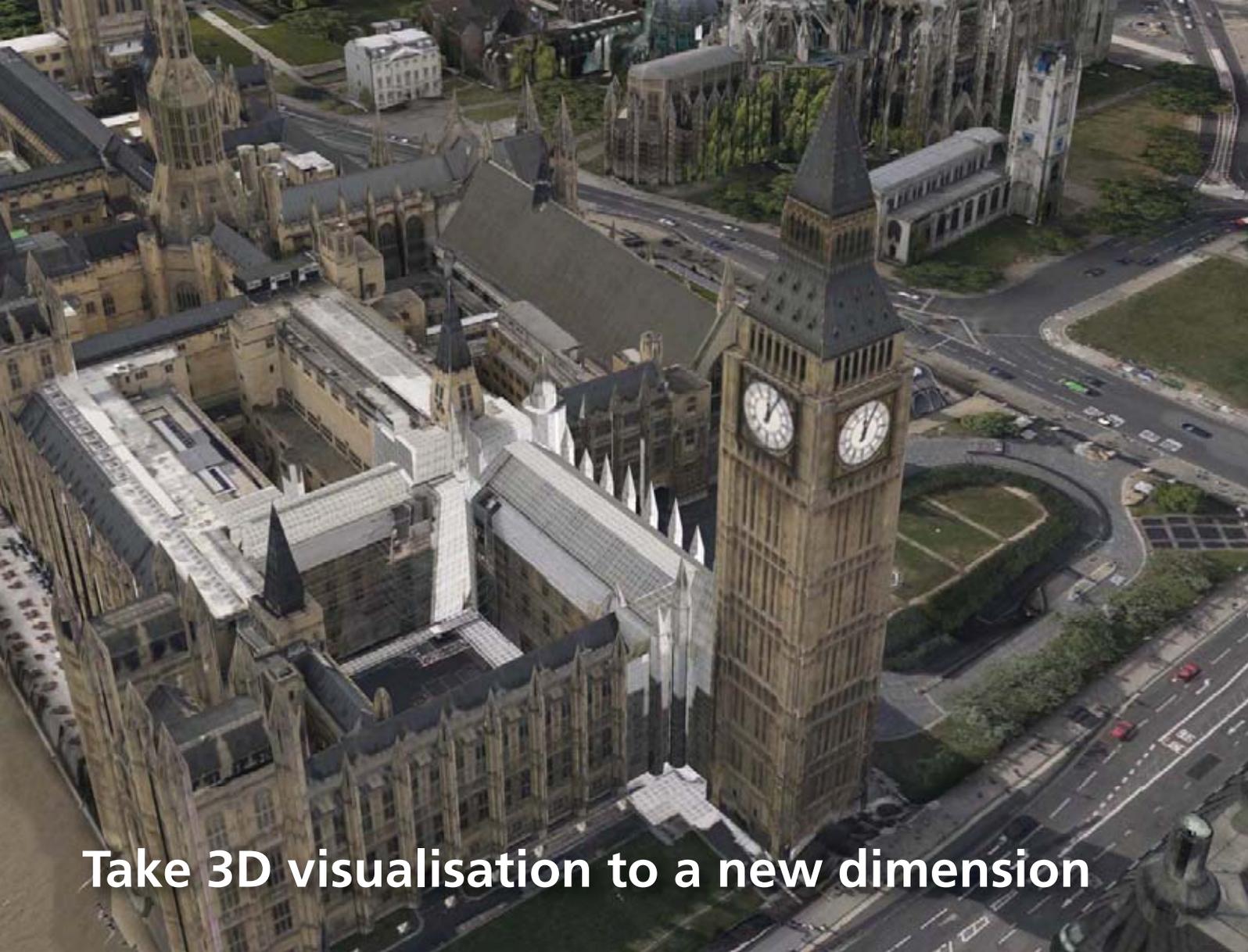
that “capability should always be under command in the field”, a lesson often historically ignored during the build-up but always identified post the operation!

Come February 1996 the ARRC had assumed responsibility, 14 Topographic Squadron was fully functional and the 4 star Forward Command at the Residency returned to Naples.

..... and Commander Geo UNPROFOR came home.

Not everyone was happy with UNPROFOR.





Take 3D visualisation to a new dimension

In today's world of unpredictable threats and global operations, the demand for high quality geospatial intelligence to support time sensitive operations in complex environments is ever-more critical.

Today's sustained high level of tactical commitments and rotation of units, mean that pre-deployment training and hand-overs become critical in maintaining tempo. Infoterra's contribution to this effort is the production of large scale mapping in high conflict areas to support training and simulation systems.

Infoterra's 3D visualisation expertise is also designed to support operations in urban environments and has developed Skape™, a 3D modelling service. Created by a novel fusion of lidar and oblique imagery, Skape creates high fidelity, real-world 3D urban environments.

Contact us today to find out how we can help you.

+44(0)116 273 2300 | info@infoterra.co.uk

All imagery is subject to copyright.

Infoterra's managed geospatial services focuses on the Direct, Process and Disseminate part of the strategic military intelligence cycle.

Direct

Custom tasking of commercial satellite imagery sensors over target areas of interest.

Process

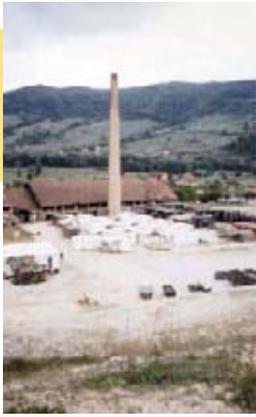
Image processing, stereo extraction, SAR change detection (CCD), DTED3 production, VMAP/MGCP mapping services.

Disseminate

Web-based geospatial services for GEOINT data discovery and retrieval over secure government networks (DII, Skynet) and enterprise hosting of GEOINT data.


an EADS Astrium company

www.infoterra.co.uk



"We may be gone some time"

42 Engineer Regiment (Geographic) involvement in The Balkans 1992-2009

By Major Stuart Fairnington RE

Introduction

A fact often relayed during Hermitage Dinner Nights is that personnel from within 42 Engineer Regiment (Geographic) have now been continually deployed on operations for over 20 years. Operations in the Balkans form a significant part of this period. The Regiment's initial involvement in the Balkans was the deployment of personnel to Croatia and Bosnia Herzegovina (Bosnia) with the United Nations Protection Force (UNPROFOR) in 1992. Seventeen years of continuous geographic support, including the deployment of different size force elements providing a wide range of capability, ended in 2009 with the withdrawal of British forces, including the Geographic Detachment, from NATO's Kosovo Force (KFOR). Figure 1 depicts the forces involved and the UK operation names for the period covered in this article.

Op Name	Macedonia / Kosovo								Op Agricola			Op Oculus						
	Bosnia	Op Grapple			Op Resolute	Op Loadstar					Op Oculus							
Force	Macedonia / Kosovo								KFOR									
	Bosnia	UNPROFOR			IFOR	SFOR					EUFOR (Althea)							
Date	Mar 92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09

Figure 1. Forces and major operations within the Balkans in which Regiment/Military Survey personnel contributed from 1992 to 2009.

This article will concentrate on the involvement of Regimental personnel in the Balkans. However, there is reference to personnel from other Defence Geographic / Military Survey units as their contribution was significant and intertwined with that of Regimental personnel. The 'Regiment' refers to 42 Engineer Regiment (Geographic) and its predecessors; 42 Survey Engineer Group and 14 Independent Topographic Squadron RE. The political and military history of each phase of Balkans operations will be introduced before the Regiment's involvement is detailed. Personal recollections from various phases are included to add a more informal record. The significance of the Geographic support to operations in the Balkans to more recent operations in Iraq and Afghanistan will then be assessed.

It is acknowledged that various previous articles on geographic support to Balkans operations have been referred to and extracted in the compilation of this article.

Background

Croatia and Bosnia are two of six republics that made up the former Republic of Yugoslavia, the others being Slovenia, Serbia, Montenegro and Macedonia. Additionally there were two so-called autonomous provinces: Vojvodina and Kosovo. Whilst there were areas of Croatia with significant Serb communities, Bosnia was far more complex, being made up of 43% Muslims, 33% Serbs (Orthodox Christians) and 24% Croats (Roman Catholics). Naturally, Bosnian Serbs were allied to Serbia and Bosnian Croats to Croatia. Bosnian Muslims had no such alliance. The cultural complexity is evident from Figure 2.

Relationships between Serbs, Croats and Muslims have been strained for centuries and this has led to various wars and massacres. The invasion of Yugoslavia by the Germans in World War 2 and the subsequent occupation of the majority of the republics by Axis forces further complicated matters. Marshall Tito's post war Communist government, which included representation from all parties, provided unity and relative stability in Yugoslavia until his death in 1980. Without his unifying leadership Yugoslavia threatened to implode and the situation was tense throughout the 1980s. Serbia, which considered itself the lead republic and the direct successor to the Republic of Yugoslavia, went to war with Slovenia and Croatia when the two republics declared independence

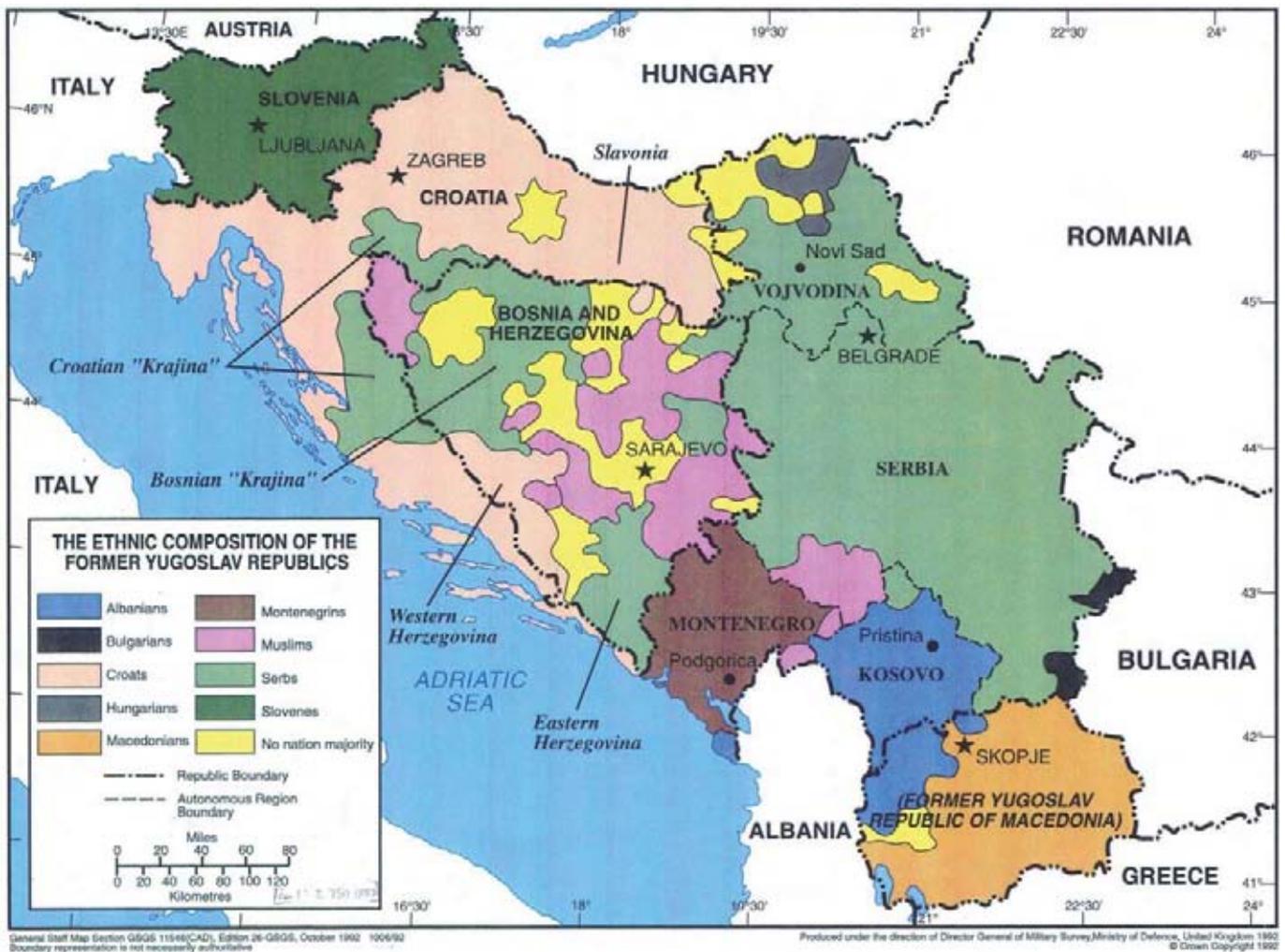


Figure 2. Former Yugoslav Republics Ethnicity Map 1992. Note the ethnic Serbs in Croatia, the complex mix in Bosnia and the ethnic Albanians in Kosovo.

in 1991. The conflict in Slovenia was quickly resolved. However, the conflict in Croatia proved more complex, as large Serb communities supported by the Yugoslav People’s Army (JNA) opposed independence. The fighting continued in Croatia and spread to Bosnia throughout the remainder of 1991. The United Nations became involved and adopted various resolutions in an attempt to find a solution to the crisis. UN resolutions 743(1991) and 749(1991) approved the establishment and authorized the deployment of the UNPROFOR for an initial period of 12 months.

UNPROFOR / Op GRAPPLE

UNPROFOR initially deployed a headquarters into Sarajevo and forces into three UN Protected Areas (UNPAs) in Croatia with the mandate to ensure demilitarization and the protection of the population. Monitoring functions were extended from the UNPAs into various ‘pink zones’, which had Serb communities and were controlled by the JNA. HQ UNPROFOR staff moved to Belgrade and then, due to intensified fighting in Bosnia and, specifically, around Sarajevo, to Zagreb in May 1992 (Figure 3).

The situation in Croatia was fairly simple in comparison to Bosnia, where Bosnian Serbs fought against a Bosnian Croat-Muslim alliance. The Bosnian Serbs, better equipped as successors of the JNA and supported by Serbia, controlled the east and west of Bosnia, connected by a stretch of land in the north. The Croat-Muslims, supported by Croatia, controlled the centre of the country, stretching north from the Dalmatian coast, and occupied Sarajevo.



Figures 3. UNPROFOR peacekeeping zones in Croatia and locations in Bosnia in 1992.



Figure 4. Burnt out Bosnian houses – a result of ethnic cleansing.

Fighting intensified significantly in Bosnia throughout 1992, with the Serbs, who almost surrounded Sarajevo, mercilessly shelling the city. Elsewhere, there was fighting and ethnic cleansing, which caused significant destruction (Figure 4) and large numbers of refugees. UN resolution 776(1991) authorized the enlargement of UNPROFOR's mandate and strength in Bosnia, with the aim of supporting the UN High Commissioner for Refugees (UNHCR) to deliver humanitarian relief and, in particular, to provide protection. UNPROFOR was to grow to a force strength of 41,000, drawn from over 35 nations.

force, which totalled approximately 3,500 personnel, was in the form of a Brigade staff, infantry battalion, logistics battalion, reconnaissance squadron and an engineer squadron. Royal Navy Sea Kings provided helicopter support. Main bases included a headquarters (HQ British Forces (BRITFOR)) and logistics base at Split, with units being deployed throughout central Bosnia. The UK operation was designated Op Grapple.

Apart from providing staff officers to HQ UNPROFOR, Britain's contribution to the



Figure 5. 14 Topographic Squadron personnel prepared for the UNPROFOR deployment.

The Regiment's involvement in the Balkans begins here, in October 92, with the deployment of Geographic Sections to the headquarters of the UN Bosnia Herzegovina (BH) Command in Kiseljak, 20km north east of Sarajevo, and to HQ BRITFOR. The personnel came mainly from 14 Topographic Squadron (Figure 5).

The HQ BH Geo Section was attached to the G2 Branch and comprised an SO2 + 5. It was equipped with a TACIPRINT, MAPSP and GIS/graphics system and provided support to UNPROFOR. The HQ BRITFOR Geo Section was based in Divulje (or 'Gungie') Barracks, Split, and was attached to G3 Branch. It comprised an SO3 + 7 (Figure 6) and was equipped with a TACIPRINT, a TACICAM, a MAPSP and a GIS/graphics system (Figure 7).

The two sections provided a wide range of products, with the main emphasis being situational awareness mapping (PICINFSUMs, Routes and Obstacles etc.) for the UN Protection Force and Aid Agencies, who needed common information (Figure 8). Demand for mapping was high, and after initial print runs of 100 sheets, customer feedback from various products led to multi-colour overprints and increased demand, ending with 6 colour, 550 sheet runs going to over 90 customers.



Figure 6. HQ BRITFOR Geo Section.

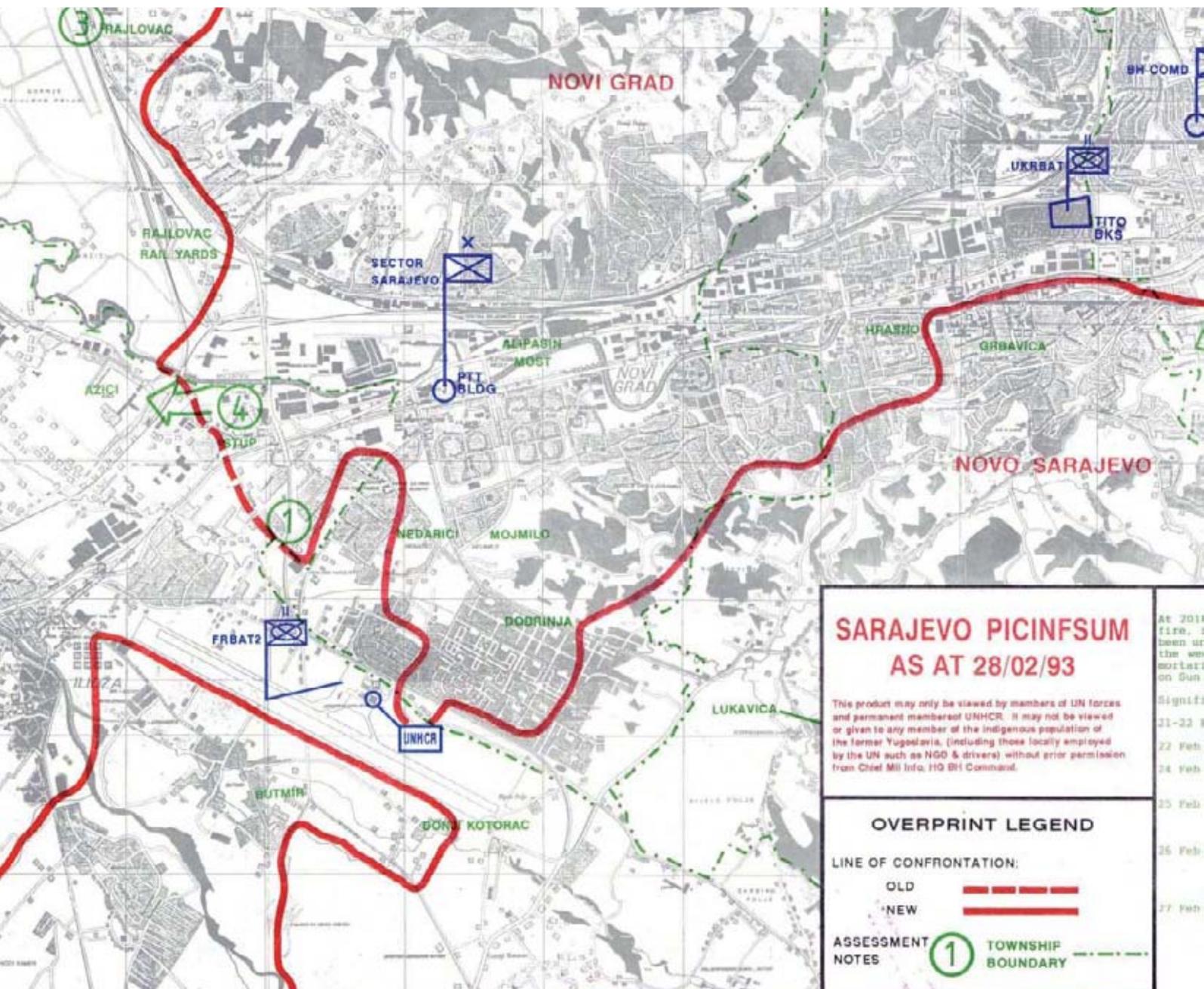


Figures 7a&b. HQ BH Command MAPSP and HQ BRITFOR TACIPRINT and TACICAM.



Typical terrain analysis products included perspective views, route analysis and line of sight queries. Data was obtained from various sources, including Western European agencies and local geographic institutes, throughout the tour. Subsequently, the terrain analysis capability improved over time. (The then) SSgt Al Easingwood recalls the deployment as follows:

Figure 8. Example of Sarajevo PICINFSUM produced by the HQ BH Command Geo Section.



This map is not to be taken as necessarily representing the views of the UN on boundaries or political status.

BH TACI 5
UN RESTRICTED

BASE MAP DETAIL
SARAJEVO VELIKI PLAN
GRADA 1:20,00 SCALE

Printed by GEO Section,
HQ BH COMMAND
02/03/93

The Grapple 1 team was a 'composite' made up from a disparate selection of Geo personnel. I was sent down from HQ 1 (UK) Armoured Division at Verden (as the Geo Sergeant) to HQ 11 Armoured Brigade at Hohne. Given the news one Friday morning, I drove down to the HQ, which was about an hour and a half away, only to be told to go away and have a terrain brief ready for the Brigade Commander's Orders Group on Monday morning! The next week was spent driving between 14 Squadron in Dusseldorf and the Brigade and Division HQs in Hohne and Verden. Having put the vehicles onto a ship in Bremen the team deployed to Croatia very shortly afterwards.

The HQ staff arrived in Split and were taken to temporary accommodation. To everyone's surprise this turned out to be a holiday hotel and chalet complex right next to the seafront. We shared two 4-bedroom chalets and went swimming every day for the first week! A temporary Ops room was set up in the hotel's bowling alley where 'Geo' was given lane 6. Meanwhile, meals were taken in the hotel restaurant – with waiter service!

This didn't last more than a few days and we were soon taken to Divulge Barracks. The kit arrived soon after and we set up. Tasking was fast and furious with great demand for Taciprint maps. The main products were Main Supply Route (MSR) maps, Road and Bridge (R&B) maps, Minefield mapping, Disposition mapping, Ethnic disposition, UN disposition, Refugee (displaced population) maps and Serb, Croat and Muslim military disposition maps.

One of the biggest tasks for the team was to produce a complete series of R&B maps at 1:100K for the entire BRITFOR Area of Interest (AOI). Recce teams from 35 Engineer Regiment were tasked to support the Geo team by conducting route recces to collect all the R&B information, particularly tunnels and bridges, which were a characteristic of the mountainous terrain up country. During a route recce task there was a 'hairy moment' when Lieutenant Colonel Field, CO 35 Engineer Regiment, was stopped at an HV roadblock. Many of the soldiers were under the influence and were being very aggressive. Colonel Field gave the order for all of us to de-bus and make ready. The HV soldiers promptly pulled the barrier back, much to everyone's relief.

A further Geo Section was established within HQ UNPROFOR in Zagreb in March 1993. Including an SO1 (manned by a full Colonel at times and provided by NATO), two WO2s (one provided from the Regiment) and two SNCOs, the section was equipped with GIS/graphics systems and provided geographic advice, terrain analysis and map supply capabilities. The Theatre Map Depot (TMD) held approximately 1300 line items, with stocks totalling some 350,000 sheets (Figure 9).

Indeed, map supply proved to be the highest priority task. Initially, UN map supply policy relied upon contributing nations' goodwill. With such a large force, it became evident that a more formal system was required and, subsequently, the Chief Geographic Officer, Colonel Peter Walker, secured funding of \$2.2 million per year for the provision of mapping. The mapping initially issued to deploying troops was based on the indigenous Topografiska Karta (TK) mapping. The TK

mapping was planimetrically accurate and proved, beyond the UN deployment, to be the preferred mapping for navigational and positioning purposes. Overprinted with the NATO operational grid (UTM) relative to WGS84, power-lines, significant route changes and the recognised international boundaries, two series (1:50k and 1:100k) were produced and supplied. Depending on priorities, Geographic personnel were moved between the sections in Zagreb, Kiseljak and Split as well as augmenting the UK Brigade Geo staff in Gornji Vakuf.

Four 19 STRE Field Survey sections deployed from 1993-1996 in support of the Artillery. The first section was led by Captain Andy Brookes with SSgt Geordie Beckwith. Comprising 1+7 personnel, and deploying in support of 94 Locating

Regiment RA from January to April 1993, the section established a network of survey control points using GPS survey techniques (Figure 10). Initially, geodetic control was transferred to two points in Croatia, Split and Metkovic, from two European Reference (EUREF) System points, Herstmonceau



Figure 9. WO2s Paul Palmer and Ray Wilkinson handing over in the TMD (a converted stable block). New shelving was installed at a cost of \$19,000.



Figure 10. Spr Bennett carrying out GPS survey.

in the UK and Wetzel in Germany. The control was then transferred into various UN bases across Bosnia (Divulje, Tomislavgrad, Vitez, Fojnica, Kiseljak, Gornji Vakuf and Kladanj) before Artillery survey control points were established approximately every 10km along MSRs throughout the majority of Bosnia.

Sections then deployed from January to April 1994 and June to December 1995. The second section, comprising 1+8, provided position and azimuth for Cymbeline mortar locating radars. Survey control was transferred from Split and Metkovic to Sarajevo where various bearing pickets were

established in positions around the city. Pickets were also established in various other locations before the team re-established MSR Artillery survey control points, which had been destroyed over the winter months. The third section, comprising 1+7, deployed to provide survey support to 19 (Lowland) Regiment RA. Main tasks included the provision of survey control for subsequent transfer to the light guns on Mount Igman, positioning of Cymbeline radars operating in Sarajevo and the re-establishment of Artillery MSR survey control points. (The then) SSgt Andy Gray gives a feel for the task as follows:

The call out for a Field Survey section to deploy to Bosnia in support of 19 (Lowland) Regiment RA (equipped with 105mm Light Guns) came on the second May Bank Holiday Monday, 1995. By Thursday an 8 man survey section (Figure 11) led by Captain Pat Fryer and equipped with Trimble 4000 GPS (and conventional back up) was in theatre.

We moved up to our tour base at the Metal Factory in Gornji Vakuf and immediately began preparations for artillery survey support by bringing in control from previous deployments, in preparation for a deployment to Mount Igman. Once this local control had been established things seemed to settle down for a while and we began the task of augmenting or replacing the existing control stations within the UN bases. During this period the Artillery Regiment went on standby and planning was completed for a move to Zenica and Srebrenica, where the work would involve a foot insertion of a survey pair to provide forward control. This had been practiced on a previous Regimental training exercise and culminated in the survey pair being required to return on a subsequent lift to bring back the observed data for processing; the Achilles heel in our survey methodology. However, to the eternal shame of those responsible, the UN Forces were not deployed to aid the civilian populations. The local women who were employed at the factory and the locals we passed on the roads during our surveys were able to show their contempt of the UN soldiers, who did nothing to aid their fellow countrymen.



Figure 11. The third Field Survey Section prepared for deployment.



Figure 12. The Section's salubrious accommodation in the Sarajevo Winter Olympics complex.

Our time did come. In the middle of the night in late July we were woken up with yet another alert, but this time there was no stand-down. The Regiment moved out in the late morning with the Field Survey section as part of the HQ group. After a long but eventful journey we were established in a burnt out building that was part of the Sarajevo Winter Olympics complex (Figure 12). We immediately began preparing this wreck for defence whilst awaiting survey deployment tasks to establish control for Battery Centres (BCs). This was not long in coming and BCs were rapidly positioned for the unit's two Batteries. Additional tasking to provide control for Dutch Marines 120mm mortars, in the

Regiment's observation posts and for alternate BCs was also completed. This was in between helping out with field defences for the Regimental HQ of which we had become an integral part.

For myself the memorable part of the Mount Igman deployment was the way in which the section worked as a team, we all knew our part and got on with the job. We experienced our first jamming of the GPS signal, by our own forces, when air sorties were overhead. I also remember vividly that on the way to Mount Igman, the locals came out to wave at us, perhaps redemption for Srebrenica. We spent a week up on the mountain without the guns firing; this would come later in September. We then moved back to Gornji Vakuf in time for my birthday (thanks for the cake boys). I then had a side trip with Pat Fryer to Sarajevo to establish control for Cymbeline (mortar locating radar), HALO the latest version (at that time) of artillery sound-ranging equipment and, at the airport, the Royal Signals Beady-Eye (which I had last seen and worked with on exercise in BAOR in 1984!). The section then settled down and continued with augmentation of control which would be handed over to our relieving section and later 14 Topo Squadron in the December.

The fourth Field Survey section, led by Captain Vicky Bealby (later Roberts) with SSgt Martin Chorley and Sgt Smacky Jones, deployed in December 1995. They were based out of Gornji Vakuf as UNPROFOR troops and initially established Artillery control points on MSRs in support of 29 Regiment RA.

Throughout the UNPROFOR deployment the war in Bosnia intensified, resulting in an estimated 100,000-110,000 deaths and 1.8 million displaced people. In the summer of 1995, Croatia waged a lightning military campaign in which it took back most of the territory earlier captured by the Serbs. It resulted in a mass exodus of about 200,000 Serbs from their self-proclaimed Republic of Serbian Krajina into Serbia and further strained the already over-stretched economy. Croatia's victory in Krajina was followed by a successful offensive against Bosnian Serbs in Bosnia. Then, following well-publicised Serb massacres at Srebrenica and Markale (the Marketplace), NATO intervened by conducting Op Deliberate Force, a sustained air campaign against the Serbian Army between August and September 95. These actions forced Serbian President Milosevic to the bargaining table.

After six weeks of solid negotiation, witnessed and assisted by the then Chief Geographic Officer, ARRC, Lieutenant Colonel Nick Rigby (described in Ranger Winter 2009), the Dayton Peace Accords were signed on 21 November 1995 to put an end to three and a half years of war in Bosnia. An Agreed Cease Fire Line (ACFL), which depicted the partys' final front, and an Inter Entity Boundary Line (IEBL), depicting the line to which the parties would withdraw, were agreed. Both lines and zones of separation, were overprinted onto US Defence Mapping Agency (DMA) produced M709 mapping, to be known as the 'Golden mapping'. The agreement prompted the deployment of the NATO led Implementation Force (IFOR) on 20 December 1995 to take over from UNPROFOR.

There had been seven rotations of personnel through the UNPROFOR Geographic sections from October 1992 until December 1995, with up to 32 military surveyors in each rotation, and the deployment of four Field Survey sections. In reality, the transfer of responsibility between the



Figure 13. The IFOR (and SFOR) MND boundaries.

UNPROFOR and IFOR meant that the personnel already in theatre repainted their vehicles, removed their UN (light blue) berets, reverted to their navy blue berets and ‘cracked on’ as normal.

Bosnia - IFOR

IFOR, commanded by HQ ARRC, deployed in Bosnia with a one year mandate to oversee the implementation of the military aspects of the peace agreement, which were to bring an end to hostilities, separate the warring factions, to transfer territory between the two entities according to the peace agreement, and to monitor the movement of the warring parties’ forces and heavy weapons into approved storage sites. The ARRC commanded three Multi National Divisions (MNDs) (Figure 13). At its height, IFOR involved troops from 32 countries, with approximately 54,000 troops in Bosnia and 80,000 overall (support and reserve troops were based in Croatia, Hungary, Germany, Italy and on ships in the Adriatic Sea).

On the Dayton Accords being signed, the Field Survey section moved from Gornji Vakuf to HQ MND(SW) in Banja Luka. A positive change was noted in the local Bosnians’ approach to the foreign forces: *“overnight, the locals changed from snowballing us with rocks to cheering us”*. With uncertainty over where the various lines had been drawn within the warring factions on the ground, the section had free run of the disputed areas and made good use of the opportunity, establishing more points during this period than the previous three deployments combined.

14 Independent Topographic Squadron, commanded by Major Jim Mitchell (then Major John Kedar), deployed to Bosnia on 22 December 1995 and formed the basis of a Geographic Support Group (GSG), initially in Split and, from late January 1996, in the Brick Factory, Kiseljak (Figure



Figure 14. The Brick Factory, Kiseljak, home to the IFOR GSGs.

14). Its mission was to provide direct geographic support to the ARRC to assist in the conduct of unrestricted operations within Bosnia. Reinforcements were provided to the GSG from other Military Survey units and, significantly, 19 STRE attached for the period 8 January to 1 April 1996, with the fourth Field Survey section being brought back to the GSG (much to their displeasure!). Deploying before HQ ARRC Main and without formal command and control links, the GSG relied heavily on informal contacts developed during training in Germany. Indeed, arrangements

for the Chief Engineer, ARRC to take operational control were not confirmed until April 1996. Administrative control took longer to resolve, with Commander 1 Signal Brigade accepting responsibility in June 1996.

At this time, 129 of Military Survey's soldiers, approximately 40% of Military Survey's uniformed strength, were deployed within the IFOR Geographic organisation, with the GSG playing a key part (Figure 15). Many of the personnel had previously deployed on Op Grapple and were destined to complete further tours in the Balkans.

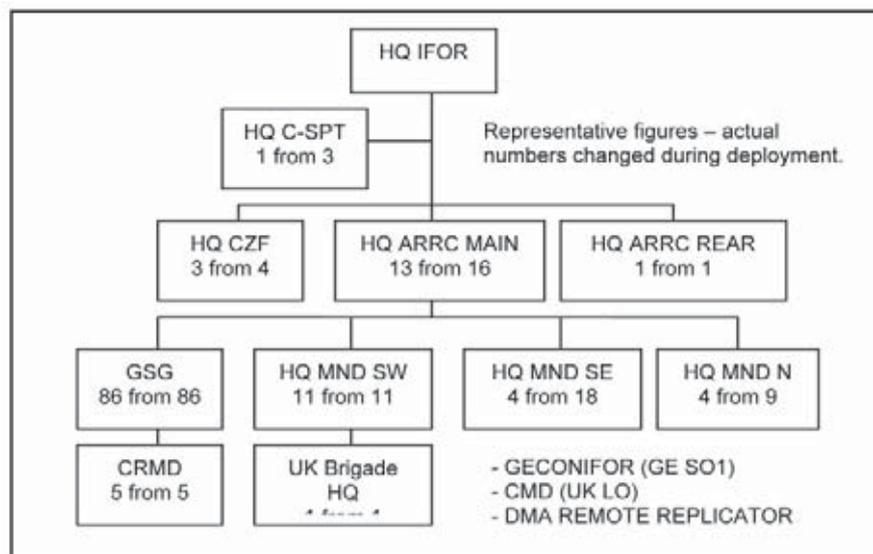


Figure 15. Military Survey representation amongst the ARRC Geographic organisation.

The capability within each geographic detachment and the main tasking undertaken was as follows:

- HQ Comd for Sp (C-SPT) - A JNCO ran the map store in Zagreb, supporting both C-SPT and the UN.
- HQ ARRC Main - A significant proportion of the ARRC Main Geo Section, in Sarajevo, were provided by Military Survey. Tasking included terrain analysis, including flood and earthquake predictions, graphic and limited run production. Much effort was dedicated to supporting the IEBL negotiations.
- HQ ARRC Rear - A WO2 (and additional UK personnel at times) provided advice, map supply and graphics support to HQ ARRC Rear in the Dalmatia Hotel in Kiseljak.

- HQ Communication Zone Forward (CZF) - A Geo Cell provided graphics and map supply support to HQ CZF in Split.
- Corps Reserve Map Depot - A team of 5 personnel were collocated with the Logistics Regiment in the Dalma Warehouse, Split, came under direct command of the GSG, and processed mapping into theatre.
- HQ Multi National Division South West (MND (SW)) - Each MND headquarters had a Geo Sect, with those at MND(SE) and MND(N) coming under command of the GSG. The UK led MND(SW) Geo Section came under command of that HQ and was equipped with a TACICAM, TACISYS, TACIPRINT and 2 MAPSPs. Tasking ranged from map supply to graphics and mines map production. The MND(SW) Geo Sect led on the Bosnian mines map production, using new Arc View software to plot the mines overlay information.
- UK Brigade HQ - The UK provided one Brigade into theatre, based at Sipovo. A JNCO reinforced the Brigade Sergeant and assisted in the provision of advice, terrain analysis, graphics and map supply.
- Central Map Depot - A section was deployed to the CMD, the 'out of theatre' reserve map depot, in Zweibrucken, Germany, at the end of 1995 to facilitate the initial map supply thrust into theatre. Thereafter, a SNCO provided liaison and assistance.
- HQ MND (North) - The US led MND(N) in Tuzla was provided with a TACIPRINT and MAPSP, with the vast majority of work being based on mines map production and map supply. Living conditions were basic, with appalling food.
- HQ MND (South East) - The French led MND(SE) in Mostar was provided with a TACIPRINT and MAPSP and carried out tasking similar to MND(N). Again, living conditions were basic and the food even less appealing, as eluded to in (the then) Cpl Al Beeton's recollections:

The first month attached to HQ MND(SE) was in freezing Sarajevo and was memorable due to the fact we were living in squalor in the heavily damaged Tito barracks. I will never forget when we turned off the light we could hear the rats scuttling about under the floorboards! In March the entire HQ moved down to Mostar airfield – approximately 2000 French, 200 Spanish, a Moroccan guard force and around 30 intrepid Brits. 25 of those were Scousers, so to say we 4 brave Geo Techs felt a bit isolated was an understatement.

Mostar was significantly warmer than it had been up north. As spring became summer the temperature was consistently around the 40 degree C mark, which presented all manner of problems. As a printer, the challenges of the air con breaking down and the machinery in the press being affected by the excessive heat was a constant battle. After some time I felt like "King Printer" because despite all the problems, I would emerge from the wagon in a soaking T-shirt, covered in a sheen of sweat but with another batch of mines or bridge maps good to go. It felt great to be fighting and winning!

There were many frustrating times over the months. I was informed that I had been nicknamed "Corporal-Chief Problem" as every time I appeared in the Geo office, sweaty, red-faced and perplexed looking, I would have a map I had just printed in my hand. I would march up to the table in the middle of the office; slam down the map, followed by a big fat index finger pointing at, for example, a minefield depicted crossing a known cleared route. I would then leave having not said a word, too angry to speak! Tensions eased slowly and in the end I was presented with an Ornamental French Army knife, inscribed with my name, in a presentation box, a really tasteful gift, which was much appreciated.

I came away with some lasting memories; bad including the food and the toilets, good including printing against the odds, the squaddie humour, the fiercely competitive 7s rugby, improvised PT, and the Brit bar – no two can rule (when in Rome!!).

Map supply was considered by the chain of command as the single most important aspect of work, with 6.1 million maps being handled by the IFOR Geo organisation whilst 14 Squadron formed the GSG. Approximately 1000 line items were available through the map supply system in Bosnia and Croatia. Mapping series were replaced; the UN1002 series of 1:50,000 mapping used on Op Grapple was replaced by the seemingly less detailed M709 series, and editions were superseded; the original M709 'Golden 1' mapping (overprinted with the ACFL and IEFL) was superseded by the

'Golden 2' mapping (the ceasefire line was removed at D+90), and finally the 'Golden 3' mapping (including the minor changes to the IEBL negotiated since D+90) was introduced. The new series and editions were produced (by various nations and the GSG), freighted via the CMD to the CRMD, packed into unit loads and distributed across the force and to the warring factions in a timely manner – no small task. The value of map supply being a geographic capability, rather than simply a G4 logistic function, was proven beyond doubt.



Figure 16. IFOR 1:600,000 Mines Contamination map.

The first operational deployment of the mobile medium format Interim Geographic Support System (IGSS) proved very successful, with approximately 300 colour and monochrome products being generated and 80,000 small and medium format sheets being printed each month. The IGSS consisted of six air conditioned 20ft containers mounted on 14ton flatbed trucks; pre-press, helio, two medium format presses, print finish and a paper store. The theatre 1:600,000 Mines Contamination mapping was coordinated and partly printed by the GSG and was to prove the main production task (Figure 16). Other key products included revised route and disposition maps, survey control point and communication coverage maps, three (seven colour) Golden 2 map sheets and various Psyops tasks. Some 300 different products were generated in eight languages.

The deployment of 19 STRE, whose original task to demarcate the IEBL had been delayed, proved immediately beneficial in providing extra manpower to assist in clearing, setting up and guarding the Brick Factory site in readiness for the GSG. Some IEBL marking and Artillery support tasks were then completed before a major geodetic survey to establish first order control across Bosnia was then conducted. All twelve survey teams deployed to either existing EUREF points in Croatia or new points across Bosnia to provide control for the future IEBL survey. 19 STRE then departed theatre, leaving the 14 Squadron Field Survey section to provide support. Combined with 523 STRE and working with an old Engineer Surveyor acquaintance from 512 STRE and the Gulf War, Sgt Jona Jones, the section provided control and set out the alignment of a proposed route between Sarajevo and Gorazde. Working in a mountainous and strategically important area, which had been continually fought over and heavily mined, proved dangerous work. The Section also carried out planning for the IEBL Technical Commission and further densified the control network in readiness for the Commission's work.

Limited terrain analysis was carried out by the GSG due to the capability being available within the various formation headquarters and the fact that units had freedom of movement within their Areas of Responsibility (AOR). The Tera capability was kept busy in the reproduction process and carried out some ground reconnaissance. Liaison was critical to the GSG's capability being advertised across the force, with the multi lingual Captain Vicky Bealby taking on the role of the GSG Liaison Officer in addition to being the Topographic Section OIC. The GSG contained first line support for both its own and the Geo detachments' vehicles and equipment. Mechanics and electricians were constantly on the move, and technicians from the Geographic Engineer Group Field Support Office regularly deployed and based out of the Brick Factory to carry out equipment maintenance across theatre. The GSG's QM was responsible for the movement of geographic equipment and consumables to the many and disparate detachments across theatre. The previous occupiers of the Brick Factory had a dedicated guard force, which unfortunately left on 14 Squadron's arrival. The GSG guarded itself, with the subsequent adverse effect on capability, until June 1996 when a guard section from HQ MND(SW) arrived.

13 Topographic Squadron replaced 14 Squadron in the Brick Factory on 27 June 1996, with the key equipment being handed over between the two units. Both the 13 Squadron OC and SSM changed hands early on in the deployment, with Major Ross Thurlow taking over from Major Mark Burrows as OC and WO2 Al Easingwood taking over from WO2 Arthur Mann as SSM. 13 Squadron initially maintained a high level of tasking, with regular updates of route and minefield mapping, and expanded the GSG's catalogue of products to include mine awareness posters in several languages and a Helicopter Landing Site booklet (Figure 17). The collation of the booklet proved memorable in that it became a complete Squadron task, with chefs, mechanics, drivers, management as well as the Geo technicians not being able to pass the briefing area without collating a minimum of 10 booklets.

The survey of the IEBL finally came to fruition. The GSG Field Survey section was augmented by US and Canadian military surveyors, with the Canadians taking the lead in the conduct of the survey. Using the Brick Factory as their base, the survey teams travelled to various locations in the vicinity of the IEBL to conduct pre-arranged meetings with locals from the relevant factions. After the approximate (map accuracy) alignment of the IEBL had been confirmed by the survey team, it was then up to the local faction representatives to agree on the exact location for the boundary post. This was often, understandably, contentious. Once the position had been confirmed, the survey would be conducted and the marker post erected. The survey proved interesting but dangerous work, as the IEBL followed what was the frontline during the conflict and was strewn with minefields. Most of the minefields laid by



Figure 17. The Helicopter Landing Site booklet, produced by a contribution from all GSG personnel.



Figure 18. The IEBL Survey Training Team with Bosnian Serb, Muslim and Croat surveyors.

the Serbs were found to have been correctly marked and recorded. However, this was not the case with the Bosniac minefields. The joint UK/US/Canadian teams conducted the survey in MND(SW) and MND(N), with the French operating more independently in MND(SE). A training package was also delivered over the period 23rd of September to 4th of October 1996 to provide surveyors from all three Bosnian factions with the knowledge to conduct GPS surveys. Led by WO1 Mick James from the RSMS, SSgt Andy Gray and Sgts Taff Brighton and Mac McEvoy conducted the training from within HQ ARRC(Rear), Kiseljak (Figure 18).

Unfortunately, the MND(SW) Guard Section left on the arrival of 13 Squadron and, once again, the squadron was to guard themselves until later in their tour when a Section from the RAF Regiment covered duties for a two month period. Force protection was a concern, with the squadron holding only small arms and the local QRF being a little too far away for comfort. Therefore, gathering information on how the GSG was perceived locally and fostering good local relationships was imperative. Various locals were employed on camp, an ice-cream van was invited in on a monthly basis and the local Catholic priest, Father Ivan, was befriended. All provided good intelligence on the local situation and any tensions.

Once settled into a routine, the Squadron also looked to provide some humanitarian assistance to the local populace. The Squadron 2IC, (the then) Captain Nick Collins, along with others, became heavily involved in various welfare ventures and relays his experiences below.

On being introduced to the local priest, it was brought to our attention that the local school had very limited resources. Well, what's the point in being a map production unit if you can't divert a few expendables for a good cause? Colouring books, the collation of which proved to be the bane of everyone's life, were produced and gifted. Families back in Hermitage had got wind of our efforts and had organized a collection of clothing and toys from the Newbury area. We were amazed at their efforts when the first 10 tri-wall containers arrived. The contents were gifted to the Kiseljak Roman Catholic Church, again on the advice of the local priest. However, we later found out to our dismay that the priest's friends and colleagues had first pick at the gifts. The priest, it turns out, was one of the local mafia leaders. This forced a period of consolidation and research before we were confident to attempt more assistance.

We learned about a mental asylum in Pazaric and, after gaining clearance, a team carried out a visit. On what proved a difficult and emotional day, we found twelve staff looking after over 200 in-patients. Adults and children were treated in appalling conditions and the sights and smells that we encountered stunned us. In particular, we will remember the child who was picked up by the OC, Major Ross Thurlow. The child was continually banging his head against a wall and was subsequently bleeding from a wound. He acknowledged Ross with the broadest of smiles, hung on for a hug and as if his life depended on it (Figure 19a).



Figures 19a&b. The OC, Major Ross Thurlow, with the boy in the mental asylum. Captain Nick Collins and WO2(SSM) Al Easingwood delivering teddies.

Again and again, the families back home rallied around and forwarded toys and clothes. In addition, on R&R, I was lucky to make the acquaintance of a lady in Hungerford who was responsible for coordinating the production of ‘Teddies for Tragedies’. The idea was simple, we would give a needy child one teddy (in a draw string bag) so the bear was theirs to love and the bag could also be otherwise used. We handed the teddies out personally and brought smiles to all the children we encountered (Figure 19b). Finally, we travelled to an orphanage in Gromiljak and, again, witnessed some horrendous scenes. We explained the theory behind the teddies and were invited to deliver them, resulting in smiles from the younger children as they clutched their new possession. Unfortunately, the staff seemed to have different ideas on how the teddies would be used, pinning them to the walls for the children to watch. We insisted that this was not the intention and, after much discussion the bears were returned – one teddy, one child.

So what did we learn from our experiences? In a conflict the meek, mild and disabled appeared to suffer more than most. We felt that, with the assistance of families and friends in UK, we made a small difference to the lives of some adults and many children.

No recollection of the Brick Factory could fail to mention what was ‘probably the best bar in Bosnia’. Both Squadrons benefited from the conversion of a kiln into the squadron bar and the Kiseljak Kaverne hosted many a morale boosting evening. During 13 Squadron’s tenure, quite a reputation was developed for the fortnightly theme parties (Figure 20a), with renowned and talented artists being flown in from across Europe (well, RSMS) to entertain the troops (Figure 20b).

The goals of IFOR were achieved by June 1996 and the NATO Stabilisation Force (SFOR) was formed with the aim of upholding the Dayton Peace Agreement. Subsequently, the 13 Squadron GSG was prepared and departed theatre in November. Field defences and Hesco bastion were stripped out and the Squadron QM, Captain Ian Thurgate, handed the Brick Factory back to its owners. The GSG’s vehicles were delivered to the port in Split and personnel returned to UK either by ship, accompanying the vehicles, or by air, via Split airport. UK Geo support was drawn down considerably and provided thereafter by sections in HQ SFOR, Sarajevo, HQ MND(SW), Banja Luka, and by the UK Brigade’s integral Geo staff.

Bosnia - SFOR

The British contribution to SFOR deployed under Op Lodestar and operated under peace enforcement rules



Figures 20a&b. A Medieval Night in the Kiseljak Kaverne. Paul (the Minstrel) Sleep entertaining.

of engagement rather than peacekeeping, as had been the case with IFOR. HQ SFOR, based in the Elidza Complex, Sarajevo, was initially staffed by HQ LANDCENT, and included their Geo Section augmented with personnel from the Regiment, many of whom were extending their IFOR tours. Manning included a US Chief Geographic Officer, an SO2 (initially Major Rupert Dash), a WO2, a SNCO and JNCO Map Storeman, 1 Carto Technician, 2 Tera Technicians and 2 Production Technicians. Equipment included a TACIPRINT, a TACISYS, MAPSP and various office based systems. A map store was maintained. Concentrating on Theatre wide issues, the Section revised routes, snow and ice, and mines mapping and worked extensively with Psyops. The TACIPRINT and MAPSP were removed from theatre in early 1997.

The Geographic Section within HQ MND(SW), Banja Luka, retained 2 TACIPRINTs, a TACICAM, Print Finish, a TACISYS and a MAPSP, various office based systems and a map store. Manning included an SO3, WO2, 1 SNCO plus 8 JNCO/Sappers (Figure 21).



Figure 21. The MND(SW) Geo Section July 1997.

Tasking was fairly routine, with a notable exception being the support provided to the elections in summer 1997. In addition, a revision to the mines mapping was produced, with subsequent supply issues, to provide an overlap on each sheet. Personnel from within the section were also sent to Sipovo to augment the UK Brigade Geo Sgt. (The then) Captain John Adlington recalls the tour as follows:

I took over from Captain Adge Roe in Banja Luka on the 27th of May 1997. The Geo Section was firmly established providing support to the Division HQ. This involved continual update of the routes map, mines information, numerous Tera products and elections mapping. The Section had the skills to cover the Tera, Print and Field tasks and all were in demand. Updating of the routes maps involved some fieldwork in measuring bridge heights, widths and tunnel dimensions on many of the routes. Even the OIC was out taking field measurements. The Tera section produced many perspective views, fly throughs and mapping overlays.

The main tasking was to keep the routes maps up to date, together with the onward distribution, and also ensuring coherence with the NATO maps produced in Sarajevo. Map supply was one of the main tasks and, with many different battle groups changing, it required maintenance of mobilisation map packs at the various bases. We had to ensure that these packs were not just another mobile map store contrary to the local unit expectations. There were many interesting exchanges between very young infantry officers and the Geo Section who declined to provide full theatre mapping on many occasions. We had to supply local mapping in support of minor surge operations during times of tension in Banja Luka.

The Section made full use of TACISYS in the production of routes mapping which in combination with TACIPRINT enabled up to date products to be distributed both accurately and in a timely manner. The WO acted as the technical control ensuring the appropriate rigour was applied to Geo production. The powerful Silicon Graphics computer supplied by the Field Support Section

at 42 Group was however not greatly used, with the exception of the Brigade Commander who thought the WW1 flight simulator was excellent. The Section did produce a number of fly throughs which were used by the air cell and very well received despite using mapping as a back drop and not imagery (imagery availability was only a dream at this stage).

The elections in September 1997 required a lot of effort in terms of data collection from the Battlegroups and production of the overlays for both days of the election, printing and onward distribution. This proved how well the Section could work together as the maps were distributed prior to the elections and were widely used.

Other notable points were that the OIC acted as the 'Met' man and provided the G2 input for the RE HQ and the daily roll of the smoke cloud from the burning refuse tip into the camp made breathing difficult and was an ideal time to go out into the countryside for a run.

Both Sections' manning was continually replaced, mainly after six month tours. In 1998 the Sections provided support to Operation HARVEST, a nation-wide programme, initiated to rid Bosnia of many firearms, munitions and explosive devices. A complete amnesty was offered to anyone who handed in munitions or weapons at centralised collection points, or provided information regarding their whereabouts. By the end of the year 2001, about 11,000 arms, 14,000 mines and 50,000 hand grenades as well as 3,700,000 rounds of ammunition had been collected, significantly reducing the threat to the local population. Given the success of the initial operation, combined with concerns that a large quantity of dangerous material remained undiscovered, the operation was extended indefinitely and SFOR continued to commit resources to it.

Over the 1998/99 period the pre-press process started to become digitised, with the repmat changing from taci-chips and manmade Tera traces to base mapping and overlays plotted to film in the TACISYS. The main tasking in MND(SW) in 1999 remained the production of the mines maps. Notably, both TACIPRINTs became unserviceable and the Defence Geographic Centre (DGC) was requested (at short notice) to provide support. 'Reach back' capability was thereby tested and found to be a sound concept – 29 map sheets of repmat were sent back and 5000 copies of each sheet were printed within a three-week timeframe. Another notable task involved the geospatial analysis of the proximity of caves to rivers, roads and tracks using historic JNA (local) mapping and World War 2 imagery in order to identify potential weapon hides. The analysis proved relatively successful.

In January 2000 MND(SW) was reconfigured to consist of four battle groups, each consisting of a reinforced battalion. The UK remained the lead nation for HQ MND(SW) but reduced its presence. Subsequently, the lead for the Geo Section was passed from the UK to Canada, with only a TACIPRINT and two JNCO Production Technicians remaining.

Municipal and General elections took place in 2000 and both Geo Sections provided significant support.

Geo personnel and equipment in HQ SFOR had been gradually reduced up to 2000, when the headquarters moved in May from the Elidza Complex to Butmir Camp. In April 2001, the TACISYS was removed and returned to UK. With other nations taking on responsibilities for the majority of posts, the UK was required to fill the WO2 post on a rotational basis with the Canada. Australia also contributed.

The withdrawal of the requirement to maintain the Mines Map series, some 90 map sheets, and a number of other maps, from the MND(SW) Geo Section in July 2001 resulted in a drastic reduction of work for the TACIPRINT and the two JNCOs. A review of the Section's manning and equipment was conducted and, in May 2002, the TACIPRINT was returned to the UK and the manning was reduced to a Geo Tech, who was required to be conversant with ArcView software. Soon afterwards the requirement for the UK to fill this post was also withdrawn.

IFOR troop levels had reduced significantly over the operation to approximately 12,000 by 2003 and to 7,000 by 2004. As a result, the MNDs were re-designated Multinational Task Forces (MNTFs). None of the MNTFs had properly established Geo sections, with support being provided by a Polish Hind helicopter pilot in MNTF(N) and a French Foreign legionnaire in MNTF(S)! The HQ SFOR Geo Cell was manned by personnel from various nations on a rotational basis, with Captain Charlie Sladden taking over from a Polish Officer in November 2004. Other personnel included a SNCO (SSgt Andy Sharman in 2004), two Canadians, one French and one Dutch technician. The Cell was equipped with iGeosit, the NATO GIS maintained by the NATO C3 Agency (NC3A).

Improving security allowed NATO to transfer responsibility for Bosnia over to the European Force (EUFOR) on the 3rd of December 2004.

Bosnia - EUFOR

EUFOR troop dispositions remained largely unchanged from that of SFOR, with three MNTFs centred on Banja Luka, Tuzla and Mostar, and an Integrated Police Unit co-located with HQ EUFOR in Sarajevo. The Geo Cell changed overnight to the Geo Cell EUFOR, with the SO3 becoming Chief Geographic Officer EUFOR. Captain Charlie Sladden handed over to Captain Bill Duncan in March 2005. After a period of transition, EUFOR became increasingly more operationally effective and directed various operations against organised crime. The mission of the Geo Cell remained unchanged; to provide geospatial support for all EU-led designated forces, to ensure interoperability throughout all phases of OP ALTHEA, to coordinate the supply of maps, charts and digital geospatial information to participating forces, and to provide special geospatial products and information as required. The SO3 and WO2 posts remained rotational with other nations (Bill Duncan was replaced by a German) and was mainly manned from within NATO headquarters.

Having successfully drawn down old SFOR map stock levels, the theatre wide Map Supply Directive and stock policy were revised. These documents were promulgated to the MNTFs along with individual revised stock policies for each task force. A new map store warehouse management system was sought to automate the process of stock control. HQ EUFOR experienced inordinate delays, some up to twelve months, and with no end in sight maps were ordered directly through NATO's Joint Forces Command (JFC), Naples. NC3A created and reorganised the theatre GIS database in 2005, which addressed a whole raft of issues relating to quality, reliability, currency, structure and duplication. A formal customer supplier agreement was set up with the EU Satellite Centre for improved imagery, with 1m imagery of large towns and 2.5m SPOT imagery of rural areas being provided. The theatre routes maps were revised at frequent intervals and a civilian print company, Freytag & Berndt, was contracted to print the mapping. Common products ordered and prioritised were Unit Dispositions, Medical Dispositions and specialist products to support strike operations.

The last British technician within the HQ EUFOR Geo Cell (and in Bosnia) was WO2 Si Robinson. The Cell was then manned by five personnel; a French WO (Geo), two Dutch JNCOs (a Air Traffic Controller and a Naval Engineer), a German civilian (GIS technician) and the UK WO2. The Chief Geographic Officer post was gapped for a period, with a German Lieutenant Colonel, a qualified geologist, taking the post in November 2005. Prior to the Chief Geographic Officer arriving it was the UK WO2's role to deliver the weekly Geo brief to new arrivals in theatre; which was interesting considering the number of languages spoken. The EUFOR operation was a truly multi-national affair with 34 different nationalities represented. Remaining in Camp Butmir, the Geo Cell was kept busy supporting HQ EUFOR, the MNTFs, IMSMA and various J2 Cells throughout Bosnia. The main UK customer was the (UK led) MNTF in Banja Luka; a four-hour drive was required to collect a task. The equipment was all office based, provided by EUFOR and supported by technicians from the NC3A, with data and GIS support being provided by the Geo Cell, JFC Naples. The main emphasis at the time was planning for the possible withdrawal of troops from Kosovo. EUFOR headquarters staff drove the route from Sarajevo to Banja Luka and then into Kosovo and contingency plans drawn up. The identification of possible mass grave sites was also a priority and seen as imperative to facilitate the eventual withdrawal of NATO troops from Bosnia. Fortunate that travel restrictions had been relaxed at the time, staff could venture into Sarajevo on a regular basis to enjoy the cultural aspects of the city, blending in with the returning tourists. The city's buildings still showed the scars of war. WO2 Robinson returned to the confines of the Regimental Ops Room on the 24th of January 2006 having completed a four month tour as the last UK Geographic Technician in Bosnia.

Kosovo

Going back in time and to Kosovo, several years of relative peace had ensued across the Balkans until 1998 when President Milosevic initiated what amounted to ethnic cleansing of the ethnic Albanians in the Serbian autonomous province of Kosovo. Kosovo was facing a grave humanitarian crisis, with military and paramilitary forces from the Federal Republic of Yugoslavia (FRY) and the Kosovo Liberation Army (KLA) in daily engagement. The Organisation for Security and Cooperation in Europe (OSCE) deployed personnel into Kosovo but attempts at diplomacy failed. The death toll had reached a historic high and nearly one million people had fled as refugees. NATO began air strikes, under Op ALLIED FORCE, against Serbia in March 1999. Lasting 78 days, Milosevic finally accepted peace terms in June 1999 and the NATO led Kosovo Force (KFOR) entered Kosovo on the 12th of June 1999 to halt a humanitarian catastrophe, restore stability and thereby establish a safe and secure environment.

The Regiment's involvement in Kosovo began in September 1998, when Captain Piers Noble reluctantly departed 14 Squadron, met up with two WO2s, Chris Underhill and Al Gransden, and deployed on Op SOMERSET, the OSCE Verification mission in Kosovo, until March 1999. (The then) WO2 Chris Underhill describes the deployment as follows:

We deployed to Kosovo in September 1998 as part of the Kosovo Verification Mission (KVM) of the OSCE and were initially located in a mountain resort to conduct OSCE and verification familiarisation on the mission. Following two weeks training we deployed to the capital and the HQ KVM, which was located in the centre of Pristina and 100m from the main Serbian Police Station. Our accommodation was an apartment in Dragodan, approximately 500m from the HQ. We were unarmed, wore civilians and ate in local restaurants. Our main effort was to supply US 1:50k mapping to the 5 KVM out-stations and to provide Geo support to the HQ. Probably the only reason three of us deployed was that General Drewienkiewicz (formally a Sapper) was well aware of the Geo trade and the capability it provided. Al and I utilised ArcView 3.1. The Mission contained personnel from just about all European countries as well as US and Russian. The security situation in Kosovo during this period could be characterized as tense! Piers was soon seconded to become the General's ADC. This led to more non-Geo tasks for Al and myself and included me driving the Kosovo President (Ibrahim Rugova) to an international meeting in Skopje, Macedonia - getting past the Serbian security post on the border took six hours and I was thankful to be driving an armoured vehicle! We conducted various tasks for the UK and US and recce'd helicopter landing sites for NATO forces - these sites are still being used today! Al and I also took part in 'verification' tasks and observed at close hand the non-compliance of the Serbian forces. Due to further deterioration in the security situation the mission was extracted in March 99.

The UK's initial contribution to KFOR was 4 Armoured and 5 Airborne Brigades, under Op Agricola. 13 Topographic Squadron provided a Geo Section, consisting of an SO3 + 6 equipped with a TACISYS, TACIPRINT and MAPSP, to 4 Brigade but the section also provided support to the Airborne Brigade. The Section arrived in Macedonia on the 7th of March 1999 and immediately undertook route analysis of the Kacanik Defile, which was to be the route of the main NATO thrust into Kosovo. Moving north to the Petrovec Training Area during Op ALLIED FORCE, the Section adapted the training area mapping and produced various terrain visualisation products, including fly throughs, perspective views and a shaded relief map. In addition, a 'stoning' map was produced to inform personnel of the likelihood of being 'stoned' by locals, which was an unfortunate common occurrence. As the bombing campaign was nearing its end the Section printed 25,000 mines maps and furnished the Airborne Brigade with numerous products. Both Brigades entered Kosovo on the 12th of June 1999, with the SO3 Geo, Captain Charlie Sladden, hitching a ride in the 4 Brigade Engineer Regiment Adjutant's armoured personnel carrier to allow him to capture mines data. Sapper Weller followed with the Brigade Main HQ and the remainder of the Section came forward with the follow on force, riding the gauntlet of flowers along the way. The Brigade occupied the grounds of the University of Pristina. The Section's main effort remained Engineer Intelligence, with the production of the daily EOD proven routes and mines trace. Mapping was constantly re-printed as a result of numerous boundary changes and various Psyops information campaigns were supported.

14 Independent Topographic Squadron deployed an advance party with HQ ARRC in February 1999. Located in the Shoe Factory, Skopje, and consisting of the QM, Captain Pete Ladds, WO2 'Scouse' Murray and 3 ORs, their role was to form a Theatre Map Depot and establish logistics in preparation for the deployment of the remainder of the squadron. In addition, a Field Survey Section, consisting of eight personnel from 19 STRE commanded by Captain Tish Gauci with SSgt 'Griff' Griffiths, deployed to the Shoe Factory on the 18th of March 1999 in order to establish a survey control network in Macedonia. The network would be used to form the basis of any future survey work in Kosovo. Coming under command of 14 Squadron's QM, the intent was for a short deployment; get in, complete the survey and get out! No surprise then that the Section completed a 6-month tour, remaining in Macedonia for three months before moving forward and surveying in Kosovo. Macedonia was surveyed to the extreme, with a dense control network being established and various points being coordinated across a tank range in the south and in various Artillery locations. Once access was possible, the section extended the control network into Kosovo and carried out a survey of Pristina Airfield (overlooked by friendly Russian forces).

14 Squadron's main body, commanded by Major Rupert Dash, deployed in June 1999, meeting up with their vehicles in Thessaloniki, Greece, before establishing a GSG in the Metal Factory, Skopje, adjacent to HQ ARRC(Rear) in the Shoe Factory (Figure 22).



Figure 22. The Shoe Factory, Skopje, home of HQ ARRC(Rear). The Metal Factory, home to the GSG, is behind and to the left.

At this time there were approximately 35% of Military Survey's military manpower deployed. Apart from the Map Depot, the GSG equipment was based within the Metal Factory, with personnel being accommodated and fed within the Shoe Factory. Under operational command of Commander ARRC and administrative control of HQ 1 Signal Brigade, which proved predictably tortuous to confirm, the GSG consisted of approximately 80 personnel, with map supply, production, terrain analysis and field survey

capabilities. Tasking included the production of a wide range of operational specific mapping, terrain briefs and field survey support. A key product was the Kosovo Mines Map series, which was quickly initiated after the chaos that ensued on the initial entry of KFOR into Kosovo. The mass flood of returning refugees clogged the roads and the threat of unexploded ordnance (UXO) and mines needed to be communicated and understood by the locals. A single colour map, with native specification, was overlaid with symbols to highlight the UXO threat. The series was quick to produce and readily understandable to the local population and proved to be a swiftly thought out use of in-theatre resource. It was subsequently revised every two weeks. As the tour progressed it became evident that the GSG would pull out of theatre and a large format production capability would need to remain. Liaison was conducted with various local print companies and resulted in the theatre helicopter landing site booklet and various large format products being printed successfully by contractors as test cases. A personal account of the Squadron's deployment is provided by (the then) SSgt Dave Campey:

As SSgt of the Terrain Analysis Troop it was my remit, along with SSgt Andy Rudd to prepare the technicians, vehicles, equipment and soldiers for the peacekeeping tour in support of HQ ARRC. I recall having to scrap plans for the eagerly awaited adventure training expedition which was scheduled for imminent departure to Monte Rosa in the Swiss Alps, and to switch tack to the excitement of deploying on an operational tour. The lads were well up for it and within a week all systems were ready as we drove the vehicles to Hamburg prior to their ferrying by ship to the SPOD in Greece. This gave the Squadron time to prepare themselves for what would be a rewarding, yet gruelling, six months in Skopje, Macedonia.

A few weeks later we flew to Thessaloniki in Greece, only to be held in a rat infested, overcrowded holding area within the perimeter of the main port. We were repatriated with our vehicles and equipment and then endured a 14-hour convoy north through Greece and into Macedonia. I remember driving a TACIPRINT, without co-driver, and having to sing as loudly as I could, with head half out the window, just to keep awake as the 100+ vehicles slowly, slowly, VERY SLOWLY, snaked northwards and into Macedonia. We arrived at the Shoe Factory, Skopje feeling hungry and very tired, yet somehow morale was boosted by the fact we had all made it without a breakdown. A quick refuel for the vehicles and then orders from the OC to get our heads down for four hours as work needed to start just after Dawn.

Breakfast was upon us in what seemed an instant and we then set up the GSG in an L-shaped formation alongside our new Squadron Headquarters in the Metal Factory. The use of cam nets to protect from the sun was complimented by the ingenious heat reflectors made from printing plates on top of each Geo container, to keep the systems within working temperatures. The 'Big Tent' was overlooked conveniently by the OC's Office. However, we were ready to go and chomping at the bit for some technical work. Once the new network between TACISYS vehicles had been set up, the STCO, WO2 Pete Wyatt, hit us with the first task – a mines map series of Kosovo at 1:100 000 scale. The cartographers designed the map layouts, and the terrain analysts provided the important overlay information. Meanwhile the photographic technicians mixed their chemicals in anticipation of some long shifts and the printers lovingly kicked their Heidelberg presses into life. Three weeks of solid work, from 0730 until 2200hrs, seven days

a week ensued, with the only reward being the pride of producing over half a million mines maps that would be used by KFOR troops further forward in Kosovo. Luckily for us we had an excellent support troop who during this time built the infamous Monty's Bar, this Squadron social area hosted many an evening of frivolity and fun and was enjoyed and frequented by members of all nations and all cap badges throughout the tour.

Work gradually settled down into a steadier routine. We were graciously given a morning off, once a week, to square our admin away and do some well needed 'Fizz'. During this time we managed to liaise with a local Macedonian print firm, who were more than eager to share their technical expertise and work together, fostering both social and professional partnerships. Key tasks for the Squadron included the painfully laborious production of the first ever vector only map on operations - the Campaign Map for HQ ARRC. One of the most interesting and sobering tasks was the creation of digital products to assist in potential war crimes tribunals, with the most technically demanding being the design and production of a new series of Road and Bridge maps. The most rewarding task, as always, was the Miss AGRICOLA calendar. For the first time a special Mr AGRICOLA version was printed for the ladies on tour, both were well received 'Tonics for the Troops'. Thanks to an exceptionally talented team of technicians, in particular our young linchpin, Cpl Steve Wallace, the GSG managed to complete all the geographic tasking that the STCO could muster.

Towards the end of the tour we managed to compete in a local football five-a-side league and regularly visited the pool in Skopje town centre (needing to run four miles there and four miles back, I hasten to add). The local MacDonald's also proved a weekly treat, as was the market outside the main gate which was the source of various local 'nick-nacks', souvenirs and a plethora of multimedia entertainment. Most of the troops were afforded some well-earned R&R at Lake Ohrid in Southern Macedonia, and most even managed to behave themselves. Then, before we knew it, we were ordered to strip out the camp and prepare to travel back to Thessaloniki in Greece, arriving at a vastly improved transit accommodation - most of the rats had been encouraged to go elsewhere and there was even a Tuck Shop! Three days later and we were on our flights home, to families, tea and medals. A tour never to be forgotten and one for all involved to be proud of their achievements.



Figure 23. The five Multi National Brigades making up the KFOR.

14 Squadron withdrew from theatre with the ARRC in September 1999 and the UK took on lead nation responsibility for Multi National Brigade Centre (MNB(C)) (Figure 23).

HQ MNB(C), initially based on HQ 19 Mechanized Brigade, was established in the University, before being permanently housed in Slim Lines, Pristina. Geographic support was provided by a GSG(Light), more commonly known as the Geo Det. All manpower and equipment, apart from the Brigade Geo Sergeant and his system, were initially drawn from 13 Squadron, then from across the GEG for subsequent deployments. The ORBAT included an SO3 Geo, the Brigade Sergeant, two Tera Technicians, two Repro Technicians and a Topo Technician. The Det was initially under operational control of the Brigade's Engineer Regiment and administered by the HQ Squadron (later the UK Engineer Logistic Squadron), but later moved under direct command of the Brigade HQ. Equipment initially included a

TACIPRINT, TACISYS, two office based workstations, which were linked to the TACISYS, and two large format plotters. A small map store was also maintained and re-supplied from the Theatre Map Store, HQ KFOR in Film City. Support was provided to all 6 Battlegroups within the MNB, which included units from five different nations. Tasking included the provision of bespoke large scale mapping and image maps for individual operations, line of sight studies, the identification of potential weapons storage sites, various perspective views and fly-throughs and hand held GPS instruction. In 2001, a Kosovo GIS database was introduced, with data as diverse as dispositions, boundaries, incidents, minefields and cultural and resource information. This relied on the sharing of information between the different Brigade (and nation) Geo sections and was facilitated by the existing good will. Data management was becoming critically important. Eventually, the GIS was linked to the NATO C2 local area network (LAN) and ArcIMS software was utilised to enable all headquarters branches to share and display common information within department specific Web

pages. The connection of the database to the C2 network proved a great success and the capability was enhanced over the years. Close links were developed with G2, with the SO3 Geo sitting within the Branch and taking on the role of Brigade Imagery Requirements Manager.

In 2001, various products were generated in support of a NATO troop deployment to the Serbian and Macedonian borders in reaction to raised tensions. Contingency plans were drawn up to protect the line of communication to Thessaloniki. Most work at this time was conducted in support of the HQ G2 Branch and included products in support of surveillance operations and terrain analysis to assist the identification of weapon hides and training camps. Op ESSENTIAL HARVEST was a 30-day NATO mission in Macedonia in August/September 2001 to disarm ethnic Albanian groups in Macedonia and destroy their weapons. Involving 3,500 NATO troops, the Geo Section provided support to the UK contribution, HQ 16 Air Assault Brigade and 2 Para.

7 Armoured Brigade conducted a force review at the end of 2001. As the TACIPRINT was seldom used it was returned to UK in early 2003 and the Section manning was reduced by one (the Data Tech/Map Storeman). The external threat to Kosovo's stability had receded and the main threat became internal, with organised crime being rampant. The main focus of KFOR became the handing over of responsibility for security to the UN Mission in Kosovo (Police) (UNMIK(P)) and the Kosovo Police Service (KPS). Subsequently, in January 2003, the operation changed to Op Oculus. Command of MNB(C) was formally transferred to Finland and a Swedish Section took on responsibility for geographic support. The majority of the residual British troops, principally the British Surveillance Company, formed the Intelligence Surveillance and Reconnaissance Task Force (ISR(TF)) and transferred to Force Troops, HQ KFOR. Their mission was to monitor, disrupt, and disable extremist and organised criminal activity. The UK Geo Section moved within the ISR(TF) and manning was reduced to one SNCO and two JNCOs. However, the AOR changed to the length and breadth of Kosovo! Typical tasking included the provision of image maps and imagery based products for analysis and strategic purposes, the provision of operation specific mapping and terrain analysis for surveillance operations. Data from a commercially run UAV was exploited and utilised in routine tasking.

Sectarian violence erupted in all major towns in March 2004 following the death of four Serbian civilians. As a result, 2,500 troops, from various nations, reinforced KFOR. The UK contribution consisted of the SLE Battlegroup under Op MERCIAN. Mapping was issued at the Aerial Port of Disembarkation (APOD) and within 16 hours of the approval to deploy the first responders were in Pristina. The ISR(TF) Geo Section provided extensive in-theatre support to the operation. Thereafter, routine support was provided to the ISR(TF) and manning was reduced to one SNCO and JNCO. The MNBs reverted to MNTFs in June 2006. Even though Kosovo declared independence on the 17th of February 2008, NATO confirmed that KFOR would remain in place. However, after months of rumour and tentative planning, it was announced in February 2009 that the UK was to withdraw its troops from Kosovo. The last UK Geo personnel on Op Oculus in Kosovo, A/Sgt Cantwell and LCpl Antoine, departed Theatre in March 2009, having waved goodbye to their TACISYS earlier in the month (Figure 24). 10,000 troops, provided by 31 nations, remained in Kosovo under KFOR.



Figure 24. The Op Oculus TACISYS being craned onto a low loader for the road move to UK.

Conclusion

The Regiment's lengthy and significant involvement in the Balkans should not be forgotten; much was learnt and accomplished. Continuous support to diverse operations over a long period of time (and in various countries) led to many significant achievements and developments, which subsequently had a direct impact on how operations in Iraq and Afghanistan have been supported. The GSG concept and the Regiment's ability to successfully deploy and sustain different sized force elements, with differing capabilities, was proven. The ability to react quickly to operation specific requirements with locally conceived and generated products proved essential, but the alternative use of DGC as a reach back capability was also successful. The importance of map supply was re-enforced. Geospatial analysis was developed. Links with G2 were fostered. The importance of data management was recognised and the serving of digital geographic information over command and control networks was introduced. Above all, the technical ability, robustness and adaptability of Geographic soldiers and officers was tested and found to be completely fit for purpose.

Acknowledgement

I would like to thank the many personnel who assisted in the compilation of this article; most are mentioned in the text. Thankfully, there are many with a better memory than I!

FOST-HM Search for Suitable External Examiner

Based in Plymouth, the Royal Navy's Hydrographic Survey Squadron relies on its Hydrographic School (now known as FOST-HM) to train Junior Rates, Senior Rates and Officers in this demanding discipline prior to front-line operations. Junior Officers and aspiring Senior Rates are required to complete the 14 week-long Basic Hydrographic course which is both International Hydrographic Organisation Category B and University of Plymouth (BSc in Maritime Science) accredited.

As a result, the latter qualification has necessitated the services of a External Examiner (EE) to ensure that BSc standards are being maintained. In the conduct of this role, currently being fulfilled by Dr Julie Armishaw of the United Kingdom Hydrographic Office, the EE is required to:

1. Conduct an annual visit to FOST-HM to meet with staff and students
2. Conduct secondary checks on student examination papers (max of 30 students Per Annum)
3. Attend University Subject Assessment Panels and Award Boards
4. Write a brief annual assessment of course performance

The role is a fulfilling one which gives a valuable insight into RN training of its hydrographic personnel, permits personal development, gives access to UOP resources and finally provides a small financial reward. Financial remuneration is £350 PA plus expenses.

Minimum qualifications for the role are education to degree standard, with experience relevant to hydrography or closely associated scientific fields (Dr Julie Armishaw has a background in Oceanography which was deemed suitable). Previous experience as a BSc Programme External Examiner is preferable but is not strictly necessary. Approval for this role would be through UOP by submission of CV.

If you fulfil the above criteria and are interested in performing this valuable and fulfilling role, please contact Lt Cdr Ollie Barritt on 01752 286044 or alternatively, e-mail: fost-hm-swo-hm-2@fleetfost.mod.uk. Deadline for applications is 29 October 2010.



Rapid Environmental Assessment Al Faw 2003

Roebuck's War

By Commander A V Swain MBE RN

The announcement in December that *HMS Roebuck* would be paying off April 2010 after 25 years of service has brought back the memories of when I last served in the ship in 2002 ...

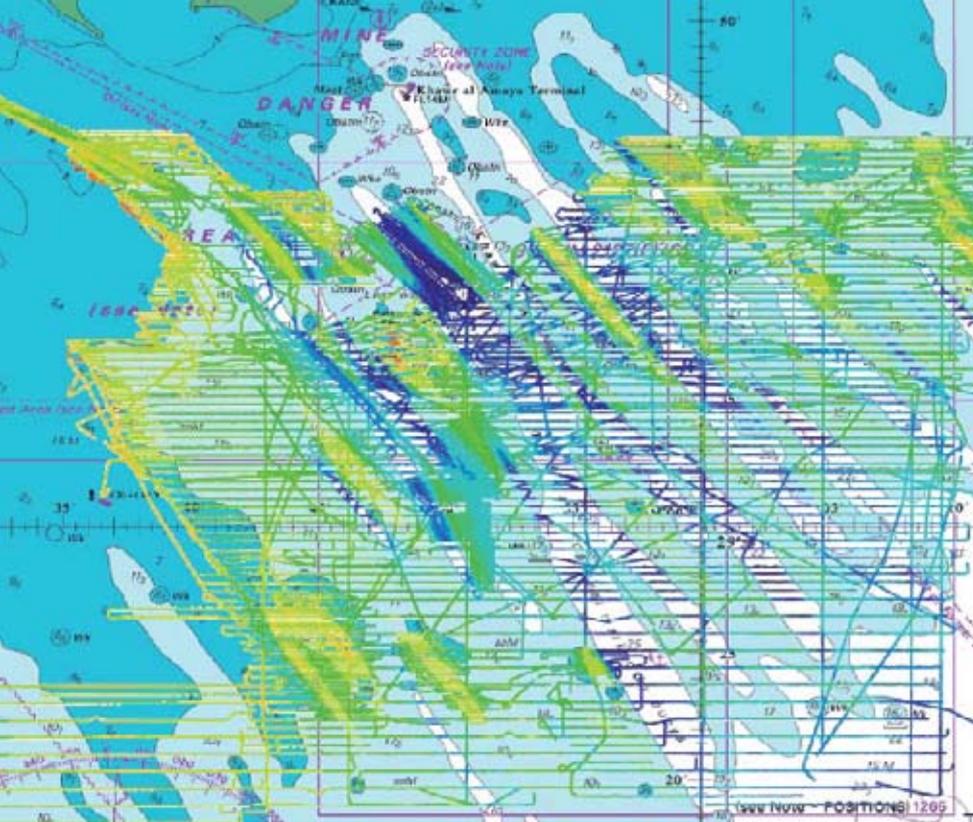
HMS Roebuck sailed from Devonport on the morning of the 11th of November 2002 for a fast passage to the Arabian Gulf. Her task was to conduct three months of hydrographic surveys in collaboration with gulf nations and to build survey skills in navies that had supported the Royal Navy's longstanding commitment to the region. This deployment had been over a year in the planning and was not a reaction to the increasing tensions being created between Saddam Hussein and the Nuclear Weapons Inspectors. She was programmed to return on the 4th of March 2003 for decommissioning and sale to the highest bidder; what really happened is proof that no plan, however high up the command chain it has been signed off, will survive first contact with the enemy.

The first leg of the journey was undertaken in appalling weather conditions and included a search for a lone yachtsman who made a mayday call on the morning of the 13th of November, thirty miles west of Cape Finisterre. The capsized yacht was located but the heavy seas and considerable amount of rigging surrounding the stricken vessel made it impossible for the ship to safety lay alongside. Launching the seaboat in these weather conditions was impossible. After calling in a Spanish search and rescue helicopter *HMS Roebuck* stood by the yacht in the ever-increasing gales and poor visibility to guide the helicopter to the location of the capsized vessel, the yachtsman was safely winched from the up-turned hull of his trimaran and flown to Spain for medical care where he quickly recovered.

Passage continued and by Thursday afternoon the weather had moderated sufficiently to allow the launch and recovery of a gunnery target. The ship conducted her first ever gunnery shoot using the two General Purpose Machine Guns which had been fitted in Devonport prior to sailing. On completion of the gunnery serial *Roebuck* made best speed to Gibraltar.

Prior to sailing from Gibraltar the Flag Officer Sea Training (FOST) Mobile Nuclear, Biological, Chemical and Damage Control (NBCD) Training team were embarked. *Roebuck* was built for survey operations in the North Sea and other UK waters. Protection from NBC attack was never considered necessary during the ship design and build process. Before sailing from UK it was considered prudent to ensure that every member of the Ship's Company was in date and fully trained in the use of Individual Protection Equipment, all required stores were carried and in addition the ship had ordered two Winterbourne liners (field Nuclear Biological and Chemical (NBC) Tents). They arrived just before the ship deployed but they were so big there was no compartment on the ship large enough to erect them. The tents themselves were returned but the air filtration units were retained and could now be utilised to construct a sanctuary. This was an important decision; the FOST NBCD team was only available to the ship for four days. Could we afford to give over this time to building a sanctuary, which might not work? We had already been told by the Design Authority that it could not be done. If it didn't work valuable training time with the FOST experts would be lost and this could prove fatal if we found ourselves in an NBCD environment. On the other hand the boost to morale if a sanctuary could be built was enormous. It took 36 hours and every member to the Ship's Company to build a sanctuary that included the bridge and the two decks below. The concept was fully tested with the assistance of the NBCD team and on Thursday the 21st of November with the ship closed down to 1ZA (a gas tight condition within the sanctuary); the first ever chemical exercise was conducted onboard and received a Very Satisfactory assessment from the FOST staff. The gleam on the Chief Shipwright's face as the internal pressure was measured at over 1 inch said it all, as he had even constructed the calibrated gauge to measure the relative difference in pressure inside the sanctuary.

After landing the NBCD team at Malta *Roebuck* transited the Suez Canal on the 29th of November. A fast passage to Muscat was conducted, slowed only by a six hour fuelling stop at Djibouti. It was shortly after sailing from Djibouti on the evening of Friday the 6th of December that a signal was received from FLEET HQ stating that *HMS Roebuck* had been extended in commission for six months and had been re-tasked to the Northern Arabian Gulf (NAG) on arrival in theatre.



Hydrographic Instruction 1048 survey area.

HMS Roebuck arrived in Muscat on the 11th of December and on the next day the Commanding Officer called on COMUKMARFOR, Rear Admiral D G Snelson at Bahrain to receive a briefing on future plans of operations in the NAG. It was only after the ship had transited Suez into 'his' operating area that the admiral had sent a formal request to the MOD for *Roebuck's* participation in the preparations for a possible conflict. The Hydrographic Instruction (HI) Number 1048 was delivered by hand the following day and contingency planning began in earnest. It became quickly apparent that the survey task as detailed in the HI did not meet the requirements of the strategic plan, as briefed by

COMUKMARFOR, and a more flexible concept of operations was developed which was tailored to the warfighters' needs. To complete the survey as ordered would have taken over 600 days on task, 6 weeks in total was a more realistic assessment of the time available, Rapid Environmental Assessment (REA) was the approach adopted to provide the best information available, tailored to the customers' needs. All the data included in the HI was extracted and whilst surveying data was collected for all parameters possible, the timelines and methods of presentation were adapted for each dataset according to the users' requirements.

Roebuck sailed from Muscat and transited the Straits of Hormuz, arriving in the NAG to commence survey operations on the 17th of December. The southern half of chart BA 1265 was selected as the initial test area to ascertain how much the seabed had changed over the years. The buoyed channel in the central area of this chart was last surveyed over thirty years ago and the rest of the area had not been surveyed for considerably longer.

HMS Roebuck remained on task until the 22nd of December then proceeded south for the Christmas standoff at Bahrain. This six day period alongside was easily the low point of the deployment. The duration of the deployment had been extended by four months; the port for the Christmas standoff had been changed twice in the previous two weeks (from Dubai to Muscat to Bahrain). The extension of the ship's commission by six months necessitated new draft orders for everyone onboard; and the uncertainties of the possible forthcoming conflict were foremost in everyone's mind. Considerable effort was expended by the Heads of Departments and other key personnel to improve morale. In addition, Admiral Snelson found time in his busy schedule to visit the ship. He reviewed the survey data, and at the subsequent Clear Lower Deck, impressed upon the Ship's Company the importance of *HMS Roebuck's* tasking over the coming weeks, she was the only survey vessel in the entire coalition force, the only ship that could perform this important mission.

The results of the initial survey period were landed to the Staff in Bahrain and signaled to all coalition units. During the period alongside the ship was fitted with the capability to transmit classified data via Brent and Inmarsat to Fleet Weather and Oceanographic Centre (FWOC-Northwood). This meant that the ship could now transmit data from sea. The next target was to provide as much information as possible for COMATG's (Commander Amphibious Task Group) pre-deployment brief on the 9th of January in Portsmouth.

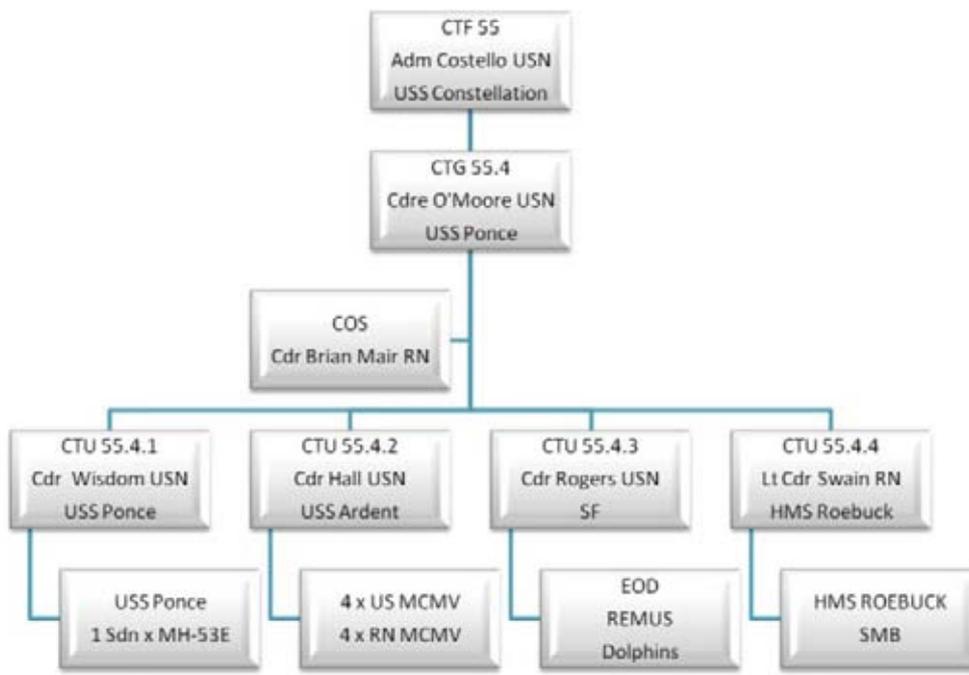
On returning to the survey area the ship concentrated on delineating the ten metre contour, which would act as the safety limiting line for the Amphibious Task Group (ATG) (primarily *HMS Ark Royal* and *HMS Ocean*). On each occasion of finding a depth shallower than 10 metres, the area was fully investigated. It was during this period that the ship concentrated on working as close to Iraqi Territorial Waters as possible as this would be the area the ATG were most likely to utilise to reduce time in the air for the landing force.

On the 3rd of January the secure e-mail facility was successfully tested in preparation for the datasets required for the COMATG meeting on the 9th of January. The only station holding the software to receive the data was the FWOc reactive cell at Northwood. The data was then cut to a CD-ROM and taken by hand to UKHO Taunton where it was uploaded to their Survey Information Processing System. The files were then printed out onto transparent chart overlays. These overlays were collected by COMATG staff and driven to Portsmouth for the COMATG pre-deployment meeting. The charts were received in time for the meeting and allowed COMATG to accurately brief all Commanding Officers from his Task Group on the water space available in their operating boxes. The new operating boxes gave the ships considerably more room to maneuver than had been originally envisaged and allowed the fine tuning of the group's plans prior to deploying from UK.

All survey data considered essential to Operation TELIC was collected prior to the ship breaking off task on the 2nd of February. The ship then proceeded alongside Bahrain for a Self Maintenance Period and to process all survey data. All survey data was dispatched during this period to FWOc, UKHO, MCMTA, UK and US MCMVs, FF/DD of the Maritime Interdiction Force, as well as COMATG, UKMCC and COMUSNAVCENT for planning purposes.

On the 10th of February *Roebuck* sailed for the NAG but the political situation had increased tensions in the region to a considerably higher level. The ship alternated work areas between Kuwaiti Territorial Waters (TW) and claimed Iranian TW, working as far north as was practical. In the middle watch of the 19th of February, while working over shoal banks close to Iranian TW the ship ran over a fishing net. This net was made of a very fine material and managed to entangle itself underneath the rope guard and the stern seal on the starboard shaft. The damaged seal leaked oil, and the possibility of water entering the stern bearings was a major concern. Operational authorities were informed immediately and *Roebuck* came off task, proceeding to Bahrain on one shaft to effect repairs.

She arrived in Bahrain two days later where divers confirmed that the ship was required to enter dry-dock for the removal of the after section of the Starboard shaft so that the stern seal could be replaced. Contracts were raised and *Roebuck* entered number 3 floating dock at the Arab Ship Repair Yard Bahrain on the 28th. A considerable amount of work was completed before the ship returned to her berth in Bahrain port on the 4th of March. Basin trials were successfully completed on the 4th and 5th of March. It was during this time that the tactical control of *Roebuck* was passed to the US forces to ensure that her efforts were fully integrated with the US commander of the NAG (CTF 55).

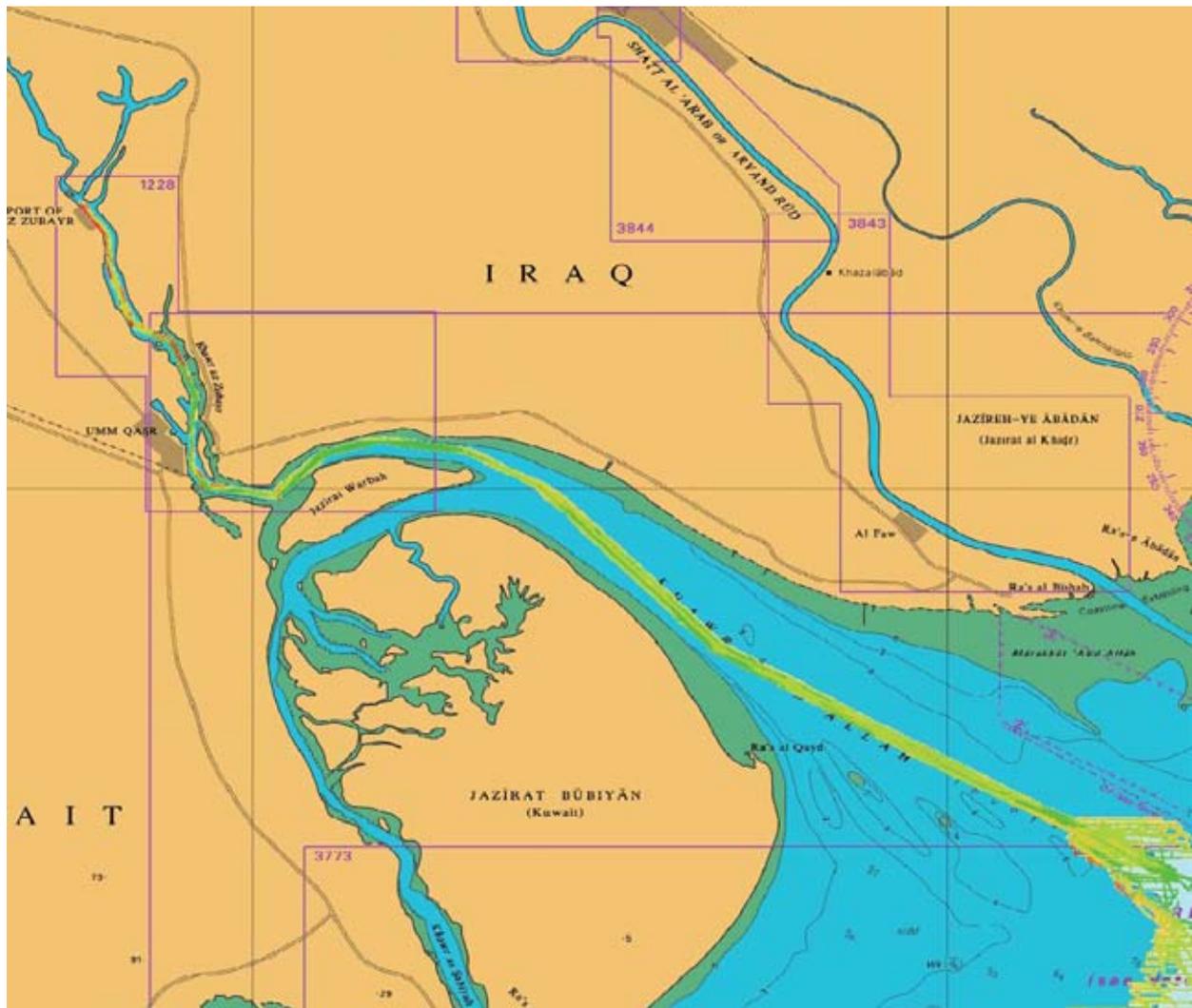


The operational organisation in the Northern Arabian Gulf.

On the 5th the CO accompanied COMUKMARFOR to Kuwait to call on the Commander of the Kuwaiti Naval Forces. During the visit two charts of the recent surveys in the northern part of Kuwaiti TW were presented. It was agreed that the ship could return to Kuwaiti waters when required and further tasking for the ship and her boats was agreed north of Jasirat Faylika.

On the morning of the 6th of March *Roebuck* sailed from Bahrain for the survey ground in the NAG. On arrival, the ship rendezvoused with HM Ships *Chatham* and *Sandown*, to transfer personnel and stores collected from Bahrain. The ship then recommenced surveying in the vicinity of Jasirat Faylika, and the results were dispatched to the Commander of the Kuwaiti Naval Forces via the British Naval Attaché in Kuwait at the next port of call.

Conflict began over night of the 19th of March. All preparations for Action Stations were rechecked in infinite detail and the Ship's Company was ordered to take Nerve Agent Pre-treatment Set tablets. *Roebuck* remained well to the south from the 19th to the 22nd conducting surveillance operations on the task force supply routes before being tasked to proceed north to assist in the search for wreckage of two Sea King Mk7 that had been involved in a mid-air collision earlier that day. The ship remained on this task assisted by *USNS Catawa* and *HMS Grimsby* to conduct recovery operations until called forward to commence survey operations in the Khawr Abd Allah (KAA) at 0700z 28 March.



The Khawr Abd Allah (KAA).

Roebuck was now operating in a multi-threat environment, mine, surface and air threats were red and the NBC threat medium. It was never envisaged that *Roebuck* would ever be deployed in such hostile waters but the ship was now operating as little as 100 metres from the Iraqi coastline. The ship worked as close to the lead Mine Counter Measures Vessels (MCMV) as was practical without impeding their task, and by midday on the 29th of March the ship had surveyed a route through to the port of Umm Qsar, 36 miles inside Iraq. Unfortunately much of the port itself had yet to be cleared so work continued in the rest of the KAA, widening the surveyed channel to the maximum of the swept channel as soon as each section was cleared.

It was during this period that a local amendment to the International Regulations for Preventing Collisions at Sea was promulgated; normally a survey vessel would be required to give a wide berth to a MCMV conducting mine hunting operations, for obvious reasons. The new rule stated “*if a survey unit required to pass an MCMV in the swept channel, then the survey vessel is to maintain*

her track and the MCMV is to allow her to pass". At this stage the channel was still very narrow and the MCMVs were far better equipped to leave the channel to allow *Roebuck* to pass than the other way around. This rule worked well and greatly increased survey productivity whilst causing minimal impact to MCM progress.

On the 30th of March while conducting survey route widening in the vicinity of KAA, an uncharted wreck was located. The wreck stood 6m proud of the seabed with a least depth of 4m. It lay only 70m north of the centreline and *RFA Sir Galahad* was due to pass this point within a few hours. A flash signal was sent to inform her and other units in the area. The survey area was then confined to the south of this area to ensure that she would be safe to divert around the wreck and another wreck was found close by, this time 170m south of the centreline of the route. Again a flash signal was sent to *RFA Sir Galahad* and *Roebuck* stood close to the wrecks to mark them as *Galahad* and her leadthrough vessel and surface escorts passed safely by. In that evening's signals a recommendation was made that the MCM route was moved south to keep clear of these dangerous wrecks, a recommendation that was quickly actioned by the Joint Force Commander.



HMS Roebuck ensures the way is clear for deep draught vessels carrying humanitarian aid to Umm Qsar.

Work continued to widen the survey route until the 2nd of April when a berth at Umm Qsar was cleared for use. Due to working in a mine threat area, 3 and 4 decks were out of bounds and all members of the Ship's Company were hot bunking in officers' and senior ratings' cabins. Despite these unpleasant conditions and other factors such as the heat, defence watches and the ever-present threat from chemical weapons and small fast attack craft, morale onboard was extremely high; we were conducting the task we had been trained for.

From alongside Umm Qsar we were able to divert all our resources into Survey Motor Boat (SMB) operations to ensure that the harbour was opened as quickly as possible.



HMS Roebuck alongside the Port of Umm Qsar, the first British warship to berth in Iraq for 40 years.

Synthetic Aperture Sonar, HISAS



Synthetic aperture sonars combine a number of acoustic pings to form an image with much higher resolution than conventional sonars, typically 10 times higher.

The HISAS sonar is part of the HUGIN system solution for mine countermeasures, which has been ordered recently by the Norwegian Navy.

HISAS is a wideband SAS sonar with frequency range of 70-100 kHz, capable of producing ultra high resolution acoustic images as well as co-registered bathymetry. The sonar is tightly integrated with the INS navigation and motion sensing platform of the HUGIN AUV, and makes use of modern signal processing such as DPCA (Displaced Phase Centre Analysis) to process the raw data into images.



Underwater instrumentation ▶ SONARS ▶ TELEMETRY ▶ POSITIONING ▶ HYDROGRAPHIC ECHO SOUNDERS ▶ CAMERAS AND LIGHTS ▶ AUTONOMOUS UNDERWATER VEHICLE

Norway: +47 33 03 41 00, USA: +1 425 712 1107
Canada: +1 902 468 2268, UK: +44 1224 22 65 00
Italy: +39 06 615 22 476, Singapore: +65 68 99 58 00

www.km.kongsberg.com
e-mail: subsea@kongsberg.com



KONGSBERG



The Survey Motor Boat ready for action. For very shallow water surveying in the harbour the Side Scan Sonar was secured to scaffolding on the Port side as it could not be towed.

Mine clearance on the last of the priority berths was not completed until sunset on the 4th and after completing these berths the SMB returned some four hours later. All data was processed overnight and at 0500z the next morning the final results of all the cleared berths and their approaches was passed to the Harbour Master prior to sailing to continue surveying the KAA.

On the 9th of April mine clearance of all berths in Umm Qasr had now been completed so the ship proceeded to the harbour at midday and lowered the SMB. Whilst the SMB was surveying the harbour the ship continued to widen the northern section of the KAA channel until she completed her work and then recovered the crew, leaving the SMB in the care of the Harbour Master.

HMS Roebuck left the KAA the following day to conduct stores transfers with *RFA Fort Rosealie*, and then *HMS Ocean*. The ship was now ready to complete her final task, a survey from Umm Qasr to Al Zubayr and the port of Al Zubayr itself approximately two days survey work. However, the MCM effort could not be started until force protection issues had been resolved, accordingly with regret the CO cleared the Lower Deck to inform the Ship's Company of his decision to postpone arrival in Jebel Ali for an assisted maintenance period by one week.

The ship arrived at Umm Qasr at 0800z on the 14th of April and immediately landed a maintenance team to ready the boat for surveying, and establish an automatic tide gauge at Umm Qasr. After giving instruction on its use, responsibility for the gauge was handed over to the Harbour Master.

Unfortunately, on the morning of the 15th the KAZ mine clearance operations had still not been completed. It was nevertheless arranged for the SMB to work in the lower reaches of the KAZ, keeping clear of the MCMVs. Time was now very tight and any hold-ups would delay the ship's arrival in Jebel Ali on the 19th of April. The SMB worked industriously just behind the MCMVs and upon return to the ship at sunset that evening had completed 70% of this final task. During that day arrangements had been made to allow the SMB access to all berths in Al Zubayr the following day. *HMS Sandown* continued her work well into the night, in difficult conditions, to confirm that the harbour was safe for the SMB to work the following day.

The SMB departed the ship at dawn for the final day's work and returned shortly after midday, having completed all tasks. This gave the opportunity to check all data during the afternoon and the few gaps that were found were re-surveyed; the boat returned at sunset. Again the data set was analysed overnight and completed charts were passed to the Harbour Master of Umm Qasr prior to our departure at sunrise the next morning, the 17th of April.

The ship then took passage to Jebel Ali; this passage proved uneventful and at 190001z April the CO stood down as the REA Commander and the Survey Task Unit 55.4.4 was disestablished. The ship entered Jebel Ali later that day and commenced an Assisted Maintenance Period. It was a few days later that we learnt that there was no further tasking for *Roebuck* in the NAG and that we were to take passage to UK on sailing from Jebel Ali.



The MIB and Portable Surveying System (PSS) was also used in shallow waters.

Roebuck's war was over. All tasks had been completed. The data for all the surveys had been received by the relevant commanders in good time and in a format they could readily use. Rapid Environmental Assessment had come of age.

Quotes:

“To one of the smallest ships in the Royal Navy befell one of the largest tasks of the operation. Without Roebuck’s work, the assault by the Navy’s Royal Marines might not have been as successful as it was and humanitarian aid might still be waiting to enter Umm Qasr. This small ship and her superb crew did an incredible job.”

Admiral Sir Alan West, First Sea Lord, 26 May 2003

“MISSION: IMPASSABLE

How the smallest ship in the Navy carved out route for Gulf fleet”

John Kay, Chief Reporter, The Sun 27 May 2003

As *Roebuck* was operating inside Iraqi Territorial Waters well in advance of the invasion the work had to be completed



Postscript

When *Roebuck* sailed out of Devonport in November 2002 it was meant to be her last voyage under the White Ensign as she was due to be decommissioned on the 27th of March 2003. The outbreak of hostilities won her a six-month reprieve but after her invaluable service during the conflict it was decided that she should remain in Royal Navy service for another ten years. However, due to the current economic climate that was reduced to only seven years and she decommissioned on the 15th of April 2010 and has now transferred the Bangladesh Navy.





Deployable Geographic Involvement on Op Telic

By Major Hamish MacMillan

Op TELIC is finally over for 42 Engineer Regiment (Geographic); Lance Corporal Gardner was the final Geo man out of theatre on the 30th of June 2009¹ approximately 6½ years after the first Geo personnel deployed during the build up to the invasion.

Although less experienced in Iraq than a number of the personnel within the Regiment who have completed multiple tours, OP TELIC has played a part in my professional life from the pre-planning phase (more on this later) all the way up to receiving the last guys from theatre back into my Squadron, and included the obligatory Operational tour in the middle. It therefore makes sense for me to mark the passing of Op TELIC with a précis of what has been achieved by the many that have deployed.

I am going to mainly limit myself to the field deployable element of Geo support to TELIC. This is partly because this is my area but also because to do justice to all the other elements who have supported the Operation from a Geo perspective, and I am thinking of the Defence Geographic Centre and JARIC in particular, would lengthen the article excessively; maybe someone from these organisations would like to take up the challenge. Plus interest in Iraq from these organisations undoubtedly continues despite deployable Geo's departure, so the chapter may not be quite closed for them yet.

I will cover the lead up to the invasion and the invasion in a chronological method and then look at the Counter Improvised Explosive Device (IED) and Indirect Fire (IDF) battle separately.

Pre-Planning Phase

What does pre-planning mean? Before we started to do the planning for the invasion of Iraq someone had to decide that we had a reason for invading the country in the first place. This was my first involvement with Iraq, well before Op TELIC even existed. Not long after 11 September 01 it was clear that Iraq was back on the agenda and work started on the now infamous 'dodgy dossier' for which my Geo team at JARIC produced a number of products. Our parts were of course highly accurate and completely based on facts, generally relating to deriving accurate dimensions and positions of equipment or installations from imagery. To be fair to the decision makers the vast majority of staff at JARIC, whatever they may say now, who had access to most of the intelligence did believe Iraq had Weapons of Mass Destruction - WMD, I for one did. But that is a whole different argument; suffice to say by mid 2002 it was clear something was up. About this time I left the privileged intelligence world and joined 13 Geographic Squadron where we had to wait until the 25th of November 02 for the Secretary of State for Defence to formally announce that contingency planning for possible operations in Iraq was being undertaken.

Pre-deployment Planning Phase

The actual planning phase started in detail during October 02 with Geo at PJHQ and 1(UK) Division heavily involved and 42 Engineer Regiment (Geo) providing the Chief Geographic Officer for the National Component HQ (NCHQ) in the form of the CO, Lieutenant Colonel (now Colonel) Kedar. He and WO2 (now Captain) Underhill, from PJHQ Geo, deployed to Doha, Qatar, in November 02 to take part in a US led Command Post Exercise to look at the strategic perspective of any future invasion.

At this point the UK was still looking at invading through Turkey and when 1(UK) Division Geo staff, amongst others, were asked to look at the vegetation and hence what type of camouflage was required it was envisaged a winter operation in Northern Iraq hence no urgent requirement for desert uniforms. Only when the option was turned off in December and the UK switched to Kuwait was it suddenly realised just how many desert uniforms would be required and, as most know, they did not all turn up on time.

Geo was of course involved in many more decisions than this from what the obstacles were likely to be and how they could be crossed, for example it very quickly became clear that the only way to get armour across many of the rivers was the use of the M3 Amphibious Rig. SO3 Geo at 1 (UK) Armoured Division, Captain (now Major) Bell, also had to quickly become the expert on meteorology and how this might effect any operations, an issue that was to continue throughout the land campaign. The eventual campaign plan is shown in figure 1.

¹ Although A/Captain Girling from 14 Geographic Squadron was still deployed at this date he was undertaking a non-Geo role

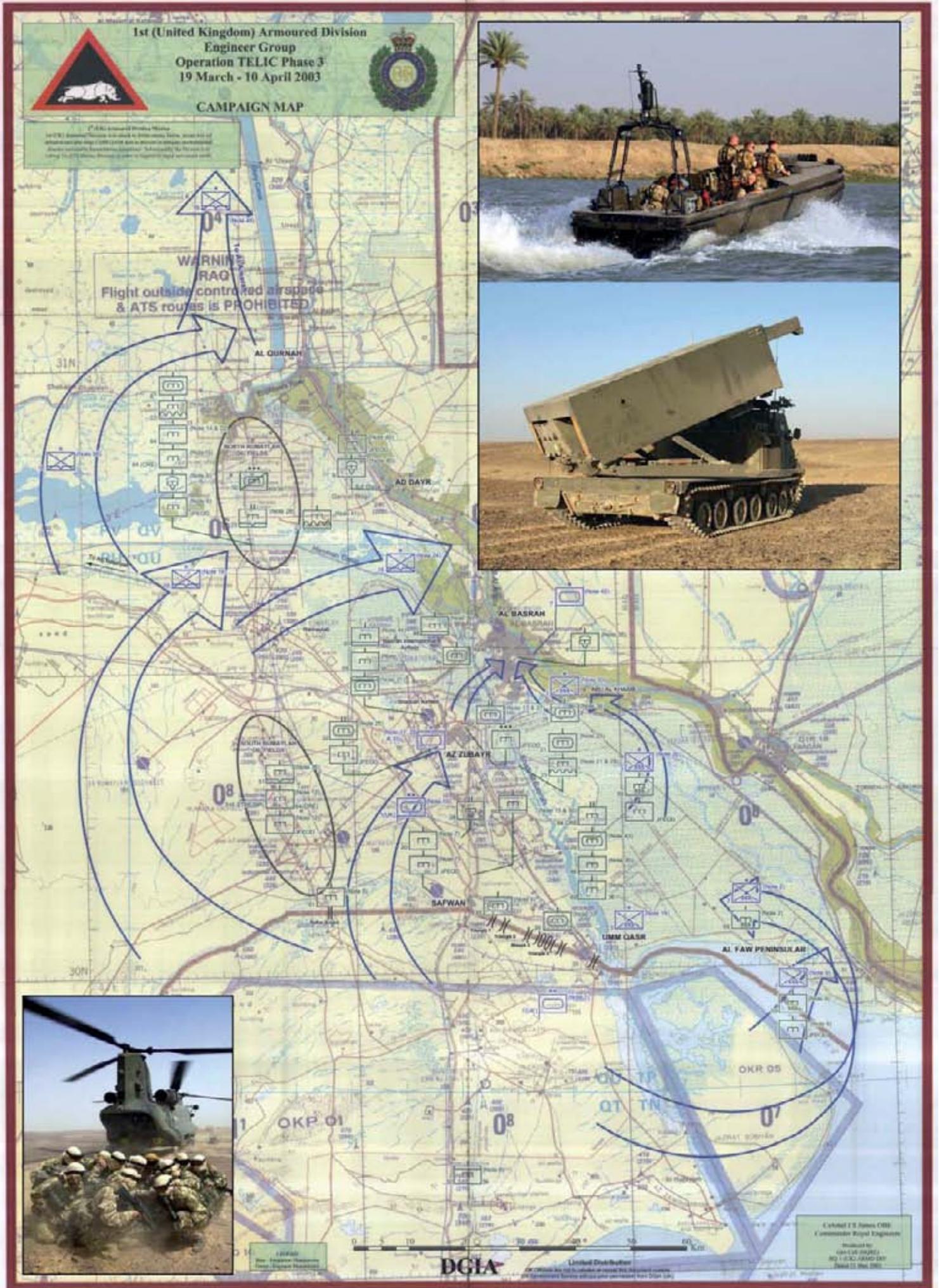


Figure 1 - Op TELIC Campaign Map.



Figure 2 - Diverse locations of Geo Detachments. From living in fireproof suits on HMS Ocean (Sgt Bowden and Spr Morrison) to undertaking 16 Air Assault Brigade's favourite past time of posing in Iraq (Spr Day, Sgt Conetta, LCpl Weller and Spr Fitchett)².

Deployment/Build Up

Planning clearly never stops and was a focus of Geo support in and out of theatre throughout the campaign. The main Geo element to deploy was 14 Geographic Squadron, with 6 + 73 personnel and were placed OPCOM NCHQ. However Geo personnel from across the Regiment, including TA personnel from 135 Independent Geographic Squadron (V), were required to augment other organisations. The Joint Force Logistics Component (JFLogC), the UK Air Component (UKAC) and the Joint Force EOD Group (JFEOD Gp) all deployed with Geo personnel for the first time. The Brigades (3 Commando, 7 Armoured and 16 Air Assault) wanted more personnel as the one permanently allocated Geo Sergeant was clearly not capable of working 24/7 for a sustained period. The 7 Armoured Brigade Geo Sergeant who was undergoing his handover on posting was simply told by his Brigade Chief of Staff that he was not to leave hence giving his Brigade two Geo Sergeants, which for the type of manoeuvre warfare being fought proved very effective. Other organisations such as the Maritime Component and the UK staff at the Joint HQ were also all provided with augmentation from 42 Engineer Regiment (Geographic).

It was this phase where TELIC again imposed on my professional life. As 2IC 13 Geographic Squadron I was not given the glamorous task of going to war but was tasked with finding the majority of these augmentees. I would like to say that this was done in a scientific fashion with the best person selected for the appropriate job but such was the rush of new posts and the problems with having people suitably qualified that on one occasion in particular the person selected to deploy was simply the first lance corporal to walk past the office, a Lance Corporal Davies, who headed off to the Air Component HQ shortly after.



The build up of Forces in Kuwait was too much for the Iraqis to resist and it was during this time that a number of SCUD missile attacks took place and the Geo community for once did not miss out on the action. All attacks carried the extra element of the potential of a chemical weapons attack; they were looking for WMD after all, so the threat was considered reasonably high. This meant that the daily ritual of climbing in and out of NBC equipment had some meaning even if the abiding memory for many is the look on people's faces when respirators could not be found while the attack alarms were sounding. This was generally met in true Army fashion with ridicule rather than concern.

Figure 3 - 14 Geographic Squadron during another SCUD attack.

² Where are they now? Sgt Bowden will shortly be WO1 Bowden, Spr Morrison is now a Lieutenant, Spr Day is now a Cpl, Sgt Conetta is now WO1(RSM) Conetta, LCpl Weller is a Sgt and Spr Fitchett is now also a Lieutenant.

Another part of Geo support that is often overlooked in the so-called digital world was the distribution of hard copy maps. The key question for commanders was have all units received their maps? Units could clearly not cross the line of departure without them. Captain (now Major) Rogers in the NCHQ was intimately involved with this throughout his deployment. The Defence Geographic Centre (DGC) produced over 5 million maps and the right ones had to be delivered into the hands of the right section commanders before an advance could start. The fact that originally an approach from Turkey had been planned did not help the situation. The maps, carefully managed by a knowledgeable team, did make it to the start line on time, unlike a number of other logistically controlled assets!

War Fighting

By the time all units were in position and the invasion was due to start the Geo structure looked like that shown in figure 4. At this point there were Geo personnel deployed in six countries (Kuwait, Qatar, Bahrain, Turkey, Cyprus and Jordan) and all this effort was coordinated by the Chief Geographic Officer (CGO), Lieutenant Colonel Kedar from the NCHQ in Qatar.

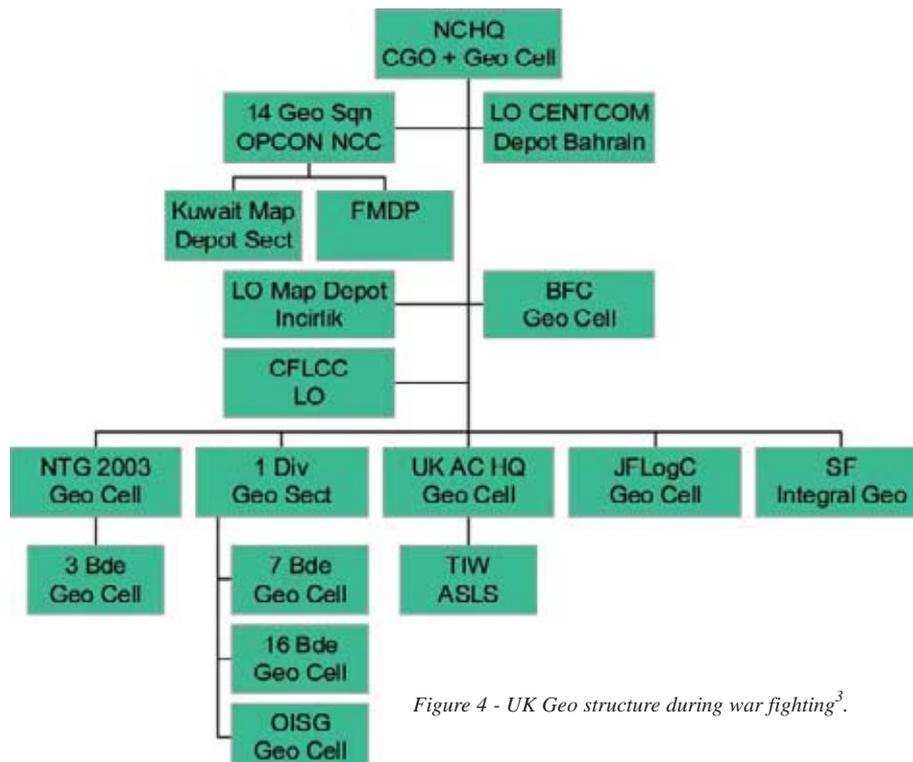


Figure 4 - UK Geo structure during war fighting³.

The lead up to the main operation as so often with Geo was the busiest period and once the maps were produced and distributed and the planning firmed up there was a slight lull in output as the actual invasion took place. This did not last long and the Geo personnel across the area of operations from Coalition HQ in Al Udiid to the guys living in shell scrapes with the Brigades contributed more to an operation than ever before. Towards the end of war fighting in Basrah this even saw a precursor to what is now standard practice in Afghanistan of Geo personnel deploying forward to Battle Groups for the more complex urban operations involved with the securing of Basrah City.

With war fighting operations called to an end on the 1st of May 2003, the main effort was a switch to rebuilding the country although, as we know now, a rush to get troops out and home may not have been the best way to do this! 14 Squadron had moved into Iraq and finally settled down in Shaibah for the wait to go home, ending up moving much of their equipment to Basrah Airport in support of the Division HQ.

Awards for the efforts of the Geo guys across theatre were received with an MBE for WO2 Underhill and QCVS's for Captain Bell and Sergeant McCurry.

³ The less common abbreviations in this Figure are as follows: NCHQ – National Component HQ; FMDP – Forward Map Distribution Point; BFC – British Forces Cyprus; CFLCC – Combined Forces Land Component Command; NTG – Naval Task Group; UK ACHQ – UK Air Component HQ; TIW – Tactical Imint Wing; ASLS – Air Survey Liaison Section; OISG – Operational Intelligence Support Group.

TELIC 2 - Peace Support

TELIC 2 saw the handover between 1 and 3 Divisions as the Multi National Division (South East) - MND(SE) - and with it the change of Division Geo Cell. In the same time frame 14 Geographic Squadron were replaced with a Troop of 30 personnel from 13 Geographic Squadron led by Lieutenant Hodges (now retired) and WO2 (now Captain) Rudd. However the war was 'won' and Geo work was not what it once was and Lieutenant Hodges was soon employed as SO3 Water in the Engineer Branch and after a month of oiling himself up to improve his tan and sufficient time to get his medal WO2 Rudd came back to the UK and the Geo element on TELIC very much became an integral part of the Division Engineer Branch. Although it did crucially keep its own account at the NAAFI for buying beer and a reefer (refrigerated container somehow acquired from the Americans by 14 Squadron) for keeping it cool.

Reconstruction and Development (R&D) was the name of the game during this period and in particular getting the essential services up and running. As such many of the key products related to these essential services and one of which was the power line mapping.

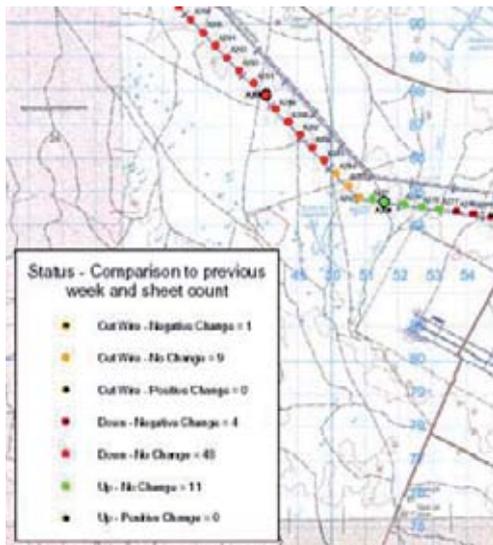


Figure 5 - Detail from one section of Power Line Study.

Getting power distributed across Iraq was an enormous undertaking, the infrastructure was fragile even before the bombing involved with the war fighting and getting power lines up was a high priority. However, the cables used were worth a lot of money and the locals had a tendency to take down the wiring as quickly as it was erected. An added issue around Basrah was the feeling that all connecting Basrah to Baghdad would do is take power away from them to the capital. This was something that under Saddam was standard practice, so the locals were wary and there was little chance of them complaining too much. From this came a task to

try and predict where the next attack might take place and the product would also double up to show how much progress was being made on construction. The pylon survey was born. Each pylon was numbered, all 1150 of them split between a line running North towards Al Kut and one running North West towards Nasiriyah. A regular helicopter flight was taken by one of the Geo cell to assess if the pylon was up and if the cable was still in place. To start with this provided a nice break from the office and a chance to fly around Iraq in a helicopter but the novelty of doing it 2-3 times a week wore off after a number of months. The now sadly deceased Corporal Wenham received a GOC's Commendation for his work on this project.



Figure 6 - Soldiers from 37 Squadron RE use a Chinook helicopter to lower a repaired pylon back into place outside Az Zubayr. 19 February 2004.

Peace Support – Towards Counter-Insurgency (COIN)

My next personal Iraq experience was when I was deployed to carry out the SO3 Geo post in MND(SE). This was in March 04 (approximately mid-TELIC 3) and the above pylon tasking was in full motion and peace support/redevelopment was still the plan; by the time I left in August 04 (approx mid TELIC 4) the starting of what would become a fully blown COIN operation were well under way. Many people will think of the Iraq conflict as the IED and IDF hell it became or the war fighting phase it started off as, but there was undoubtedly a pause where life while although not exactly comfortable, was not that dangerous. For example, at one point Virgin Atlantic jumbo jets were flying in to take troops home but unfortunately the RAF had taken on the route by the time I arrived with all the customer-focussed service that entails. I was however able to drive in a convoy of two normal white fleet Land Rover Discoveries and four Geo blokes from Al Muthana, through Al Nasariya via the Basrah Airport and on to Kuwait without even thinking about it. The most dangerous part of any journey was passing US convoys who insisted on pointing M60s at us at all times. Within a few years you would avoid going down town except in an armoured vehicle and only C-130 Hercules with Defence Aid Suites were taking personnel in or out of Basrah airport.

By my arrival the Division HQ was very much Multi-National as although the main elements were British, a number of nationalities filled posts throughout the HQ. The main front line units were British, looking after Basrah and Al Amarah but there was also an Italian Brigade with Romanian reinforcements in Nasariya with integral Italian Geo support and a Dutch Battle Group in Al Muthana also with their own integral Geo support. UK Geo was only based at the Divisional HQ at Basrah Airport and with the Brigade HQ in Basrah Palace. The foreign component certainly made life interesting; of particular note is one visit to the Italians for Sunday lunch during which free sparkling wine was available on the table, it seemed rude not to partake and anyway the Chinook pilot was going to do the drive home.

Geo support was much as it is now and concentrated on delivery of imagery and mission specific mapping products for operations. At this stage of the Op there was considerable focus on supporting the reconstruction and development effort, hence numerous infrastructure maps showing the water, oil and power infrastructure.



Figure 7 - Subset of a typical infrastructure map.

TELIC 2 had seen deployment of a new digital pre-press and platesetter for use with medium format press, this had not gone hugely successfully and the platesetter spent a large amount of TELIC 2 and 3 unserviceable. However delivery of new capability into the field rarely goes smoothly and once up and running this provided an excellent way to print rapid turn-around products, even if due to the heat printing was often only possible at night.

One consequence of the inability of production in the field was that DGC were increasingly used to turnaround products rapidly. The now ubiquitous spot maps (see box below) in particular were often required at short notice. Originally sent back as a CD, often accompanied by an individual to guarantee delivery, later they were e-mailed back to PJHQ for onward transmission. This excellent support from DGC to Ops and close interaction between the deployed Geo Officer and the DGC Ops team has continued to improve on recent Ops and although much Geo support cannot be rear based as interaction with the customer is essential, DGC have very much become an Op based organisation as is continually proved in Afghanistan now.

Spot Maps: Modern Maps for a Modern War

Spot Maps use dots (spots) on a map that are colour coded and numbered to allow users on the ground to easily and quickly reference their location without the need to give a grid reference, to aid this the spots are positioned on main junctions, key features or known vulnerable points. As such when moving or under contact a patrol commander can simply say “moving from Red 5 to Red 6” or “contact at Green 17 ...” rather than having to take the time to accurately determine a grid reference. In Afghanistan this technique has progressed and all compounds are given a unique alpha-numeric reference again to allow quick easy communication between those on the ground, ops rooms and supporting assets such as air or aviation, although accurate grids are still required for targeting purposes.

Move to Provincial Iraqi Control

The aim all along on TELIC was to hand responsibility of running the country back to the Iraqis and one of the Geo roles in this was providing the country with a geographic reference system similar to that available in the UK. This was a Coalition directed operation and the UK role was to survey in a number of points across RC(S). Hence the Iraqi Geospatial Reference System (IGRS) task was born and in early 2005 a joint UK and US troop deployed out into the desert to first build suitable concrete monuments with a survey nail (which for some reason the Iraqis seemed to want to steal) in them and then carry out the actual survey. This offered a rare chance for Geo personnel, mostly sourced from 13 Geographic Squadron, to deploy for an extended period outside the confines of camp. There were very real force protection issues to consider but the survey was designed to avoid the high risk areas and mostly took place in the empty desert in Al Muthana. An extremely successful 'old school' survey task was carried out and the results passed up via the Americans to the fledging Iraqi Survey Department. Afghanistan needs a similar job but I see little chance given the current security situation of being able to drive around in three soft skin vehicles and carrying out 8-hour survey observations.

The situation in Iraq was never stable for long and while in some areas the security condition improved and the provinces of Al Muthanna and Dhi Qar were handed over to Iraqi control in late 2006, the situation in Basrah remained far from stable. This led to 19 Light Brigade instigating Op SINBAD, a comprehensive operation which intertwined reconstruction with the development of the Iraqi Security Forces within 22 districts of the City over a period of three months. This undoubtedly had an effect, although not a lasting one, on security in Basrah. At one point this included the largest single coordinated Brigade action since the invasion and of course, led to another surge in Geo requirements. Mission specific imagery products of target areas were in particular high demand. This period also saw the Geo manpower reduce from, 1+10 to 1+5 with the HQ 3 Division Geo Cell covering the beginning of this period, led by Captain (now Major) Stuart Fairmington, and a happy bunch they look in Figure 8. He, however, handed over to Captain (now Major) Matt Smith for the majority of 19 Brigade's time.



Figure 8 - HQ MND(SE) Geo Cell TELIC 9.

On the 16th of December 2007 Basrah itself was handed over to Iraqi control and the UK forces moved towards simply proving overwatch. Operation Charge of the Knights starting in March 2008 was to be a real test of this principle. An Iraqi Division from the North was moved down to clear out Basrah of insurgent activity. This led to a flurry of activity as Geo provision was provided to not just UK forces carrying out their mentoring role but also the US forces that came with the Iraqi Division from Baghdad. After this operation the roles of the Military Integrated Training Teams (MITTs) increased considerably and a surge of mentors was sent out. This in turn led to the reoccupation of a number of sites in downtown Basrah with UK forces and all the force protection measures this required. One of the products produced to give the personnel occupying what were often fairly small locations was extremely detailed viewsheds. With the delivery of LIDAR data into theatre it was finally possible to take an accurate consideration of buildings effect on line of site. The product shown at Figure 9 shows what is visible from the roof of a joint Iraq and UK control centre in Basrah. Similar products were also produced to show from what buildings activities in the vehicle park could be seen.

Charge of the Knights proved that the Iraqis could manage their own affairs, although the support provided by the UK and US forces was essential for success. It also set the conditions for the final withdrawal of UK forces. Basrah was now a relatively stable location run by the rule of law rather than militias and corrupt policemen, no one claimed it was perfect but it was an improvement from pre-invasion. The UK handed over command of MND(SE) to the US on the 31st of March 2009⁴ and the last combat operation was carried on the 11th of May 09 which saw a convoy of 93 vehicles cross into Kuwait, as you would expect this final operation was supported by mapping and imagery. The UK has left behind a few personnel carrying out training and staff functions across the country but in general the job was considered done and focus has now rightly moved to Afghanistan.

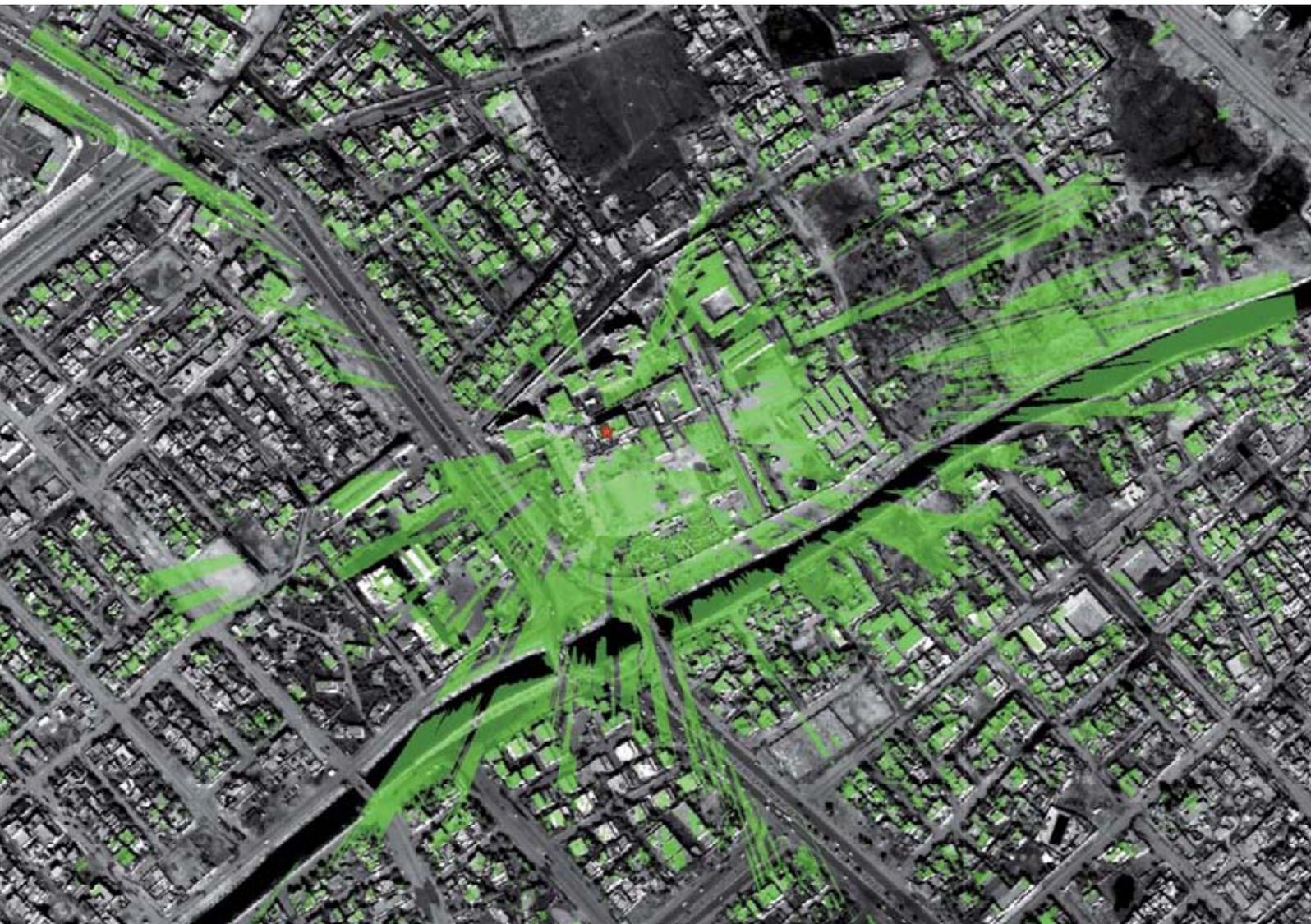


Figure 9 - Visibility from roof of PJCC Basrah (Green is visible).

⁴ The US amalgamated MND(SE) and MND(Centre) under One Command MND(South) at this point, the HQ of which was based at the COB Basrah.

I have not mentioned every aspect of the Geo campaign, for example there was always a permanent detachment supporting the Special Forces on their long deployment. There were also the brave souls who had to withstand the rigours of living in a 2-bed apartment in Bahrain in order to provide a UK link into the US map supply system. Their main issue seems to have been to constantly solve the issue of what they could possibly spend their extra £74 a day on! They actually provided an extremely useful link into both hardcopy mapping and satellite imagery from US sources and the Map Depot representative only departed in early 2009 (once the depot had moved to Kuwait and the allowances had stopped!). We also had the ASLS/TIW⁵ detachment who made numerous trips into theatre from TELIC 1 onwards, often having to go diving in Oman while waiting for the ageing Canberra aircraft to become serviceable, an extremely tough life.

To give an indication of Geo support over the years the table below shows approximate numbers of personnel committed to OP TELIC over the time frame and the corresponding numbers of UK Geo support provided in theatre.

Time Frame	Total Number UK Tps	No of Geo Personnel
Peak During Major Combat	46,000	128
Ops Mar 2003 ⁶		
End May 2003	18,000	28
End May 2004	8,600	19
End of May 2005	8,500	15
End of May 2006	7,200	11
End of May 2007	5,500	6
End of May 2008 ⁷	4,100	6
End of May 2009	<500	1 ⁸

Table 1: Number of UK troops and Geo personnel deployed on OP TELIC

IED & IDF Battle

The aim of the counter Improvised Explosive Device (IED) and Indirect Fire (IDF) battle is to allow the Coalition forces the freedom to operate across their Area of Operations while reducing the number of casualties. Figure 10 shows how deaths from various enemy action built up to reach its worst in 2007⁹ before dropping markedly when control of Basrah was handed over to the Iraqi Army and UK forces were repositioned at the Contingency Operating Base (COB). As can be seen, from mid 2005 the main threat was from IEDs, numbers are skewed a bit by the multiple deaths caused when aircraft are shot down. An overall indication of casualties by type is given in Figure 11.

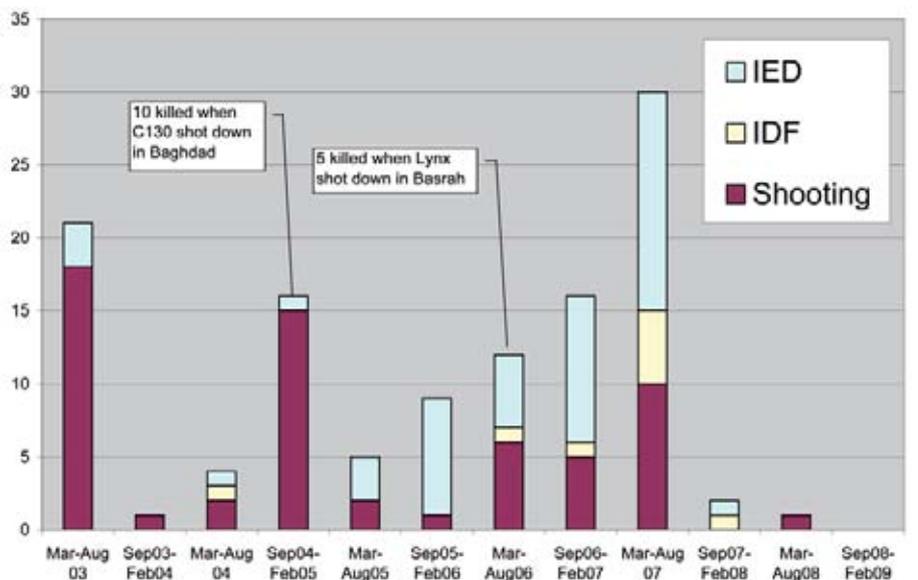


Figure 10 - UK fatalities due to enemy action.

⁵ Air Survey Liaison Section/Tactical Imagery Wing – A team supporting Tactical Recce based at RAF Marham.

⁶ Includes all deployed on or in support of TELIC 1 across the region (i.e. Qatar, Kuwait, Jordan, Turkey, Bahrain, at Sea).

⁷ In Southern Iraq.

⁸ Geo JNCO was based in Kuwait by end May 09.

⁹ It should be noted that casualties due to accidents are not included in these figures, for example the crashing of two helicopters and a number of friendly fire incidents particularly during TELIC 1 are not included.

IDF attacks had been a fact of life on the COB since TELIC 3 (2004) but were treated as fairly harmless at that stage; this was not to be the case later on. Real interest was sparked when a strike on the COB killed three RAF personnel in one incident in July 2007; from then on force protection became a big issue. At figure 12 is a so called splash map from a four month period 1 December 07 – 23 March 08, during which time there were 274 rocket/mortar impacts in and around the COB. The problems this caused led to the installation of Royal Navy close protection Phalanx guns onto the FOB, figure 13 shows one in action. Not something you might think would involve the Geo world but it did in two ways. Firstly a survey team was required to accurately position the weapon system and secondly the guns only had a limited range and certain arc over which they could detect incoming projectiles so a number of planning/briefing maps were produced by the Geo cell to show what areas were covered and from what direction, these maps remain classified.

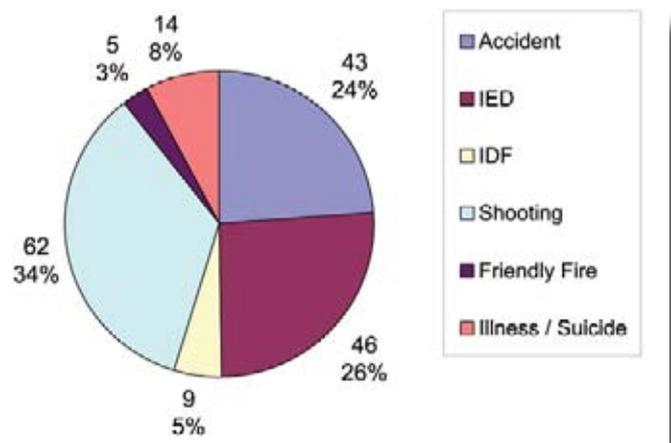


Figure 11 – UK fatalities OP TELIC.

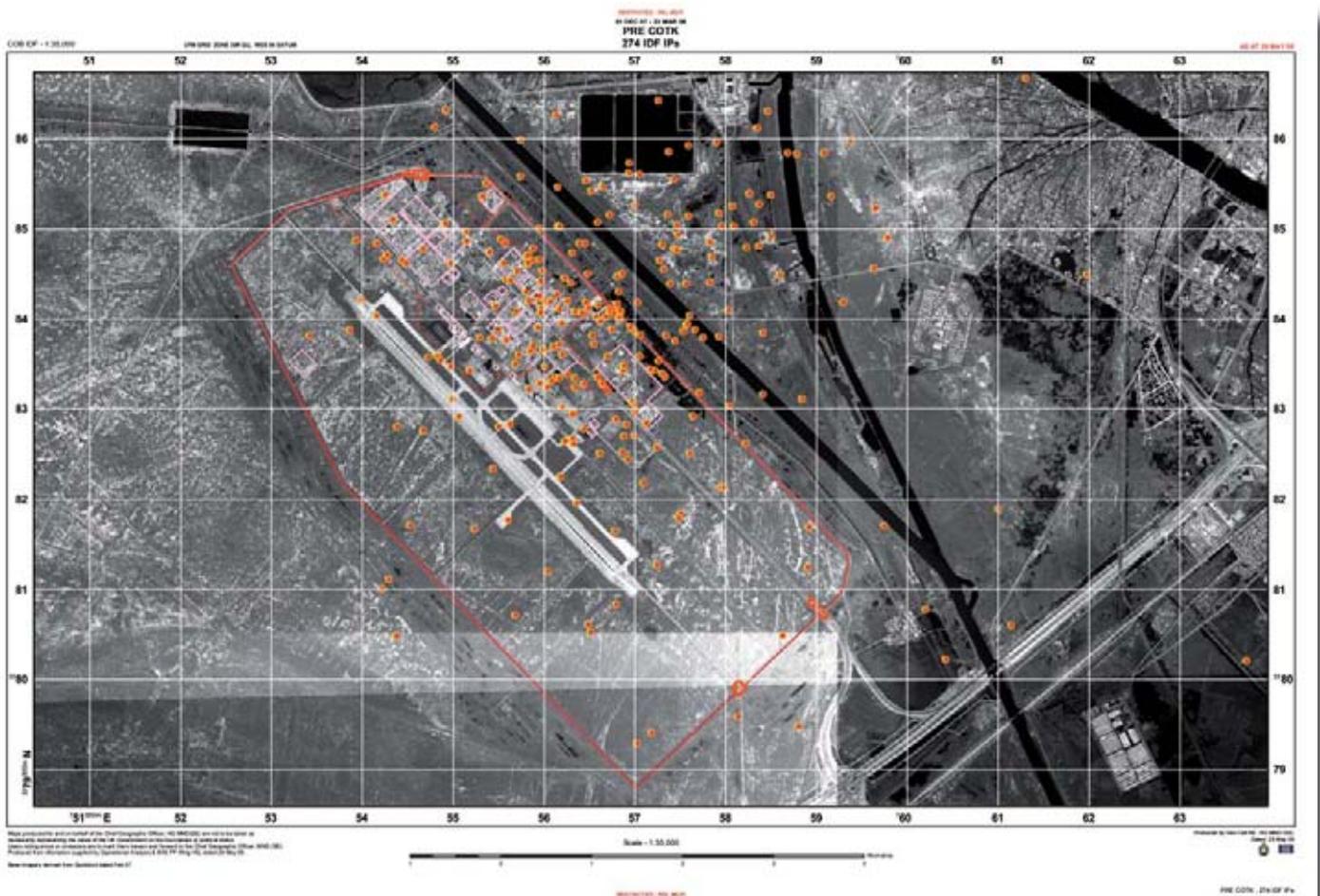


Figure 12 – IDF impact map Basrah COB 1 Dec 07 – 23 Mar 08.

As well as defensive measures to counter IDF attacks, offensive measures were put in place and this included the locating of an AS90 battery at immediate notice in the COB. This was linked to weapon locating radar to identify the source of the attack. These required traditional survey support but also led to the development of the Artillery shooting map. In effect the shooting map gave the Gunners information on where they could fire without having eyes on the target. If the weapon locating radar identified a firing point within the 'go' area, shown in Blue on figure 14, then the battery was allowed to return fire without the requirement to confirm the target by other means. It used criteria such as accuracy of the guns, which of course decreases with distance from the gun line, and the amount of built up areas and infrastructure to determine the risk of collateral damage. The product was originally developed in theatre, passed to JARIC and finally found a home at DGC



Figure 13 – Phalanx gun in action Basrah COB 2008.

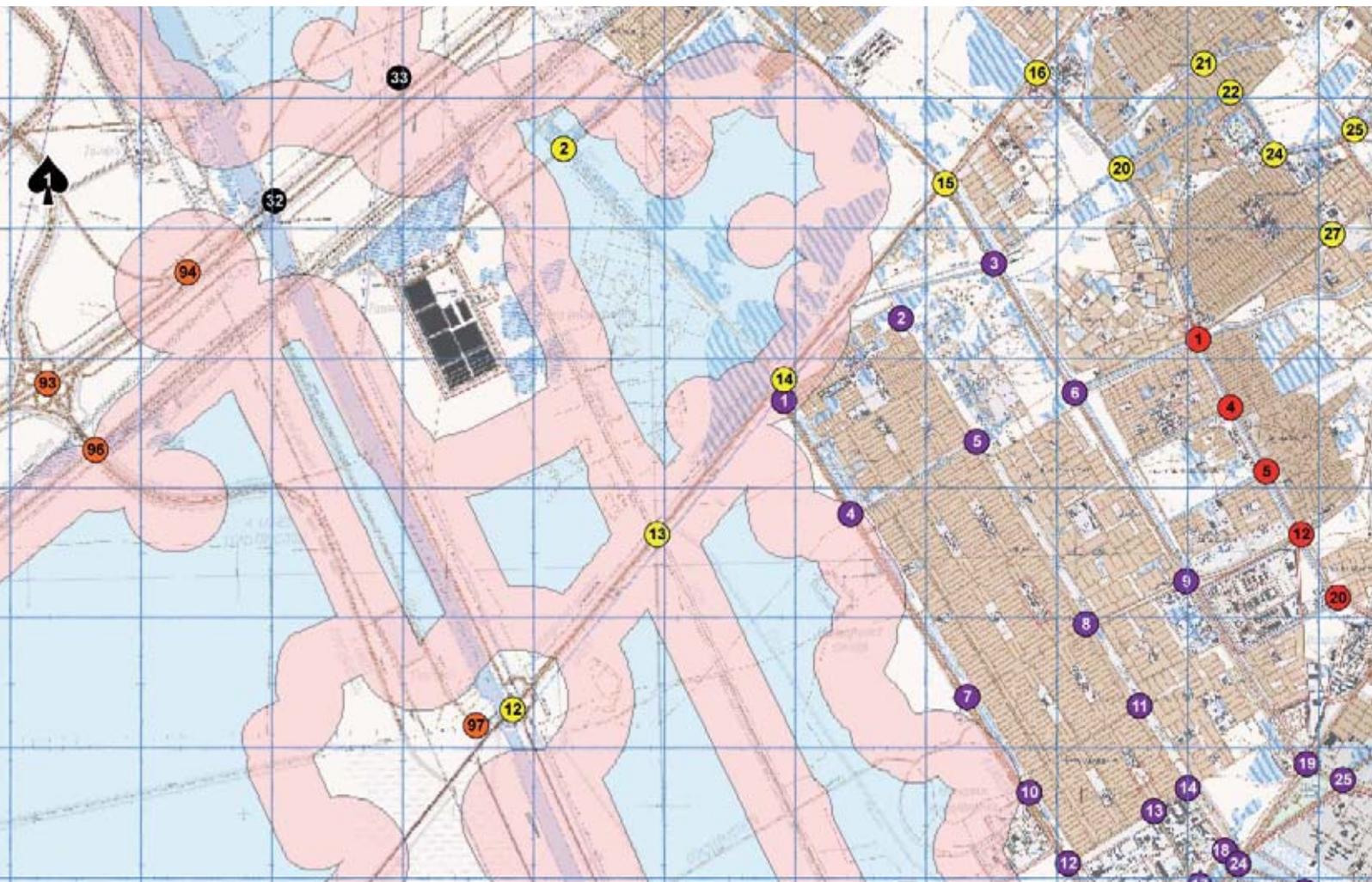


Figure 14 – Basrah shooting map.

who would regularly update it and distribute it back to theatre. The currency of the information was critical and the Divisional rules of engagement stated that the product had to be derived from imagery no more than 90 days old.

The other threat that was always relevant in Iraq but built up from June 2005 onwards was the threat of IED attacks. The Geo response to this was to get really serious about urban Intelligence Preparation of the Environment (IPE). Traditional Intelligence Preparation of the Battlefield (IPB) considers urban areas to be restricted or very restricted for mobility and moves on; this clearly is not suitable when the majority of the insurgency is urban based as in Iraq. Firstly this led to a much more detailed study of the routes in and around Basrah; where could you drive a Warrior, where could you turn it round, which buildings gave an overview of UK bases, etc. Figure 15 shows a product giving the road widths in an urban area North East of Basrah City. In this case red depicted road widths less than 5 m, Orange road width of 5-10 m and finally Green as widths over 10 m. In a similar way to traditional IPB, this would give armoured commanders a feel for the ability to manoeuvre their vehicles in and out of locations.

IPE involves more than just physical terrain and products were introduced that showed not only past incidents to build up a pattern but also the suspected loyalties of certain areas to various Iraqi factions, thus giving an indication of how high a risk one area was to another. JARIC became increasingly involved with the IED battle and would assess routes in and out of Basrah and attempt to predict the next attack, not just using imagery but also taking into account the insurgents tactics. This would lead to certain areas being designated as 'no-go' until they had been investigated in more detail. There were some successes but it is difficult to know if we were really winning the Counter IED battle as the significant decrease in casualties also coincided with the re-positioning of UK forces. We may not have that opportunity in Afghanistan and it is worth noting that the worst month in the entire Iraqi campaign for IED fatalities was April 2006 when six personnel were killed; this is now regularly exceeded in Afghanistan.



Figure 15 – Road width analysis Al Latif.

The End. For Now.

With Basrah handed over to the Iraqis and the vast majority of UK forces located in the COB, the beginning of the end of UK involvement in Iraq had led to disbanding the SO3 Geo (or for those who like grander titles UK Chief Geographic Officer) post. Captain Andy Hill thus returned in April 08, thinking he had got away with a very short tour. However, the plan was soon changed and clearly the loss of Captain Hill had been too much for the HQ to bear and he was given time to return to Germany move his family back to the UK in preparation for his next job and then redeploy to Iraq to finish off his six months. He was then replaced by Captain Gary Payne and it was left to our New Zealand import to finalise the closing of the Geo cell in Iraq.

As with much of the campaign, the close down of the COB was fraught with unknowns including the threat that the Iraqi Government was not going to sign a Status of Forces Agreement (SOFA) effectively leaving the UK forces with no legal right to operate in the country. This led to some frantic contingency planning to deliver an option to pull all personnel and kit out in three weeks rather than have the orderly end of mission that was hoped for. While most of the mentoring responsibilities were handed over from UK to US forces, the stock from the map store was in fact handed directly to the Iraqi 14th Division, all 140,000 copies of various products. Captain Payne finally returned to the UK on the 1st of April 09 having handed over to the US 10 Mountain Division Terrain Team and the role of a UK Chief Geo left with him. The table below shows the illustrious bunch that have filled this appointment since OP TELIC started. The Brigade Geo Sergeant and a couple of technicians did stay behind to deliver any final Geo support requirements for the recovery of equipment and the final personnel from theatre. Lance Corporal Gardner finally returned, after a period in Kuwait, to 14 Squadron on the 30th of June 2009 and Geo's deployment in the Gulf was over.¹⁰

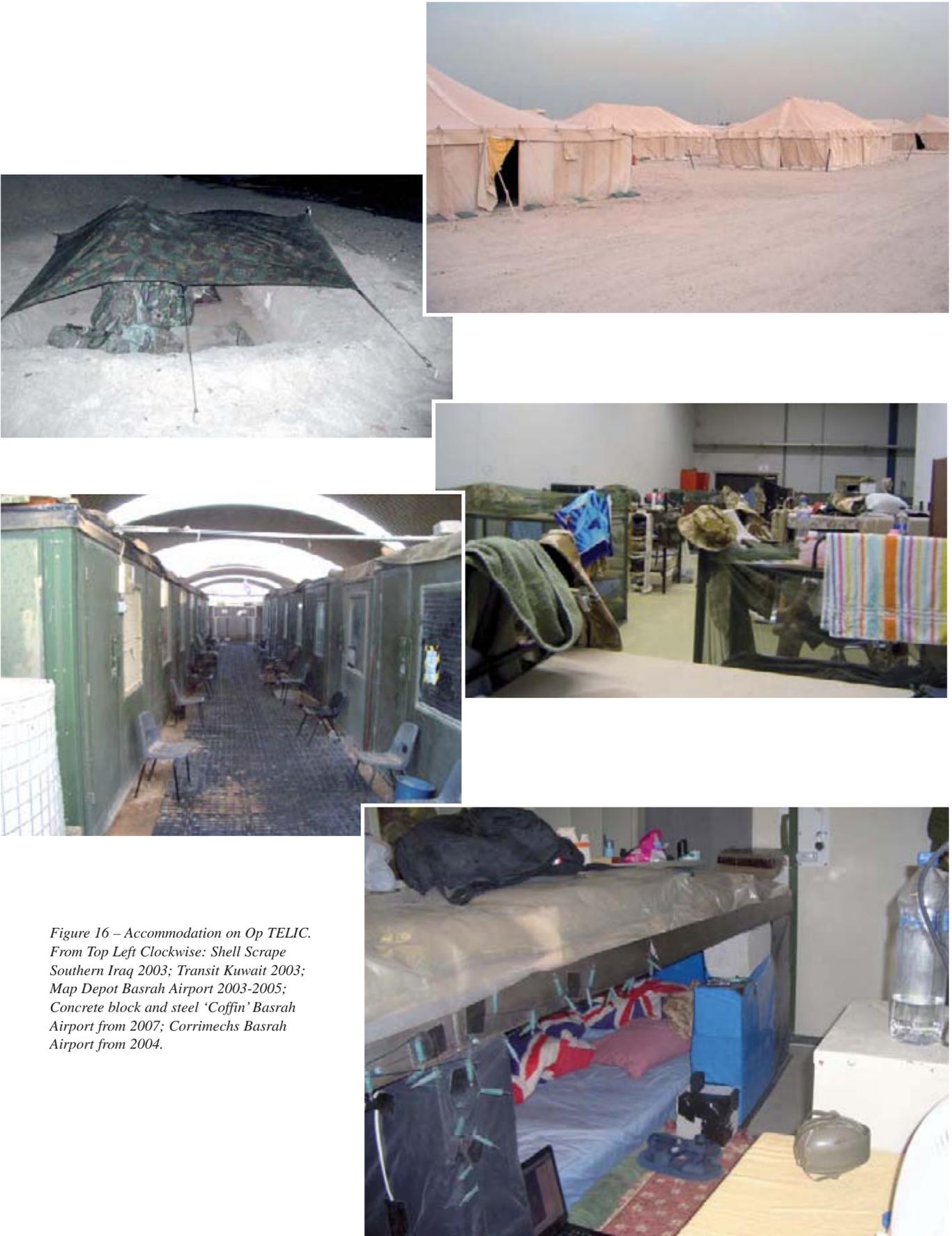
UK Chief Geographic Officers OP TELIC

Name	Unit Deployed From	Approx Dates
Lieutenant Colonel Kedar	42 Engineer Regiment	Jan 03 – May 03
Captain Bell	HQ 1(UK) Division	May 03 – Jun 03 (in theatre from Feb 03)
Major Blunt	HQ 3(UK) Division	Jun 03 – Dec 03
Captain Arnison	16 Geographic Support Squadron	Dec 03 – Mar 04
Captain MacMillan	13 Geographic Squadron	Mar 04 – Aug 04
Captain Chapman	13 Geographic Squadron	Aug 04 – Jan 05
Captain Denham	HQ 1(UK) Division	Jan 05 – Mar 05
Captain Hammet	16 Geographic Support Squadron	Mar 05 – Jul 05
Captain York	16 Geographic Support Squadron	Jul 05 – Sep 05
Captain Foad	13 Geographic Squadron	Sep 05 – Jan 06
Captain Denham	HQ 1 (UK) Division	Jan 06 – Jul 06
Captain Fairnington	HQ 3 (UK) Division	Jul 06 – Jan 07
Captain Smith	JARIC	Jan 07 – Jul 07
Captain Calderwood	HQ 1 (UK) Division	Jul 07 – Sep 07
Captain Guest	HQ 1 (UK) Division	Sep 07 – Feb 08
Captain Hill	14 Geographic Squadron	Feb 08 – May 08 Jul 08 – Sep 08
Captain Payne	16 Geographic Support Squadron	Sep 08 – Apr 09

¹⁰ LCpl Gardner also did a short tour and unlike Capt Hill who returned to Iraq we turned LCpl Gardner round relatively rapidly and deployed him out to Afghanistan.

Living in Iraq

To hopefully bring back some happy memories for those involved, Figure 16 is a selection of photos showing the various accommodation facilities enjoyed by the Geo personnel on TELIC over the years.



*Figure 16 – Accommodation on Op TELIC.
From Top Left Clockwise: Shell Scrape
Southern Iraq 2003; Transit Kuwait 2003;
Map Depot Basrah Airport 2003-2005;
Concrete block and steel ‘Coffin’ Basrah
Airport from 2007; Corrimechs Basrah
Airport from 2004.*

Op Herrick Afghanistan: 2002 - ?

In 2002 British Forces deployed to Afghanistan and as we go to press the 12th roulement of Operation Herrick is in theatre, the 13th is training for deployment and the 14th is planned to take place in April 2011. The time to record Operation Herrick will be when it has been completed. However, the RE Geo involvement has continually increased throughout the campaign with Geo soldiers now operating at every level of command down to singleton technicians in Forward Operating Bases and Patrol Bases.

The following are excerpts from articles written by soldiers from 42 Engineer Regiment (Geo) for their regimental magazine. Each gives a flavour of what life is like for these young Geo soldiers.

I dismounted the Chinook Helicopter it was dark but it appeared that Main Operating Base (MOB) Lashkar Gah did not change much, even the flight path from Bastion seemed familiar. I arrived at the waiting area but there was no one there to meet me, that was not problem I left here two years ago and I remembered my way around. I took the route around via Grenade Alley the memories came rushing pack as I go past tent ten, which used to be home during Herrick 6. I arrive at the HQ and now I realised that a few things had in-fact changed, there was now a perimeter fence around the HQ, luckily I bumped into Frankie (LCpl Green).

The Counter-IED tasks vary from very interesting to slightly boring at times however, it is predominantly very interesting. The CIED Task Force brings together personnel from all three services, this is all part of a bigger plan to combat the IED incidents that are currently the number one killer in Helmand. Most of us were on the Brigade MRX so that made it a lot easier when I arrived because I knew most of the people I would be working with.

After a few weeks here we found out that we would be staging on in the Sangar, I must admit I was sort of looking forward to it as I was getting tired of the seeing the four corners of the camp walls. It seems not much has changed outside either, it looked almost the same as it did when I was here during the war on Herrick 7. The normal working day starts at 0800 and finishes at 2200 hrs, they are long days but there's work to be done. On Fridays we have a lie in and start work at 0900, but Saturday is the best day here luckily we get the football games on Sky, however when the Sky is not working we get stuck into the Newbury Weekly News.

Cpl 'Keva' Hackshaw, HQ Task Force Helmand (TFH), Counter-IED TF

So far I've been moved about through central Helmand, initially at Bastion, then up to the highest region we in TFH (Musa Qulah) which was freezing! Especially during a midnight sangar duty, even with four thick layers on making me look like the Michelin man. For anybody who thinks they have done team medic training for nothing it's far from the truth. There was a suicide bomber in the local village and it was hands on when local civilians came through the front gate. Anyway from Musa Qulah I eventually arrived in Lashkar Gah.

Battlegroup Babaji Patrol Base 2.

*LCpl 'Meerkat' Rogers,
HQ TFH*

During my time in Sangin I worked along side 2 RIFLES for the majority of my tour. The majority of work carried out in Sangin was the production of patrol mapping to help the lads on the ground. It was good to see that the work you were doing was being to put to good use and not going up on some officer's wall!





The 'Geo Office', Patrol Base 2.

sangar duties during the Afghan national elections after around 7 hours of on/off Indirect Fire, I put down around a 100 GPMG rounds onto a Taliban mortar position that was targeting the sangar position I was currently occupying. (At one point a mortar round landed 50m away, but even at that distance I was suffering from squeaky bum time!) That was the most exciting day during my tour.

LCpl 'Corky' Corcoran, Battlegroup (North), Sangin

After spending the first half of my tour in affluent and salubrious Lashkar Gah, I was 'lucky' enough to be transported back in time to Patrol Base Two. PB2 is in the heart of Helmand province and is the headquarters of the Babaji Battle Group. On my arrival in the patrol base I was not only informed that I was to provide geographic support but I would also have to actually build the patrol base! Needless to say Geo work took a back seat and the erection of tents took centre stage. It's not that often that we Geo get to work closely with the mainstream Sappers, luckily for me I was taken in by the lads of 23 Squadron RE and their courageous leader Lieutenant Dan "Turkish" "The Jazz" Hands (Ex Geo). The Sappers in PB2 were responsible for putting the infrastructure into the patrol base, much to the distaste of the Coldstream Guards who have to rely heavily on us for the small comforts in life such as plumbing!

With the patrol base built, it was time to get on with some of my primary trade, which unbeknown to me had been changed to Guardsman! The next 3 weeks or so were spent getting intimate with a GPMG and a sangar. This is not to say that I didn't get some Geo work done.

Geographic support has been provided to operations and rebuilding projects in the Babaji community, such as route Trident road build and establishing schools in the area. The work remains varied and interesting as one moment I am providing terrain analysis products to the Battlegroup Engineer and then the next moment I am printing out the Alphabet for a local school's wall! I have used the majority of the skills learnt on the ME Geo Class 1 course to cover the patrol base in signs!

LCPL 'Franky' Green, Battlegroup Babaji, Patrol Base 2

The facilities at Sangin are fairly basic with all washing carried out in the canal that runs through the centre of the Forward Operating Base (FOB). With an ICAT Helicopter being shot down 600m short of the FOB while flying over the green zone, in my time there fresh food was hard to come by. However, if you liked noodles and spam you were in for a treat as this was the only dinner we had for around 3 months, so forget the Atkins diet and try the Sangin Weight loss plan!

Guard Shifts were another highlight of my time at Sangin completing around 3 a week.

It was on one of these fateful



Inside the TACISYS at FOB Shawqat.

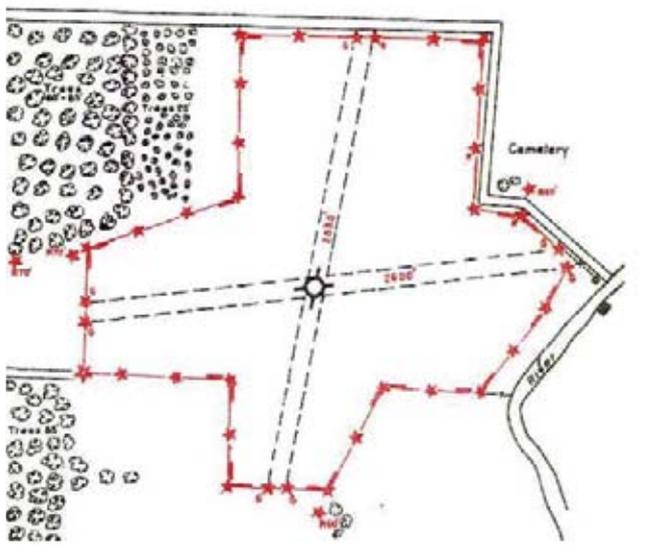


Chase The Dragon

By Wing Commander Charles Howard-Vyse

Wing Commander Charles Howard-Vyse has been Officer Commanding No 1 Aeronautical Information Documents Unit since September 2008. After his early tours as a Tornado navigator, he spent time in A3 and A7 staff tours, and in Kandahar. Here he offers a personal view of some of the big questions facing GIS in general, with illustrations from the air environment.

'Hic sunt dracones' (Here be dragons). A neat way of drawing a line under the knowledge of early cartographers, in this case The Lenox Globe dating from 1505. Some of the very earliest maps, from Ptolomy's Atlas in the 2nd century, and other Greco/ Roman/ Phoenician explorers, to the Ebstorf map of the 13th century, include weird and wonderful creatures on their peripheries: not just dragons but lions, elephants, and walruses all of which would have been fantastical and depicted the correct message of mystique and danger to the contemporary user.



An early schematic airfield chart.

We still use the same device today: a rather more prosaic 'unreliable data' shows we have our own cartographic limits, despite knowing where walrus live. Of course, maps and charts developed swiftly from the Renaissance onwards and were an integral cause and effect of the centuries of exploration, trade links and empire building that followed.

By the time brave people had sailed every way around the world and travelled laboriously to much of its land surface it was clearly time to move upwards and the era of air travel was born. The Wright brothers successfully flying along the beach at Kitty Hawk meant the whole industry of producing charts for use in the air could take off as well.

The greater speed of aircraft and the new visual perspective from on high soon invalidated the scale and the represented features of the early 20th century maps which had hitherto been fine for road and rail use. Flying at an altitude of 5,000 feet, a pilot can see more than 25,000 square miles of terrain and is drawn to different kinds of landmarks to navigate safely. With first the introduction, then increasing complexity, of navigation systems and beacons, air navigation took on distinct techniques and requirements. As early as 1926, in the USA

This Tornado GR4 taking off from Kandahar will have digital Air Information in its autopilot, ASRP imagery in its cockpit mapping unit and paper AI in its crew's pockets. MOD/Crown copyright.



at least, a standardised set of air information products was mandated by the US Congress. These included the 1:500k scale that has endured to this day, together with agreed representations of the types of information and relevant symbology. The standardisation of 1:1m and 1:250k scales was agreed in 1945. It is an interesting aside that although early air maps required faithfully accurate mapping of the ground topographic and cultural features, it was the need for increased coverage for use in the air that drove the ability to survey from the air. With today's satellite and aerial survey capability that has not changed either.

So what has changed recently? Much and yet little. The purpose of a chart has always been to inform. It offers the end user a means of verifying position and hence ascertaining direction of travel. It offers an increased awareness of the immediate environment which will bring associated decisions and actions. Today the information portrayed must still support those objectives but whereas the emphasis used to be on making the journey, the complexity of today's hazards and contingencies demand just as much about what is encountered on the way.

Requirements

The concept of displaying air information has not moved nearly as quickly as the development of the aircraft themselves or the supporting technology. The hand-drawing skills of the early cartographer (for 'early' read up to 1980's!) have finally been overtaken by the arrival of desktop publishing and there will soon be a further evolution as producers move to data-driven charting. Subjectively, this is only an evolutionary, not a revolutionary, step because the end result is pretty much what was being used by BOAC crews half a century ago. Until end users either ask for, or are happy with, a forced change in product design, progress will only be incremental. That is not a bad thing per se but today's society, and the military in particular, are not good at handling stability. While we may fear change, or hopefully embrace it, we often confuse stability for stagnation. Having a firm grip on a set of rigorously tested requirements will go some considerable way to making that equation balance.

Systems

There have been massive advances in printing techniques in recent years and the quality of bulk reproduction is at new levels. Additionally developments in ink technology, an area of research more interesting than it sounds, have enabled night vision friendly red ink giving direct operational benefit. The capabilities of digital copiers can be coupled with the versatility of software programs to produce powerful combinations of bespoke output at reasonable cost. There is a downside here: expectations have risen in line with a demand for more and more information. The ready distribution of high quality printed material has also engendered a mindset of disposability and there is a real risk that commanders and end users only see the tip of the process iceberg (where the walrus live).

All air systems, even unmanned ones, require Air Information. MOD/Crown copyright.



Another critical driver is that where once maps and charts used to inform people, now the same data also needs to inform systems. That brings a change in what is included, how it is used and what attributes are recorded, i.e. the metadata. For example, the high level charts that AIDU produce (at 1:1m, 1:2m and 1:5m scales) will shortly be produced from the same database which already feeds directly into Flight Management Systems in aircraft (the autopilot). This will be a welcome step forward since it: allows far better data configuration control, offers a seamless area of charting from which to pull sheetlines, is inherently easier to maintain quality assurance, allows a far quicker response to end user requirement changes, and there is a digital route to exchange data and hence products with Allied partners. However, the items visually represented on a chart overlap only partially, not completely, with the information the aircraft actually needs to fly around the sky. So in the interests of harmony and coherence of data we now have a significantly more complicated system to administer. It is also significantly more expensive and the offsetting benefits are not easy to quantify in cash equivalence.



The Ops room of HMS Nottingham, a Type 42 destroyer, is almost entirely paperless yet fuses vast quantities of data onscreen, including Air Information. MOD/Crown copyright.

Personnel

Who are today's cartographers? Are they a skilled draughtsman, or maybe well-versed in lithographic printing techniques, or are they adroit software coders with excellent GIS and data analysis skills? Increasingly, more of the latter. Is the military equipped to train our staff to these requirements? Or if we choose to augment our military capability with civilians are we prepared to pay for these skillsets from the market place? In terms of the overall business, the MOD has to decide if it can afford to assume the demand for GIS products will stay at a predictable level, in which case it might expect to draw down manpower in favour of systemic solutions to save money. Or the MOD might wish to accept that widespread availability of fundamental and essential information requires a degree of headroom in the business process which comes with a price. A first level analogy might be mobile phone usage: at a certain level of activity, the pay-as-you-go model becomes more expensive than the monthly contract.

Distribution of Maps and Charts

The default setting for distribution of Air Information (AI) over the past decades has been paper. Large folded pieces, small A5 loose leaves, ring bound volumes, glued perfect bound booklets, A4 folders full of it, much of it multicoloured, mostly double sided, all of it time consuming to produce and distribute. And then came the Internet. Hallelujah! Suddenly the concept of 'always available' did not have to mean 'always present on site'. Over a short time, AIDU has been able to move from an entirely 'push' distribution model to one where 'pull' from the Internet can be regarded as

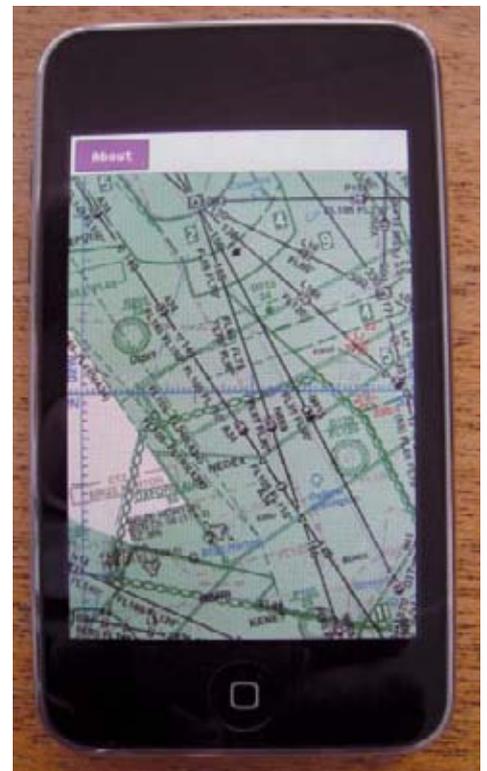
increasingly the norm. It is the same for you at home. You are likely to log on to Streetmap to check the postcodes for directions to a restaurant; you may go to RAC or AA routeplanner webpages for your next road trip; if moving house you might use estate agent links to satellite imagery to check the new neighbourhood. The clever thing here is that the end user is doing the work. But it is relevant, targeted, wanted work. There is no waste because the end users gets the information they need. They can choose to see certain layers of vector information, ignore other layers, and thereby get exactly what is needed. Mischievously, it might be considered that the concept of the end user in the aircrew world doing more work is not going to be easily accepted. However that is the future; it will mean more effort is required from the consumer, but the upside is more tailored choice.

Of course a piece of paper has a value. Often the physical format of a hard copy product carries a significant value in its own right: you can slip it into a handy flight suit pocket, you know all the pages are securely glued in, you can easily check the cover for the validity dates of the information therein, etc. What's more, the legacy platforms are not configured, and are not likely to get the investment, to move to a paperless environment. So straight away, it can be seen the paper will endure as a required distribution channel. However, where digital dissemination can assist the task in hand it must be embraced.

There are substantial fuel and handling costs to repeatedly flying with unused paper, so consider the capacity of a laptop hard drive or other hand held device – smart phone, iPad, electronic flight bag. That small box can store many hundreds of thousands of pages of data, or series of charts. A suitable front end to enable intelligent display of that data is now COTS stuff. Furthermore all these machines come with the communications connections to update any or all of the data contained, automatically, from any location. Using the latest mapping software it need only take the bandwidth it needs to process the changes, not the entire piece. It can allow users to actively research new information or allow them to be alerted when directed updates are received. Those are becoming compelling arguments for a closer look at the applicability of technology. To ensure balance in the discussion, it is right to check: what is the availability of the unit? How tough is your Toughbook tablet in the dust of Helmand, or your paper map during a rainy yomp through the Sierra Leone jungle? Which one needs extra lighting to use in the dark? How do you recharge the batteries if you run out of spares? If your glass-cockpit screen map goes u/s in an aircraft, have you got a bigger problem than knowing where you were a short time ago? From a producer's viewpoint what are the risks of incoherence of standards, or of interoperability with other equipment of users? Is the initial urge to open up a folded map something that can be functionally achieved on an 8 x 10inch screen?

There are other risks associated with the new technology purporting to take us to the broad sunlit uplands (no walrus there). For a start, how many of the maps produced in the last year on anything other than paper will be useable in 100 years time? Or even 15 years? There are landfill sites throughout the country filled with 5 ¼ in floppy discs, VHS video tapes, and other good ideas whose time has past. The average military officer is usually all too keen and eager to adopt the new and latest ideas, but there are huge penalties if you back the wrong technological horse or fall for the slick patter of salesmen with excessive tie-ins or whose R&D departments have not quite kept up with the corporate vision. Even at the foundation data layer, just because you can doesn't mean you should - we must all beware mission creep. We must also beware investing all our energies in replicating with technology what we have already ('doing things better') rather than properly harnessing the power of what is available ('doing better things').

There is no single answer to all of those risks and areas of concern. It is not possible to produce a single solution that is optimum in all respects. What is clear though is that there are many situations where better solutions are available in many respects. Adopting them will require several things to happen. Firstly a sea change from users about the way they consume GIS/ Aero Info. Secondly, some rebalancing of the MOD's risk equation which is sufficiently conservative to reduce our opportunity to really benefit from possible advances (that is spin-speak for 'save money'). Both are difficult tasks, but both are possible if those of us who do this for a living undertake the journey. Even if it is into 'dragon-territory'.



This technical demonstrator from BAE Systems shows that traditional air charts can be successfully displayed on iPods.



The Fleet HM Unit – One Year On!

By Lieutenant Becca Martin RN

One of the primary duties of the HM Mobile Teams is to provide HM manning for the duty Towed Array Patrol Ship (TAPS). One officer and one rating are permanently at 48 hours notice to join the TAPS frigate to provide environmental expertise in an anti-submarine warfare (ASW) scenario. During the past year the team has been called on four times, on each occasion providing valuable support to the Command in a live ASW environment. Regular training courses also take place to qualify personnel to undertake these duties, overseen by Flag Officer Sea Training (HM).

The Teams also support the Atlantic Patrol Task (North) deployment, which has the combined aims of providing disaster relief for the Caribbean during the hurricane season and of working in conjunction with a number of local authorities to counteract drug smuggling in the region. As well as providing aviation forecasting and tactical environmental advice to the Command, the embarked HM Mobile Team is capable of conducting short notice surveys of hurricane-hit harbours and waterways to ensure shipping can transit safely. This assists in returning the harbours to a working state as quickly as possible, further aiding the disaster relief process.

HM Mobile Team personnel normally deploy on most major exercises. The *Taurus 09* deployment to the Mediterranean and Far East was the largest deployment the Royal Navy had undertaken in several years and had a significant HM Mobile Teams presence augmenting the permanent HM personnel. Lieutenant Andy Taylor, assisted by Naval Airman John Collinge, provided environmental support to the fleet throughout all phases of the exercise and gave tailored ASW advice to the frigates. Dividing their time between four different ships they also provided aviation support and sonar range prediction for the embarked Merlin ASW helicopters. Elsewhere in the task group, Petty Officer Paul Railton and Lieutenant Ben Barrett on board *HMS Bulwark* liaised with the rest of the deployed HM cadre to provide face to face environmental advice and tactical support to the Commander Amphibious Task Group (COMATG).

The Teams, depending on the operational requirement, undertake a variety of other ad hoc tasks. Lieutenant Andy Patrick has just returned from a deployment in the Arabian Gulf in support of the Mine Warfare Battle Staff (MWBS) and the Mine Counter Measures Vessels (MCMVs). His primary purpose was to create route survey tasking for the ships during operations and exercises in the area, applying environmental knowledge to ensure the most suitable areas are covered at the right time. This work included liaising with the US Navy Mine Warfare Staff to ensure deconfliction in tasking but also to achieve a joint operating picture. In addition he provided the basic services expected of an HM; weather forecasts and tactical analysis of the environment, allowing the in theatre Commander to tactically exploit the environment for mission success.

The Teams are not confined to maritime environments. Lt Rebecca Martin recently spent four months deployed to Camp Bastion in Helmand Province, Afghanistan. Her primary role was to support the newly deployed Sea King Airborne Search and Control (SKASaC) squadrons, drawing on her experience of forecasting for the SKASaCs in a maritime environment to develop radar range predictions for their tasking in Afghanistan. In a first for the HM Mobile Teams, she worked alongside the Met Office Mobile Met Unit (MMU), training the MMU in radar range prediction as



The Met Office in Camp Bastion.



well as fulfilling the role of forecaster. During this time she provided land and aviation forecasts for ground forces, RAF fixed wing aircraft and Army Theatre Unmanned Aerial Vehicles (TUAVs) as well as the helicopters of the Joint Helicopter Force Afghanistan.

Elsewhere during the past year, HM Mobile Team personnel have deployed with the Mediterranean-based Op Manta, embarked on frigates and in co-ordination cells ashore to provide tactical and ASW advice in the multinational Joint Warrior exercises, conducted operations in the Baltic and assisted with survey operations on a variety of hydrographic platforms.

HMSML Gleaner also comes under the umbrella of the HM Mobile Teams. Her primary role as the RN's only Survey Motor Launch is to conduct inshore and coastal hydrographic surveys. When not deployed, her Ship's Company are co-located with the HM Mobile Teams in Devonport. This provides a valuable interface for hydrographic training for Team personnel and gives a strong pool of hydrographic expertise to advise and assist with short notice survey tasking.

New Developments

The early retirement of *HMS Roebuck* has presented the HM OPS Squadron with new opportunities. Work is now in the final stages to claw back *Roebuck's* HM capabilities and to develop three areas of mobile 'H' activity. These three teams will enable the HM Cadre and Joint Operational Meteorology and Oceanography Centre to provide balanced environmental support in geospatial intelligence data gathering and environmental exploitation. This measure also supports seedcorn development for the new Mine Warfare Hydrographic and Patrol Craft project, namely in the development of HM support to mine and amphibious warfare.

From June 2010, it is expected that the Fleet HM Unit (FHMU) will begin to embed four personnel within the Fleet Unmanned Underwater Vehicle Unit to develop the concept of Rapid Environmental Assessment and survey from Unmanned Underwater Vehicles. Following on the successes of both the H and M teams deployed to *Cold Response 10*, the FHMU will deploy its second combined H and M team with COMATG to provide environmental support during *Auriga 10* and an opportunity for the FHMU to begin developing close ties with the US Navy's Fleet Survey Team. Under the auspices of 1 Assault Group Royal Marines, measures are also at foot to develop better integration and support opportunities between HM mobile teams and RM assault squadrons.

The FHMU is also expecting to take delivery of its second dedicated survey asset in the form of *Survey Motor Boat Nesbitt*. It is intended to operate this 15 ton, 10 metre launch in the vicinity of Naval Bases to augment *HMSL Gleaner* in her *Op Rococo* tasks as well as conducting other survey tasks in support of UK military operations and of course contributing towards the professional development of the unit's survey ratings and HM Officers.



Cold Response 10 – Surveying in Norway.

Too Many Sensors - Not Enough Receptors

How intelligent geospatial processing can improve situational awareness for the desktop warfighter.

By Richard Goodman, Intergraph UK Ltd

Intergraph

Intergraph is a global software engineering house with its corporate headquarters in Huntsville Alabama, USA and its UK headquarters in Swindon, Wiltshire. The company provides GIS and other geospatial solutions to a wide spectrum of users around the world. These include Defence, the Emergency Services (Police, Fire & Ambulance), the Utilities (Power, Water and Telecoms) and Government Agencies such as Ordnance Survey and HM Customs & Excise.

“Desktop warfighters” face a unique challenge in managing the extensive data sources and feeds available to them. Every month, the media highlights how modern, remotely sensed data is overwhelming those tasked with analysing it to extract meaningful intelligence:

- *The New York Times* (January 10, 2010) reports there’s so much video data coming from drones (remotely controlled unmanned aircrafts) that analysts can’t keep up. Data collection for 2009 in Afghanistan and Iraq has tripled since 2007, meaning if you sat down to watch it all continuously, it would take about 24 years.
- *Information Week* (July 9, 2009) – In an article titled, “Military Grapples with Information Overload,” the author reports that surging surveillance data threatens to overwhelm the military’s ability to deal with it all.

With the deluge of still imagery, intelligence reports and full motion video, not to mention automatically derived products, the task of simply viewing new data is no longer achievable by traditional means. An automated, enterprise wide geospatial solution is required to streamline the data life cycle of receive, archive, manage, exploit and disseminate. Ultimately, this should relieve analysts of the overhead related to locating and accessing data, leaving them free to concentrate on the real work of assessing relevant intelligence.

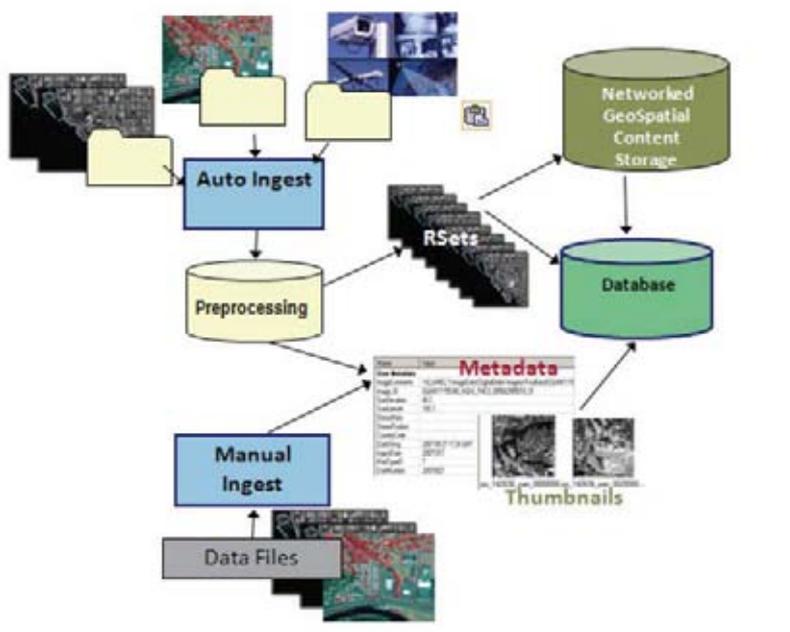


Figure 1: Automated data ingest flow diagram.

A typical high-level workflow consists of four key areas that must function in harmony to properly support the end-to-end requirements of the mission:

- Automated and manual capture of geospatial information, including imagery, video, and other sensor data
- Management of enterprise geospatial content, including traditional vector data sets (layers, features), imagery, video, and terrain models
- Integration and analysis of multiple overlapping sets of geospatial and non-geospatial information
- Visualisation and dissemination through a variety of interfaces

Where possible and practical, open standards – such as Open Geospatial Consortium (OGC®) Web services – should be used to ensure this foundation of geo data storage and dissemination is agile and sustainable.

Due to the volume and disparate nature of the data sources, it is impossible to receive and manage all feeds in a single location. It is also not possible for analysts to take action on every item. Thus, viable solutions must be able to receive data, possibly by ‘watching’ many designated sources, and then act appropriately when new data is detected. The post-receipt actions may need to be configured to reflect specific combinations of data type, geographic location, metadata, or properties such as ground sample distance. For example, the cataloguing of full motion video, including its geographic metadata, allows the creation of representative geometries, or footprints, for the frames. This allows spatial queries from any source to exploit the data via Web services, letting more analysts exploit it. Once the receiving solution has catalogued the data, the relevant analyst should be notified that it is ready for consumption. Whether this notification is by e-mail, news feeds, or simply displayed in a viewer depends on the particular requirements of each analyst.

While every data type has its default viewing method, viewing data in new ways can assist analysts in better understanding its context, as well as complement other information. The vast majority of data the intelligence analyst sees have geographic locations associated with them. Thus, displaying the data within a geospatially enabled viewer, such as a geographic information system (GIS), enables the creation of a comprehensive view. Whether data sources are raster or vector, point or area, still or moving, they can be fused into one viewing environment.

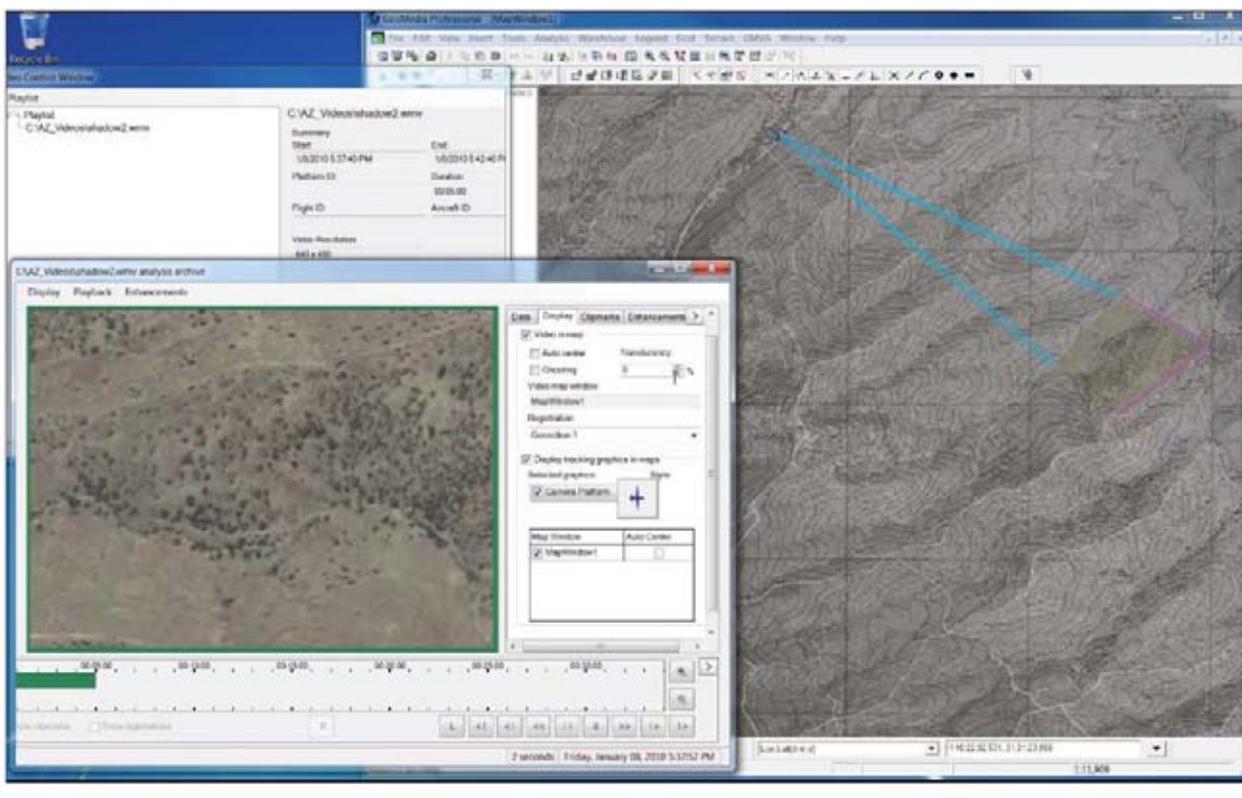


Figure 2: GIS data viewer that fuses raster, video, and intelligence data.

To maximise the amount of useful information extracted from the data, the analyst requires a multitude of tools, which must be intuitive and conveniently positioned within the viewer. These can include tools for simple image enhancements, advanced rectification and annotations, video tagging, clipping, and mosaicing. Combined with geospatial and attribute-based queries, these tools can quickly direct the analyst to the most relevant area of data.

Once the data has been assessed and salient information extracted, the source data can be removed from the system, freeing storage space for the next data influx. Because all data was catalogued on receipt, any future queries will still be able to find the relevant information, regardless of its online status. This permanent geospatial intelligence enables traceability, which is increasingly important in all areas of the data life cycle.

The extracted information must be disseminated to the correct end customer in a timely and suitable fashion. This may be in the form of hardcopy intelligence reports, Web service feeds to portals, or simply e-mailed image clips with annotations.

All data agencies face the need to adapt to wider-reaching demands and quicker response times than they have in the past. Furthermore, they are assimilating and analysing more data than ever before, such as high-resolution imagery, real-time video, and GPS-tracked objects. Therefore, they need to collect and analyse relevant information quickly and effectively to make sense of current situations and reduce wasted time and effort. With the continued evolution in technology (such as service-oriented architectures, advanced geospatial applications, and mobile technology) and the speed and methods of transmission, now is the time to provide powerful and intuitive geospatial intelligence solutions that can help agencies be more effective and cost-efficient.

Integrating geospatial data and workflows with scalable enterprise technology, Intergraph solutions help data professionals meet their operational goals and enable data-sharing across the enterprise.



HELP *for* HEROES

Support For Our Wounded

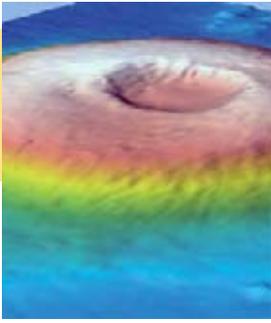


H4H is a charity set up in response to the desire of ordinary people to do something practical to help our wounded Servicemen and women get back on their feet.

We want to raise £5 million to pay for a fitness complex to assist with vital rehabilitation. We want to do this urgently and you can help us get it done...

Will you help a hero?

www.helpforheroes.org.uk



HMS Scott does go to the Antarctic

By Lieutenant David Ives RN

What is the difference between the two pictures in Figure 1, apart from one being a painting and the other a photograph? Not much, and you would be forgiven for thinking that the former has been inspired by the latter.



Figure 1 - Scott and Antarctica. Much difference - the painting and the real thing?

The answer is that the painting is an impression, painted nearly 20 years ago when *HMS Scott* was still on the drawing boards and the photograph is of *HMS Scott's* 2009/2010 deployment to Antarctica. I discovered the painting in the back of a drawer in 2008. It was dusted off and shown to other members of the Wardroom. While doing this I mentioned the possibility of the ship deploying to the region as there must have been some thought for that contingency back in the mid 90's when she was designed. After a quick discussion we concluded that *HMS Scott* has no capability and would never go to the Antarctic.

Fast forward six months (January 2009) and that conversation was being replayed in the back of my mind as we were ordered to prepare for deployment to the Antarctic for the austral summer 2009/10! This was on the back of *HMS Endurance*, the RN's usual Ice Patrol Vessel, not being available after a severe flood in late 2008. The planning for this deployment was no small feat to achieve – for the ship's entire life (commissioned 1997) she has generally followed the Sun collecting vital geospatial data in regions likely to provide benign conditions appropriate to the time of year. Apart from the ice strengthened hull, the *HMS Scott* of January 2009 had no capability to deploy and operate in one of the most extreme areas of the world. A lot of work had to be put in by the small ship's company to ensure that we would be ready to deploy by October 2009.

The mission directive was to deploy to Antarctica to support the Foreign and Commonwealth Office (FCO) and the British Antarctic Survey (BAS). Together we were to reinforce UK presence and sovereignty in the Antarctic and wider South Atlantic region as well as to re-affirm the UK commitment to the Antarctic Treaty (AT). We were also tasked to conduct geospatial data gathering in this data sparse region on behalf of the UKHO. This data gathering for us was going to be a first – our data is usually solely used in the defence community (the 2004/5 post tsunami survey a notable exception from this). The UK is responsible for the charting of claimed waters within the Antarctic Treaty Zone (ATZ) and the data will be used to update the charts and maintain navigational safety in this vital area of the world.



Figure 2 - *Scott deploying for Antarctica.*

All preparations were achieved and *Scott* deployed from the UK on the 27th of October 2009. The first seven weeks were spent surveying whilst on transit, stopping in Tenerife, Montevideo and the Falklands on the journey south. The Montevideo visit was high profile – we were there by invitation of the Uruguayan Government to take part in the 70th anniversary commemorations of the Battle of the River Plate. After Christmas and New Year alongside in the Falkland Islands making the final preparations and embarking the BAS and FCO representatives, *Scott* headed to the Antarctic.

The Antarctic period of the deployment was a varied, challenging but ultimately rewarding period for the ship. The geospatial data gathering element was a huge success, with a large proportion of the Bransfield Strait surveyed to exacting, modern standards. This element cannot be overstated: Antarctica is becoming more popular than ever with visiting cruise ships and the importance of accurate and reliable charts is vital to ensure that they are kept safe. Not all the bathymetric data will be used solely for charting purposes. For example BAS requested that we survey in the vicinity of the South Shetland Islands to investigate scour marks left by glaciers. In total around 3,500nm² of bathymetric data was collected to aid both the charting effort and scientific research.

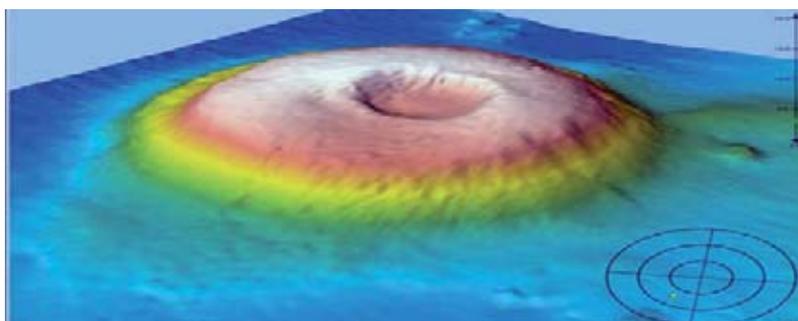


Figure 3 - *Undersea volcano discovered during Sonar operations.*

Perhaps the most challenging aspect of the period was deploying BAS, FCO and RN personnel ashore, via seaboats, to conduct base inspections. With *HMS Endurance*, helicopters were a well-used option to insert personnel, as they can more readily find suitable landing spots. This option is not available to *Scott*. Many of the islands visited were uninhabited and as such have no jetties or such like to get ashore. Along with this, the beach profiles either make it physically impossible to bring a boat ashore, or the shallow gradient dictates a long wade in Antarctic water. Ice was also an issue as it can easily be missed by small boats leading to breakdowns should pieces be sucked into the jet. Finding the correct course through the ice was always going to be a challenge for the boats' crews. The weather only added to the challenge – even in the austral summer, conditions could and did change at a moments notice. The team worked hard and achieved much: vital base visits and inspections were conducted in places such as Signey Island, Melchior Island, Port Lockroy and Livingston Island.



Figure 4a - *Boat's crew at work.*



Figure 4b - *A long wade back.*

One of the overriding impressions gleaned from the Antarctic was the sheer amount of wildlife on display at all times and in all areas. At sea the amount of wildlife, in particular whales, was breathtaking - they were a minute by minute occurrence that fascinated all. The embarked BAS Scientist, a veteran of over 10 seasons in the Antarctic, commented that he had never seen so many. The number of birds – penguins, albatrosses, terns plus many other species was also phenomenal. It may be a cold, inhospitable place to humans, but for other species it is a rich and diverse ecosystem that supports a huge abundance of different species. It makes it clear in my mind that being a signatory to the AT is right and correct – we all need to work to ensure that the unique nature of this area is maintained without undue interference and impact from humans.

By mid-February, marking the beginning of the end of the austral summer, our work was complete and *HMS Scott* headed back north, ultimately returning to Devonport in early May 2010 (via the Falklands and South Africa). The successful deployment showed that *HMS Scott* and her company maintain the flexibility and global reach of the Royal Navy. *Scott* is returning to the

Antarctic for the 2010/2011 austral summer, thereby maintaining the United Kingdom's interest in this vital area and ensuring that *HMS Scott's* unique and world beating sonar capability is again used to help maintain navigational safety in the Antarctic region.

The ultimate and unanswered question though, is, what did the artist know in the mid 90's that we didn't?



Figure 5 - Humpback whales.



Figure 6 - HMS Scott near Port Lochroy.

HMS Scott is the Royal Navy's sole Ocean Survey Vessel. Her role is to conduct deep bathymetric survey tasking off the continental shelf. The ship is fitted with a modern multi-beam sonar suite which permits mapping of the ocean floor worldwide. The ship is fully lean-manned with a complement of only 78. The ship has a three watch crew rotation system with 52 personnel embarked at any one time, enabling the ship to operate abroad for extended periods.



Operation Giraffe: The Cumbria Flood

By Captain David White RE

2010 sees the twentieth year during which Geographic Soldiers and Officers have been deployed on operations in the UK and overseas, from the first Gulf War and Afghanistan to the fire brigade strikes and foot and mouth in the UK. In November 2009, Special Support Team (SST) 42 Engineer Regiment deployed to Cumbria to what has been described as some of the worst flooding experienced by the UK, and set up Operation GIRAFFE 09.

SST is 42 Engineer Regiment's high readiness team which supports all Home Office operations, providing geographic support to either military or police commanders. Operation GIRAFFE 09 was supported by SST for four days; based in Penrith at the Cumbria Police Headquarters.

Having completed the Army Survey Course and taken command of SST in September 2009, I was still trying to understand the delicate intricacies of supporting a number of organisations across Defence and the Home Office whilst trying to keep all my masters happy; something I was told by my predecessor would be the hardest part of the job. Having seen the news broadcast during breakfast and the extent that the previous 24 hours of consistent rain was having in Cumbria, I thought they were in for a tough weekend, although I did consider heading north for a spot of white-water kayaking. Almost immediately I was called by Standing Joint Command and told that they were thinking of deploying SST elements to support the local military commander, even though they were unsure how, and in what form, the military support to the flood relief would take. The difficult decision was taken as to which of the team would deploy and miss one of the section commander's wedding whilst the vehicles were prepared with all the latest data and imagery of the UK and plenty of consumables for the unknown duration.

During the 'blue light' escorted drive from Hermitage to Cumbria, the initial geographic support requirements changed and it became apparent that SST would be better placed supporting the police headquarters rather than the military, and that Ministry of Defence approval would be sought during the journey to allow the team to proceed straight to the Cumbria Constabulary Headquarters.





Upon arriving at the Police HQ at Penrith I received a situation brief from the Joint Regional Liaison Officer (JRLO), a regular officer who provides the regional brigade with links to the local police, fire brigade and other local authorities, and the Duty Chief Police Commander and was invited to attend the hourly briefings to understand what their requirements were and how we could assist. What struck me as not only strange, but also a hindrance to the overall situational awareness, was that no one actually knew where the flooding was. The Environment Agency had provided the police with some basic A4 pictures of the flood prediction based upon their one in one thousand year flood model, but could not say if these were accurate to the immediate flood. The JRLO informed me that a Lynx helicopter was tasked to assist Op GIRAFFE during daylight hours and we agreed that it should be used initially to establish where the flooding was, so, armed with a couple of SLR cameras and maps we flew the area recording where the flooding was.

The priority was to plot the flooding onto the mapping by hand and to photograph as many bridges as we could, specifically targeting A roads, to allow the Highways Agency engineers to prioritise which bridges they would send their reconnaissance teams to. Once back on terra firma, the areas affected by the flooding were plotted and distributed to the Police and Fire command teams who were still overseeing the execution of rescue attempts of the worst affected areas, and also to the ever-expanding number of departments such as: Local NHS trust; Highways Agency; Coastal and Maritime Agency and local authority. In conjunction with the Environment Agency, we were then able to stay fairly current with the extent of the flooding from their river monitoring stations, updates from the public and via open sources such as YouTube. This allowed us to conduct critical infrastructure analysis of the area and establish which areas and facilities were most at risk.

SST holds most of the vector data for the UK, which is provided by the Ordnance Survey (OS) under the Pan-Government Agreement and supplemented by Defence Geographic Centre. This allows the team to interrogate which infrastructure is most at risk. The Geo technicians using the latest ArcGIS software were able to identify which infrastructure was currently affected and which was under threat, based upon the Environment Agency's forecast. This resulted in individual map-based products showing which power sub-stations, bridges, medical facilities, schools and evacuation centres were currently at risk, and allowed those departments to start their contingency planning.

The photography taken from the helicopter was invaluable in assessing the bridges in the area; with over 1,400 bridges it was not possible to send engineers to each bridge site to evaluate the situation. Therefore, decisions were taken from the imagery to close over ten of the main bridges between Cockermouth and Workington. As a result of the bridge closures, diversion routes had to be established and details put on the local BBC news sites and TV. Whilst this was not the most technical task, it had to be carried out as visitors from London, including the Prime Minister and the Environment Minister, were coming thick and fast. The diversion at this stage was 80km (the use of kilometres was a Highways Agency requirement) from the north of Workington to the south of the town, a particular problem for residents who lived in the north of Workington when most of the shops, schools and medical facilities were in the south. We were asked to 'paint a picture' so that the effect of the diversion would be understood by the ministers and so we produced a graphic that showed the locations of key destinations 80km from London, for example Brighton and Reading. The Chief Constable of Cumbria remarked later that it took demonstrations such as the London to Brighton map to get the minister to agree to the temporary bridge which was built by 22 Engineer Regiment.

Late on Day 2, we were visited by three WO2 (QMSI)s from Gibraltar Barracks who had been sent up to recce potential military bridge sites over the River Cocker. From the initial requirements set by the Highways Agency and local authority, and the criteria needed to construct a Logistic Support Bridge, we conducted a site selection for possible crossing sites. ArcGIS initially identified eight sites which could be reduced to three when we looked at the imagery provided by the helicopter flight and existing imagery held by SST. These five sites were discounted due to excessive flooding in that area or unsuitable abutment locations.

The key to SST's success was the ability to produce accurate products incorporating other departments' data within the tight timelines required during this type of operation. Geographic support and Geographic Information Systems are widely used and exploited within defence however; they are still being developed within many police forces, especially regional ones. During the de-brief, Chief Constable Craig Mackey QPM described SST as "*the conduit for all information throughout the operation,*" and it has also been described as '*black magic*' by other organisations. The SST took data from many of the organisations at the Police GOLD HQ and presented them as easily-understood products for the command team at Penrith and commanders on the ground.

It was the first time that 42 Engineer Regiment has supported a national emergency in their professional capacity and I am quite confident it will not be the last. During my tenure at OC SST I have regularly been asked to present this unique capability to emergency services and local authorities whose GIS and Geographic support are in their infancy. SST continues to train organically and with regional Brigades so that we can develop the capability to suit each contingency, which is difficult when it is impossible to guess what emergency is round the corner.





Geo People

Commander A V Swain

MBE MA FIMarEST AFRIN Royal Navy

Officer Commanding FOST HM

Commander Andrew Swain assumed command of FOST HM in July 2009. He is responsible for individual and collective training in the subjects of Hydrography, Oceanography and Meteorology across the Royal Navy.

He joined the Royal Navy as a direct entry Junior Seaman (Survey Recorder) in March 1979. He spent the next eight years in HM Surveying Ships *Hydra*, *Herald* and *Hecla*, assisting in Hydrographic, Oceanographic and Geophysical surveys, as well as two years as Navigator's Yeoman in the destroyer *HMS Glamorgan*.

He was advanced to Petty Officer (Surveyor) in 1986 and joined Dartmouth on the Upper Yardman scheme in 1987. After initial training at Britannia Royal Naval College and in HM Ships *Euryalus*, *Roebuck* and *Brilliant*, he rejoined the Survey Squadron as a specialist Hydrographic Officer. He then served in Naval Party 1008 and as OOW in HM Ships *Beagle* and *Hecla*, the latter as Helicopter Controller for the Mine Countermeasures Task Unit during the 1991 Gulf Conflict.

After serving two years as the Operations Officer in *HMS Roebuck* he completed the Category A Long Hydrographic Course and was awarded a postgraduate Diploma in Hydrographic Surveying from the University of Plymouth. Two further tours of duty as Operations Officer followed, firstly in *HMS Hecla* conducting Military Surveys in support of the UK strategic deterrent; and finally in *HMS Scott*, bringing into service the Royal Navy's first and largest multi-beam surveying ship.

In 1998 he joined the Warfare Staff of Commodore Mine Warfare & Fishery Protection where he was responsible for updating the Mine Counter Measures Route Survey concept and Mine Warfare data handling requirements. In 2001 he joined Naval Party 1016 as Commanding Officer and spent 14 months conducting surveys off the shoal sandbanks of Caister, the Thames Estuary and Dover Strait.

He assumed command of *HMS Roebuck* in July 2002 and deployed to the Northern Arabian Gulf where his surveys were instrumental in enabling the successful landings of the Royal Marines on the Al Faw Peninsular (Iraq) in March 2003. He then undertook surveys of the port of Umm Qasr, which allowed humanitarian aid to be shipped in to war-torn Iraq. He was awarded a MBE in the 2003 operational honours list.

During 2004/05 he initiated a HM post on the staff of the Commander Amphibious Task Group before attending the Advanced Command and Staff Course at the UK Defence Academy. In 2006 he was awarded an MA in Defence Studies from King's College London.

After a short tour at MOD he assumed command of *HMS Scott* and took in hand surveys across the North Atlantic and the Indian Ocean. In 2009 he initiated the post of Officer Commanding Fleet HM Unit deploying HM specialists across the fleet to provide tactical advantage to the battle space before being assigned as Officer Commanding FOST HM in July 2009.

Commander Swain married Christine in 1988 and they live in Devon with their two children. He is a keen follower of rugby union, and a RFU under 13s coach.



Geo People

Lieutenant Colonel John N Adlington

MBE MSc BSc(Hons) MinstRE

John joined the Army in 1973 as an apprentice Field Surveyor at the Army Apprentice College Chepstow. His first tour was with 42 Survey Engineer Regiment at Barton Stacey serving with 19 Geodetic Squadron. He took part in a number of traditional field surveys in Great Britain, Northern Ireland and abroad. A change of focus saw him train as a computer programmer prior to serving at JARIC in 1980.

Returning to survey he served with 512 Specialist Team RE travelling around the world completing Doppler satellite surveys in countries far too numerous to mention. A posting to Chepstow, this time as an instructor, was followed by a spell at the School of Military Survey (SMS) to complete the Survey Staff Specialist course.

He then moved to Hereford where he set up the Navigation Cell providing instruction in astro techniques and initial use of hand held GPS equipment. Returning to 512 STRE as the Technical Warrant Officer he served in Washington DC where he was responsible for the introduction of GPS surveying equipment into Military Survey. 512 STRE teams exploited the new technology, particularly during the first Gulf War and on many tasks worldwide. It was during this period he was awarded the MBE for his services.

Returning to the UK he served at Hermitage this time with 19 Topographic Squadron as the Squadron Liaison Officer. Promotion to WO1 saw him appointed as the RSM of 42 Survey Engineer Group. Commissioned in 1984 he took up the appointment of Special Support Team Commander at Hermitage managing the exploitation of both Field Survey and digital data for Counter Terrorist support. A tour in Bosnia was followed by a tour as Assistant Instructor at the RSMS in the Field Survey Department. The reorganisation of the soldier trades from six to three was completed during this time in addition to introducing the new GPS (MSGR) equipment into use.

Following promotion to major in 2000 he broke clear of the RSMS to serve as the 3 Division Geo officer. Deploying to Afghanistan he served as the Chief Geo Officer in the SFOR HQ in Kabul. He then returned to Northern Ireland serving as the Geo Officer with HQNI. Attendance at the University of Sheffield to complete an Information Systems MSc preceded his appointment as Senior Instructor at the RSMS Topographic department. Following another internal reorganisation he was the first SI of the Geospatial Information Management Wing.

Selected for promotion to Lieutenant Colonel he took up an E2 post with the Defence Information Infrastructure (DII) Integrated Project Team where he was initially responsible for IT Governance assurance. He now sits as the head of formal military messaging within the DII Group. This involves the provision of current email and formal messaging systems to the MoD together with the future development plans and supported by a joint RAF, RN and Civilian team.

He remains the longest serving Survey officer however he is due to leave in 2011. Married to Denise they have two children, Eric who is now training as a pilot in the RAF and Sarah who is completing a music degree at the University of Durham. Easily identifiable at work during the last 13 years as he has been accompanied by his dog Sparkle, who like him is now beginning to show signs of wear!



Geo People

Derek Ireson

Programme Director, Intergraph (UK) Ltd

Since leaving 42 Survey Engineer Group in 1990 Derek has been employed at Intergraph (UK) Ltd, the global software engineering house, and has just received his 20 Years Service Award with this company.

Derek was trained as a Topographic Surveyor whilst serving in the Royal Engineers, achieving Technician Class One level. He enjoyed tours at Barton Stacey, JARIC (RAF Brampton) and Hermitage, where he served four years as an Air Survey instructor at the Royal School of Military Survey. His last two years of service were engaged in managing the new digital and analytical stereoplotters systems that had been introduced into Military Survey and which subsequently went into mapping production at both Hermitage and Feltham. Derek finished his army career as a Staff Sergeant in May 1990 and started work at Intergraph the following week.

Since joining Intergraph, Derek has moved through the technical stream into sales, management, directorship, and finally strategic programme management. Initially providing pre and post sales technical support for photogrammetric and remote sensing solutions across a broad range of customers, including some of his old colleagues in Military Survey, Derek later served as the Intergraph UK Sales Manager for Government and Defence for almost ten years. His major customers included the Defence Geographic Centre, RAF Marham, RAF Wyton, RIGC NI (Aldergrove) and the Ordnance Survey Agencies (GB, NI and Eire).

In 1999 Derek became the UK Managing Director of a new subsidiary company called Z/I Imaging which was the result of a joint venture between Intergraph and Carl Zeiss. This company specialises in advanced photogrammetric hardware and software systems, and its latest product line includes the successful DMC Digital Mapping Camera - the worlds largest digital aerial framing camera – and highly automated sensor support systems. Z/I Imaging was bought outright by Intergraph in 2004 and continues to operate as a highly profitable business unit.

Most recently, Derek has been centrally involved in the award and delivery of a major multi-million pound contract by Ordnance Survey for the complete reengineering of its core geospatial data management system, which is at the heart of its flagship MasterMap product. Almost at the end of a two and a half year programme involving a consortium of companies, Derek is currently engaged as Programme Director for this high-profile project.

Derek currently lives in Swindon with his wife Helen who works for the Great Western Hospital as an Orthopedic Theatre Assistant. They have two grown up daughters; Deborah who recently graduated from Cardiff University with a BA in Education, and Rebecca who recently left the Intelligence Corp after serving four years (including a tour of Iraq) and now works in the City for a company providing vital intelligence and security services to the 2012 Olympic Delivery Authority (ODA).

PS to Barton Stacey 25 Years On

The last few weeks at Barton Stacey were not without drama as one morning those driving into camp took a double take to the left when they saw that 13 Squadron's headquarters building had burnt down during the night.



The DMGIC Exploits The Power of the VORF

By Lt Cdr R A Bernard RN, SO2 HM Standards and Development, DMGIC

What is the DMGIC?

The Defence Section at the United Kingdom Hydrographic Office (UKHO) has recently been rebranded as the Defence Maritime Geospatial Intelligence Centre (DMGIC) to highlight the wide range of commercial and Defence-specific geospatial products and services it delivers to the UKHO's Key Customer, the Ministry of Defence.

The Vertical Offshore Reference Frame

Soundings of waterdepth taken in tidal waters need to be reduced to a common datum (often known as Sounding Datum) to allow for the rise and fall of tide during the conduct of a survey. The use of GPS height data for sounding reduction is a proven and reliable procedure where there is an accurate geoid-spheroid separation value. The United UKHO, in cooperation with University College London (UCL), has developed the Vertical Offshore Reference Frame (VORF) to exploit this technique in UK waters. The VORF provides surveyors with vertical datum surfaces (Chart Datum, Mean High Water Springs and other options) in UK waters, and the ability for heights to be converted from one vertical datum to another. Since the datums are linked to the ellipsoid (through GPS observations and established benchmarks around the UK), the VORF enables the calculation of ellipsoid-geoid separation values at any point and subsequent reduction of soundings from accurate GPS heights.

Use of the VORF and GPS heights for sounding reduction has resulted in faster, more accurate surveying by reducing the need to establish Sounding Datum and by taking advantage of the increased precision and accuracy of modern position and motion control equipment and post-processing software.

As the testing of the VORF nears completion, the DMGIC is considering how to make the VORF available to potential users, perhaps via the Ordnance Survey. For its part, the RN is keen to expand the model to areas of interest to Defence in order to exploit the military advantages of using GPS height for tide reduction, since the VORF enables soundings to be reduced without relying on seabed or shore-based tide observations. The VORF has the potential to ease data collaboration with allies by using the spheroid to establish Sounding Datum. In addition, moving the VORF forward will keep the RN and the UKHO at the forefront of surveying technology.

Remembrance Weekend 6 November 2009



42 Engineer Regiment were afforded the privilege of leading the teams out onto the pitch at the Madjeski Stadium for the match between Reading and Ipswich. It was a humbling experience for the flag party to be applauded by 19,000 fans and to realise that they were representing the Armed Forces in general.

Once in the centre spot the two teams circled the eight-man party and the entire stadium paid their respects of the fallen with a well adhered to a minute's silence. They then marched off and enjoyed first the game and then the hospitality of chairman Sir John Madjeski and other directors and officials from Reading and Ipswich.

Report on the UK - US Memorandum of Understanding

By Lieutenant Commander P Payne RN, SO2 Military Data Gathering, DMGIC

Between the 9th and 11th of June this year, the Defence Maritime Geospatial Intelligence Centre (DMGIC) at the United Kingdom Hydrographic Office (UHKO) hosted staff from the US National Oceanic and Atmospheric Administration (NOAA), the US Naval Oceanographic Office (NAVO), and the Commander, US Naval Meteorology and Oceanography Command (CNMOC). The visitors were in the UK to take part in the 47th year of discussions on military hydrographic survey planning and maritime product provision with the Ministry of Defence (MOD) Joint Geospatial Intelligence Branch and the UKHO.

With efficiencies being the current buzz-word in both countries, the discussions encompassed a wide range of topics where working together more closely could lead to cost savings or more/better products for both sides. A number of proposals were discussed and agreed. Together these proposals will deliver better visibility of each-others' data and product holdings, as well as closer alignment of standards.

On the 10th of June there was an opportunity for the visitors to visit the Royal Navy's Ocean Survey Ship *HMS Scott*. The ship was on the return voyage from her recent deployment to Antarctica and was alongside in Cardiff as part of the City's commemorative activities for Captain Robert Falcon Scott RN, whose ill-fated journey to the South Pole commenced when the Supply Vessel *Terra Nova* sailed from Cardiff almost exactly 100 years before on 15 June 1910.

Many of the group who were seeing *HMS Scott* for the first time said they were amazed at the very impressive hydrographic capability that she offered. A number of presentations were made to those who had been involved with supporting the ship's programme over many years, the day being concluded with the joint cutting of a cake by Nigel Gooding, the Defence Manager at DMGIC and Captain Eric Trehubenko USN from NAVO.

With the strength of the 'Special Relationship' once again being questioned in the media, it was satisfying to see that, in the military maritime survey world at least, our allies on the other side of the Atlantic are as committed as ever to ensuring our ties remain strong for the foreseeable future.



Delegates at the 47th UK – US Meeting.

GISIG Goes From Strength To Strength

By Daran Scarlett

The last 20 years of operations have seen an increasing recognition of the value and contribution GEOINT is delivering in theatre. In recent years, an active community of interest has developed around the discipline which continues to grow and share knowledge across UK defence and beyond.

The Geospatial Intelligence Special Interest Group, or GISIG as it's widely known, has now been in existence since 2005. Over the last four years this community of interest conference, sponsored by the MOD and supported by ESRI (UK), has grown from approximately thirty attendees once a year to over 130 delegates twice a year at MOD sites around the country.

The GISIG's objectives are to bring together both geo specialists and those without a geo background but interested in exploiting the value of spatial information in their business area. This one-day conference is based around a series of practitioner and end user presentations from across the domains of maritime, land, air and joint. By sharing experiences and networking, attendees gain a greater understanding of how spatial or location-based information exploitation capabilities are being procured, exploited and developed.

June 5th this year saw the largest gathering of geospatial professionals to date with over 150 attendees at MOD Main Building. This has become a favoured location with excellent facilities and access for the numbers now attending. The last two GISIGs have been sponsored by Major Adrian Friend, Joint Capability-ISTAR2 based in Main Building. With a strong geo background, and with previous postings including time at the RSMS, he has a thorough appreciation of the power of GEOINT and its potential for wider exploitation across defence. From the outset, he felt that the GISIG shouldn't be confined to the specialists and that there was an opportunity to engage other operational areas with business problems and expose them to this capability.

Operational focus

June's conference echoed this thinking with six presentations from a diverse range of areas around the theme of *How spatial approaches are delivering greater operational efficiency and shared situational understanding*. These included the Maritime Warfare Centre, a newcomer to the GISIG who provided an insight into their use of geographic analysis capabilities to inform mission planning for the Sea King Airborne Surveillance platform.

The Environmental Science Group (ESG) was another first-time presenter at the GISIG, informing the audience on their use of geophysics and GIS to assist explosives ordnance clearance operations and contaminated land management on Defence Estates sites throughout the UK. This generated a lot of interest from the audience with questions as to its applicability in theatre.

5 (AC) Sqn, RAF Waddington kindly provided an operational overview of the Airborne Stand-Off Radar (ASTOR) System, again stimulating a number of questions from attendees about this world-leading capability. While the majority of presentations are held at 'restricted' level, this presentation was held at 'secret'.

New for GISIG was the inclusion of a 'capability expo' held in the central memorial court at lunchtime. Selected specialist vendors were invited to demonstrate capabilities in areas as diverse as vegetation management, simulation and geospatial mobile phone tracking. This was very well received with attendees able to approach and discuss their challenges with vendors in a non-commercial environment.

After lunch, Joint Training Evaluation Simulation (JTES) gave a presentation on how they are looking to better exploit geo information/data to meet training and simulation requirements for theatre. This included the use of 3D Afghan datasets within their simulations and their views on how they saw simulation and C4ISTAR worlds converging.

Continuing the operational theme, JARIC's Operational Intelligence Support Group Troop delivered an excellent overview on their Geospatial Analysts (GAs) contribution in support of Op Herrick. As with 5 (AC) Sqn earlier, this part of the GISIG was also delivered at 'secret' level.

With the majority of geo specialists using ArcGIS software, ESRI UK was on hand to provide technical advice and demonstrate latest capabilities. As part of this support, the company provided an overview of what's new in ArcGIS 10, launched shortly before the conference.

Extending to other domains

Whilst the majority of user presentations continue to stem from defence community, a recent evolution has been the participation of other organisations within national security and public safety domains. Underlining this, the last GISIG had attendance and two presentations from the Police service.

The Met Police are long standing users of GIS in areas such as crime analysis and event management. At GISIG, they provided insights into their growing use of Pictometry, showing how aerial imagery was being more fully exploited to inform operations planning at specific locations, such as public buildings.

South Yorkshire Police (SYP)'s presentation addressed a different challenge – the timely and cost efficient delivery of local crime intelligence to officers on the beat. Previously, SYP's officers had to separately liaise with the force's crime analysts to gain the latest picture of crime in their area. This was estimated to be taking up to 40 minutes per request per analyst, a large chunk of their day. SYP's introduction of an Intranet Mapping System, now in its second generation and known internally as IMS2, has enabled the force to serve up crime statistics to a central ArcGIS-driven server from which officers can draw down crime hot spot maps and other queries, on demand. This has cut transaction times from 40 minutes to just 2 minutes and freed the analyst team to concentrate on other core activities.

Capabilities such as this drew a great deal of interest from the audience, with Major Friend feeling that the value of this community was not only in the sharing of best practice, but in the cross-fertilization of ideas.

A view echoed by Brigadier (Ret'd) Nick Rigby, Non Executive Director of ESRI (UK) and formally Director Defence Intelligence – Intelligence Collection, Strategy and Plans (DI ICSP) *"We've seen the GISIG become a valuable forum for both geo professionals and those looking to better exploit spatial information in other spheres. We're pleased to support this community of interest and look forward to continuing to helping it go from strength to strength in the future"*.

The next GISIG takes place on November 8th again at MOD Main Building, Whitehall. A calling notice will be issued shortly to serving members of HM forces. For further information please [contact events@esriuk.com](mailto:contact_events@esriuk.com).

Nice work if you can get it!



LCpl Franklin working in the crisis support and situation assessment team.

Not all detachments involve body armour, dust and danger. 14 Geographic Squadron has been tasked with providing a Geo technician to the European Union Satellite Centre (EUSC) in Madrid since July 2008. The EUSC is an agency of the Council of the European Union whose mission is to support the decision making, particularly in the areas of conflict prevention and provision of humanitarian aid, by providing analysis of satellite imagery and collateral data. The Geo technician's task is to do the integration work for creating detailed geographic information products that support briefing notes.



The Worshipful Company of Scientific Instrument Makers

Annual Awards Dinner 4th February 2010

By Tony Keeley

The Royal School of Military Survey (RSMS) was once more the recipient of the Livery Company's hospitality at their hall in London. The Livery Company is affiliated to the Corps of Royal Engineers and historically the RSMS has managed this link. The Company has endowed two prizes to the Corps, the best Royal Engineer officer on the Army Survey Course (ASC) and to the best Royal Engineer soldier Geographic Technician on the Class 1 Course.



Captain Neil Lakin receives his award from the Master.

The Army Survey Course prize for 2009 was awarded to Captain Neil Lakin RE who completed 94 ASC last September and the Geographic Technician prize was awarded to Lance Corporal Damian Reed RE who completed his Class 1 course in March 2009. The prizewinners were accompanied at the Awards Dinner by the Principal of RSMS, Mr John Knight, and the Training Coordinator, Major (Retd) Tony Keeley. The citations for the prizewinners are given below.

Captain Lakin, born in 1978, was educated at Queen Mary's Grammar School, Walsall and the University of Nottingham, gaining a Masters degree in Civil Engineering. He was commissioned into the Royal Engineers in 2003 joining 39 Engineer Regiment (Air Support) in the Kuwaiti and Iraqi deserts to take post as the Support Troop Commander in 34 Field Squadron

for Op TELIC 1. Exercises in Canada, the Falkland Islands and Scotland followed before a posting to 3 RSME Regiment as a Training Officer. As Squadron Operations Officer with 30 Field Squadron he was attached to the Grenadier Guards Battle Group for Rerolling, Bowmanising, Mission Rehearsal and deployment on Op TELIC 8. A further compressed training cycle followed when he was posted as Adjutant 26 Engineer Regiment, with the Regiment building up for and subsequently deploying on Op HERRICK 6 in the Helmand Province.

He was subsequently posted to the RSMS at Hermitage to attend the fourteen month ASC achieving an MSc in Defence Geographic Information. For his outstanding performance while on the course he was nominated for both the Cranfield Prize and Worshipful Company of Scientific Instrument Makers' Prize. He is currently posted to 1 (UK) Armoured Division. His home with his wife Jennifer is in West Berkshire and he enjoys coaching and competing in formation skydiving. (Well, it could have been synchronised swimming!)

Lance Corporal Damian Reed was born in Barrow-in Furness, Cumbria. He enlisted in March 2004 and after his basic recruit training at Pirbright he completed his basic Combat Engineer course at Minley. Only then did he start his technical training as a Geographic Technician Class 2 at the RSMS, a year long course after which he completed his driver training for three months at Leconsfield before being posted to 14 Geographic Squadron in Germany. (It is a long haul for geographic technicians before they get to grips with their chosen profession). During his time with 14 Squadron he also deployed on operations to Afghanistan where his technical expertise was put to the test. In February 2008 he returned to Hermitage for a further year for his Class 1 training, also achieving his Foundation

Science Degree in Applied Computing (Defence Geographic Information). After completion of his course in March 2009 he was posted to 16 Geographic Support Squadron, still at Hermitage, where he forms part of the Special Support Team and so once again he will be heavily involved in operations though of a different nature. He is married to Claire-Michelle and has a very young daughter Rebecca Pauline and his interests include basketball, football and running. For his outstanding performance on his Class 1 Geographic Technician course he was nominated for the award of the Worshipful Company of Scientific Instrument Makers prize. He was also nominated for the Sheffield Hallam University prize, this to be awarded at the planned graduation ceremony on 30 Nov 10 at Hermitage.



Lance Corporal Damian Reed receives his award from the Master.

After an extremely hospitable dinner, toasts and the ceremony of the loving cup the Master of the Worshipful Company of the Scientific Instrument Makers, Mr Harry Tee CBE, presented the awards to the prize winners including several of those from all three services and the academic world. As always the Livery Company was solicitous in its welcome and hospitality to guests and prize winners alike.

THE RIFLES (Berkshire and Wiltshire) MUSEUM

*** Military Museum * Riverside Garden * Historic House**

The 250 year old story of the Infantrymen of Berkshire and Wiltshire. The museum holds over 30,000 items including uniforms, weapons and medals.



New! 'AFGHANISTAN - Battles Past and Present' EXHIBITION

CBBC 'RELIC TRAIL'

WW2 ANDERSON SHELTER

EXTENSIVE UPGRADE OF WEBSITE

The Wardrobe, 58 The Close, Salisbury, Wiltshire. SP1 2EX Tel: 01722 419419

www.thewardrobe.org.uk

In the Summer 2009 Ranger a note was published on the state of the development of Military Survey taken from the Summary of Engineer and Signal Information 1929. The inter-war years were lean years in terms of resources available for the Services and Survey was no exception in this period of "prudence". The Summary for 1930 shows the pre-occupation with the problem of producing maps rapidly from aerial photography and the continuing "staffing" of the perceived need for a field force unit equipped with mobile map reproduction equipment. The development of modern theodolites is also recorded and much may be found on this subject in the "Empire Survey Review" now available on the web at www.ingentaconnect.com/content/maney/sre and in Reports Of Proceedings of the Empire Conferences Of Survey Officers 1928, 1931 and 1935.

SUMMARY OF ENGINEER AND SIGNAL INFORMATION 1929-1938 No. 3, 1930.

SECTION IV - SURVEY.

ARTICLE 11 - AIR SURVEY.

Further progress has been made during 1929 with the practical application of air photography to mapping and survey under Service conditions.

Two exercises were held during the summer, one at Aldershot and the other at Buxton; the first to test the practicability of producing a large-scale map for a particular tactical operation; and the second to test the possibility of gridding and scaling, at short notice, air photographic strips taken and plotted some time in advance.

For the Aldershot exercise, a detachment of one officer, one N.C.O. and 9 men, plotted and contoured a 1:20,000 map covering 80 square miles of the vicinity of the Hog's Back in less than 40 working hours. This was reproduced in two colours by the Ordnance Survey and issued to the troops concerned at the end of the exercise. The detachment employed had only received one week's previous training as a unit, and it was estimated that with a larger and better-trained detachment, the time required for plotting, &c., could have been reduced without difficulty to less than 24 hours.

The Buxton exercise was interfered with by the weather, but in spite of bad visibility, it proved that in open and undulating country, the gridding of strips can be done in less than four or five hours.

These exercises show that the production of a large-scale map of some kind for any and every deliberate operation is quite practicable, although much still remains to be done in the training, organization, and equipment of the personnel concerned before it can be claimed that it is possible to meet all eventualities.

The limiting factor at present is the distance ahead of requirement to which the photography can be carried. The type of flying required for this mapping consists of long, straight, flights at a uniform speed and height, and is particularly liable to interruption by weather or by enemy action. The circumstances under which it can be carried out are still under consideration by the R.A.F. It is hoped that when the Air Authorities have defined the conditions under which the photography can be carried out that progress in the utilization of the photographs will be more rapid.

ARTICLE 12 - FIELD SURVEY.

The proposal to bring into existence a Field Survey Unit for peace has been put back for reconsideration in six month's time. Meanwhile, attention is being concentrated on the design of mobile printing and other equipment for this unit. It is hoped ultimately to form a Field Survey Unit similar to the present authorised War Unit, but perhaps somewhat smaller, capable of taking part both in R.E. and R.A. Survey Exercises and in Army manoeuvres.

ARTICLE 13 - SURVEY EQUIPMENT.

During the last few years, a new type of theodolite has been produced by the firms of Zeiss and Wild, which constitute a completely new departure in theodolite design and represent a very great advance in precision for a given weight and portability. A Service Committee has considered in consultation with the leading British instrument makers the design of a theodolite for general service, and has drawn up a specification. Captain T.Y. Baker, R.N., has invented a device for reading the arcs, which is thought to be an advance even on the new principle adopted by Zeiss and Wild in their new models. An instrument embodying these improvements is being constructed by the firm of Cooke, Troughton & Simms, and is expected to be available for trial early in 1930. It is hoped that the production of this British firm will prove to be at least equal to that of its foreign competitors.

Trials were made during 1929 with the use of aneroid barometers as a substitute for the clinometer in fixing heights on the ground. The aneroid actually used in the field was compared with a battery of reference aneroids kept at a central point in the area; in this way, atmospheric changes during the course of the work can be detected and allowed for. The results have been extremely encouraging.

Trials have been initiated in the use of the magnetic compass for precise determination of direction. Magnetic compasses have recently been constructed in which the direction of magnetic force can be read to about one minute of arc. It is hoped that by the use of a standard magnetometer in the same manner as of the aneroids referred to above, it will be possible to detect and allow for diurnal and other variations, and thus enable the artillery and others concerned to lay out lines of fire, &c., very rapidly and with sufficient accuracy.

Senior Army Chaplain at Sandham Memorial Chapel, Burghclere

On Sunday 4 July 2010 a service of Evening Prayer was held at the Sandham Chapel to mark the anniversary of Stanley Spencer's birth. The celebrant was Colonel Angus MacLeod who is the Commanding Officer of the Armed Forces Chaplaincy Centre at Axford House, near Andover.

As described in the summer 2009 issue of *ranger*, the Chapel is filled with the magnificent Great War paintings by Stanley Spencer and Colonel MacLeod's sermon drew on the themes in the art. A link has now been established between the Chaplaincy Centre and Sandham Chapel and in future chaplains under training will visit Burghclere during their courses.

DSA member Michael Gowlett, who is a volunteer at the Chapel, and his wife Pauline with Colonel MacLeod after the service.



Rear-Admiral Sir David Haslam 1923 - 2009



Rear-Admiral Sir David Haslam, who has died aged 86, was for 10 years Hydrographer of the Navy, responsible for the charts and nautical publications used by the Royal Navy, Merchant Navy and others worldwide.

As “Droggy”, he commanded a fleet of a dozen survey ships while supervising, from his headquarters at Taunton, a staff of more than 1,000 civilians and retired hydrographers. These drew on the most recent information from the sea as well as an archive dating back to Captain Cook, maintaining 4,200 charts and 150 publications which are distributed by agents in 130 countries.

In Haslam’s first few years chart sales earned some £3,300,000 and books a further £600,000, winning his office the Queen’s Award for Export Achievement – a unique honour for a government department.

But his success encouraged accountants to turn the Hydrographic Office into a self-funding, revenue-earning department which, unlike those of other navies, guarded its copyright jealously. As

demand grew for ever more charts for yachtsmen and deeper draft ships, Haslam found himself fighting what were to become increasing demands for privatisation.

David William Haslam was born at Derby on June 26 1923 and educated at Bromsgrove School. He joined the Navy as a special entry in 1941 and spent two terms at Dartmouth before training at sea as a midshipman in the cruiser *Birmingham*, and the destroyers *Quickmatch* and *Vivien*. During Operation Ironclad, the British occupation of Madagascar, he was local control officer of a battery of three six-inch guns in the battleship *Resolution*.

Specialising in hydrography in 1944, he sounded the unexplored estuaries of Burma and Malaya from the survey ship *White Bear* (formerly Sir Thomas Lipton’s steam yacht *Iolanda*) in preparation for the aborted Zipper landings.

When consulted 50 years later by the Burmese government about deep-water routes for tankers, he said that the charts which bore his signature were still the most up-to-date available, but cautioned that he had produced them for shallow-draft landing craft using a leadline at night behind Japanese lines.

In 1946 Haslam surveyed other routes in the South China Sea to ensure they were obstruction-free, and a year later commanded Survey Launch 325 in locating wartime wrecks in the North Sea for clearance by explosives. Over the next 30 years he served in or commanded the survey ships *Scott*, *Dalrymple*, *Dampier*, *Vidal*, *Owen*, *Hecla*, *Hydra* and the Australian *Tallarook* in the Great Barrier Reef, the Indian Ocean, the West Indies as well as the Pacific and North Atlantic. Often he spent weeks in small boats away from his parent ship and sleeping under canvas on shore.

His work was not without incident. In 1957 he was responsible for security at the meeting between Harold Macmillan and President Eisenhower on Bermuda. While commanding *Owen* seven years later he found evidence on the sea floor for the theory of continental drift. In 1964 he evacuated women and children from Zanzibar after a coup. In command of *Hecla* in 1969, he landed a party which hoisted the Union flag over Rockall to reinforce Britain’s claim to the island and its surrounding seas.

Five years later he was awarded the Royal Geographical Society’s medal for finding shorter sea routes through the previously uncharted seas off the Solomon Islands. He also discovered a series of coral pinnacles in the Persian Gulf, known as Haslam’s Patches, and an underwater mountain north-west of the Seychelles, Haslam Seamount.

He was loaned to the Royal Australian Navy from 1947 to 1949, and returned 18 years later as its hydrographer to draw, print and collect more than 300 charts as well as to represent Australia at the International Hydrographic Conference in 1967.

After retiring as Hydrographer of the Navy in 1985 Haslam was, for five years, president of the directing committee of the International Hydrographic Office based in Monaco. He was president of the English Schools Basketball Association, president of Derbyshire County Cricket Club and chairman of the international committee of the Royal Institution of Chartered Surveyors. He was an active member of the Defence Surveyors' Association.

Although he never married, he had numerous nephews and nieces as well as 32 godchildren. He was devoted to Bromsgrove School, serving as chairman of governors from 1991 to 1996. Recently he took the salute at the CCF passing-out parade, a ceremony in which he had participated more than 70 years earlier.

As an admiral Haslam eschewed the trappings of high office, rejecting his official car to be driven to functions by his PA in her purple Mini or to travel second-class by train, when he might meet sailors and discover their concerns. He was an inveterate pipe smoker who always seemed to run out of tobacco at the start of any official visit, and his flag lieutenant was well advised to have acquired a tin of Three Nuns beforehand to forestall the inevitable crisis.

David Haslam was appointed OBE in 1964, CB in 1979 and KBE in 1984. He died on August 4 with his pipe in hand while watching sport on television.

First published in the Daily Telegraph on the 8th of Sep 2009

Colonel Michael Cobb PhD



Michael Cobb gained national recognition when in 2008 at the age of 91 he became the oldest person ever to be awarded a PhD by Cambridge University.

Michael was born on the 10th of September 1916 at Harrow Weald and was educated at Harrow School and gained an MA in Mechanical Sciences at Magdalene College Cambridge.

He was commissioned into the Royal Engineers in 1938 and went to France with the BEF in 1940 and was evacuated through Dunkirk. On return to the UK he served in several Field Companies and spent some time training the newly raised Commando Forces at Lochailort in the use of explosives. In 1942 he was posted to North Africa and en route his ship was torpedoed but managed

to safely make it into a North African port. Service with the Airborne Forces in the Netherlands followed and after the end of the war in Europe he went to the Far East to construct airstrips. Here he was attacked by a Japanese soldier wielding a samurai sword which cut his back, not badly though. He did not mention the fate of the Japanese though Michael did say that as a front line Sapper he never fired a weapon in anger.

After the war he joined Military Survey and attended the Regular Officers Survey Course during 1945/46 where, surprisingly, his long held love of railways was satisfied when he was put in charge of the troop train which moved the Survey Training Centre from Ruabon to Longleat - he spent the entire journey on the footplate!

Tours with production units and the Ordnance Survey followed until the 22nd of February 1953 when he took over command of 42 Survey Engineer Regiment based in Fayid in the Suez Canal Zone. It was to be a busy tour in trying times as the security situation due to the Egyptian resentment at the British presence frequently flared into violence and all units were essentially permanently confined to the Zone. In 1955 the Regiment moved to Zyyi in Cyprus which was then in the grip of the EOKA terrorist campaign. Michael pushed the case to replace the unit's aging presses with new ones to be delivered to Zyyi to coincide with the arrival of the Regiment so that it could be operational with the minimum delay, a plan that worked in the event.

In February 1956 Michael moved to Hermitage, briefly as Chief Instructor and then as Commandant of the School of Military Survey until 1959. During his tenure he was involved in bringing the revolutionary Tellurometer into service use. His final tour with Military Survey was as Deputy Director Large Scale Surveys at the Ordnance Survey.

He retired from the Army in 1965 and worked for the cartographic company Geographia until retirement in 1971. He then spent some time at The Royal College of Art carrying out research into computer mapping which was in its very early stages.

In 1978 he began working on his magnum opus - *The Railways of Great Britain: A Historical Atlas* - which was to show all the railway lines of Great Britain opened to traffic between 1807 and 1994 annotated with historical detail. The atlas was completed and published 25 years later in 2003 and it was for this immense project that he was awarded his doctorate on the 19th of July 2008, making him possibly the world's third oldest person to be awarded a PhD. Dr Richard Smith, Head of Cambridge's Geography Department and one of Michael's PhD examiners says: "*The atlas is a definitive record. It is not just of interest to the enthusiast but a vital tool for anyone seriously interested in the economic geography and history of Great Britain. There is nothing like it.*"

An active sportsman in his earlier years, he maintained his sporting interests and Christian beliefs throughout life. Michael died on the 23rd of June.

Joining The DSA

An application form to join the Defence Surveyors' Association can be found on the Association's website at www.defencesurveyors.org.uk. The completed form should be either emailed to the Membership Secretary at applications@defencesurveyors.org.uk or posted to:

Honorary Membership Secretary
Outrigger
50c Huntenhull Lane
Chapmanslade
Wilts
BA13 4AS

Applications may be made by letter to the above address and should include the following information:

Name, contact details, details of any service career, name of a sponsor and a short summary of relevant experience and courses with dates and/or details of professional, commercial or academic background in the Defence Surveying business.

In accordance with the Data Protection Act, the above information will only be held for administrative purposes by the DSA.

When accepted for membership, applicants will be informed by the Chairman and receive an introductory pack from the Honorary Membership Secretary.

Membership Fees. Do not send any money with the application. New members are required to pay an annual membership fee of £15 starting from the 2nd January after they join. You will be sent a standing order form in due course which you will be asked to complete and return to the Honorary Treasurer covering the fee for the next calendar year. Any member who wishes to do so may alternatively pay the annual subscription of £15 by cheque. Any such cheques should be made out to the 'The Defence Surveyors' Association', and reach the Honorary Treasurer by 2nd January each year (DSA Hon Treasurer, 9 The Chase, Donnington, Newbury, RG14 3AQ).

Technology Focus Day:
24 January 2011
Main Conference Days & Exhibition:
25 - 26 January 2011
Special Human Terrain Analysis Focus Day:
27 January 2011

www.DefenceGeospatial.com

NEW

For 2011!
LOWER PRICES FOR MILITARY /
GOVERNMENTAL PERSONNEL TO ENSURE
THAT YOU ARE ABLE TO ATTEND THIS
INTEGRAL MEETING FOR THE GIS
COMMUNITY



ACHIEVING TRUE INTEGRATION OF GIS INTO EVERY PART OF YOUR ORGANISATION TO ENABLE EFFECTIVE IN-THEATRE SUPPORT & DECISION-MAKING

TOP-LINE STRATEGIES FOR 2011

GIS STRATEGY – You will hear presentations from heads of Geo in different MoDs across the world. They will be focusing on the strategic role of geospatial intelligence in defence operations, giving real life examples of how GIS is vital to the success of any campaign.

GIS SUPPORT IN-THEATRE – Officers who have just returned from Afghanistan and other key locations will be showing you how they used geo capability, what support it gave them and what results they achieved in-theatre. It is not just the commanding general who needs geospatial information, it is every single soldier on the ground!

GEOSPATIAL ARCHITECTURE – Most defence IT and systems will soon be based on a map and fully integrated with all available geo capabilities. Given the importance of integrated networks, DGI is dedicating over 10 hours to case studies, presentations, debate, interoperability and integration of GIS capabilities into the overall architecture.

GEOSPATIAL INTELLIGENCE IN C4ISR – There will be several case study presentations from different European and North American nations, talking about their experience of implementing a truly integrated GIS strategy in their C4ISR system.

HUMAN TERRAIN ANALYSIS – Most MODs are rapidly developing their HTA strategy, making it a key part of their GIS capability. DGI is dedicating an entire day of case study presentations, debates, panel discussions and new solutions to HTA.

GEOSPATIAL SOLUTIONS AND TECHNOLOGIES EXPO – Designed to bring you not only the best solutions for your geospatial strategy, but to show you the latest new ideas, concepts and capabilities, which are currently being developed and tested.

“The selection of case studies is perfect and delivers a valuable review of the critical geo-information challenges we all face.”

Lt. Col. Richard Nicklin, National Military
Expert (Geospatial), EU Military Staff



CONTACT US TO RECEIVE YOUR OWN COPY OF THE NEW DGI 2011 AGENDA AND TO STAY UPDATED WITH THE LATEST DEVELOPMENTS

+44 (0) 20 7365 9465



dgi@wbr.co.uk

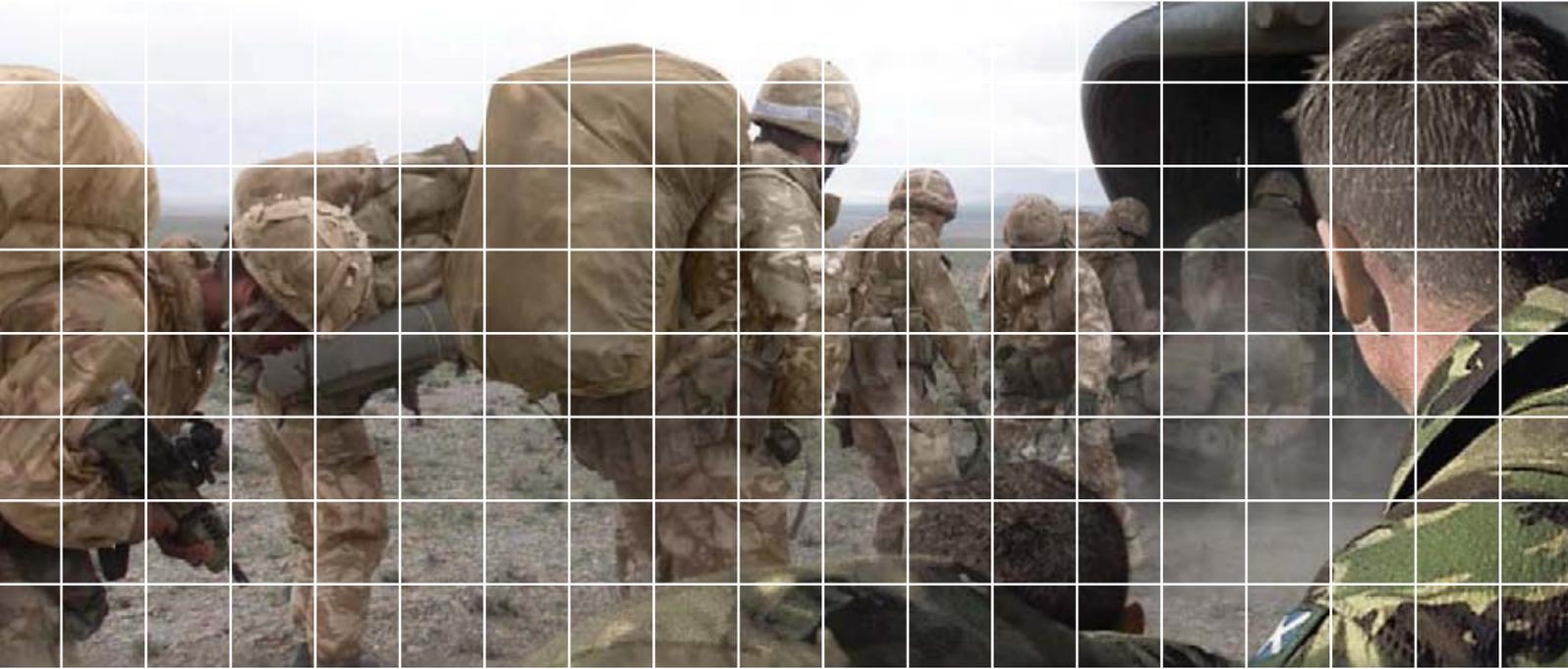


www.DefenceGeospatial.com



+44 (0) 20 7368 9401

GRANBY to HERRICK:



20 years of
supporting UK operations

Know where. Know when. Know why.

Achieving situational understanding in today's highly complex environments is critical to mission success. Over the last 20 years, ESRI (UK)'s geographic information systems have helped focus precious assets and resources for best effect. From Kuwait to Afghanistan, our visualisation of the battle space has informed key decisions on where and when to take action. This is why we believe nobody puts you in a better position.

Nobody puts you in a better position

To find out more, please visit:

www.abetterposition.co.uk or call 01296 745 630



ESRI UK
Visionary Thinking