

THE RANGER

Journal of the Defence Surveyors' Association
Summer 2005

Volume 2 Number 11



Celebrating Science Foundation Degree graduates at the Royal School of Military Survey



Registered Charity No. 221816

Sponsored by **BAE SYSTEMS**

Your Partner for Surveying Solutions

Setting the standard for surveying solutions. Many organisations and large projects have chosen Leica Geosystems for their partner.

This is due to the outstanding range of quality products and also the additional Surveying Solutions that Leica Geosystems provide.

For further information about our products and services please call 01908 256500

Services

- **Comprehensive technical product & software support**
- **Hardware maintenance contracts**
- **Installation support & backup**
- **Services & calibrations**
- **On-site demonstrations**
- **Training courses - external, internal, customised**
- **Modern fully equipped training facility**
- **Updates - software & firmware**
- **Regional workshops & open days**
- **Newsletters**
- **Worldwide support network**
- **Warranty & services agreements**

Products

- **Total Stations**
- **GPS Solutions**
- **Survey Software**
- **3D Laser Scanning**
- **Digital Levels**
- **Machine Guidance**
- **Monitoring Solutions**
- **Tunnelling & Rail Solutions**
- **Construction Levels & Lasers**



Contents - Summer 2005

<i>Item</i>	<i>Page</i>
Editorial	2
The Defence Surveyors' Association	3
New Members	4
The Launch of Defence Geospatial Intelligence (DGI)	5
DSA Visit to AIDU	6
DSA Visit to the D-Day beaches of Normandy	7
Geospatial lessons identified from Exercise Joint Venture	9
Survey Production Centre 'Hillside'	13
The Aeronautical Production System	17
<i>HMS Scott</i> : Sumatra Survey	22
Geo People	30
Award of Science Foundation Degrees at RSMS	32
One Hundred and Fifty Years Ago	36
Early Days of Sound Ranging on The Western Front	37
A Monk goes Sound Ranging	41

This edition of Ranger...

.....we carry news of the latest change in the status of the military geographic organisation – now called Defence Geospatial Intelligence (DGI) and no longer an agency. Air Commodore Martin Hallam became Director DGI on the formation of the new organisation but he will relinquish the post in June. The next issue of Ranger will include a biography of the new Director.

Our cover story has Geographic soldiers swapping their combat kit for academic gowns for the Foundation Degree Graduation Day at Hermitage, a momentous step forward in the recognition of the training provided by the Royal School of Military Survey and the quality of today's technicians. Congratulations to the staff and all the graduates.

Readers may well have seen on television or in the national press the stunning images of the Indian Ocean seabed after the horrendous tsunami on Boxing Day. These images were produced by Royal Navy hydrographers on board *HMS Scott* which had been diverted from its routine tasking to survey the area and produce data to assist the scientific community in its quest for greater understanding of the natural disaster. The quality of the imagery was a tribute to the technical expertise of today's maritime surveyors and we are pleased to include a full article on the project in this issue.

Our major historic article steps back to the very roots of the DSA as an organisation – the birth of sound ranging during the First World War. Tony Grange-Bennett was intrigued to discover that a monk had been killed in action when serving as a sound ranger on the Western Front and so researched the story of the man and his military trade. The results are two articles, the first telling of the early days of sound ranging and the second the personal story of a very unique and brave man.

Finally we welcome two new official representatives to the DSA Council, Captain Bob Stewart replaces Ian Turner who has now taken up the prestigious post of Captain HM and Hydrographer of the Navy and WO2 (SMIG) Jason Cartwright RA who now fills the Royal Artillery chair.

Enjoy a good read

Alan Gordon

Officers of the Association

President

Major General PF Fagan CB MBE MSc FRICS FCMI

Chairman

Colonel JAN Croft

Royal Navy Representative

Captain R Stewart RN

Royal Artillery Representative

WOII (SMIG) J Cartwright RA

DGIA Representative

Lieutenant Colonel MRH Burrows BSc MA RE

Hon Secretary

David A Wallis HonRICS, FCIM
161 Cooden Drive, Bexhill-on-Sea
East Sussex TN39 3AQ

Tel: 01424 842 591

Email: secretary@defencesurveyorsassociation.org

Hon Treasurer

Shaun Jones
The White House
8 Latimer Close, Little Chalfont
Amersham HP6 6QS

Tel: 01494 762381

Email: treasurer@defencesurveyorsassociation.org

Membership Secretary

Lieutenant Colonel JF Prain RE, MA, MSc, FRICS, MRIN
The Old Forge House
Quidhampton, Salisbury
Wilts SP2 9AT

Tel: 01722 743533

Email: membership@defencesurveyorsassociation.org

Editor of the Ranger

Major AA Gordon FRGS, FRSPSoc, MCMI
1 Majorca Avenue, Andover
Hampshire SP10 1JW

Tel: 01264 359700

Email: editor@defencesurveyorsassociation.org

Official Address

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

Web Site:

www.defencesurveyorsassociation.org

Registered Charity 221816

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

DEFENCE SURVEYORS' ASSOCIATION

Formerly the Field Survey Association

The Defence Surveyors' Association, or DSA, is a registered charity whose principal objectives are:

- To maintain a permanent liaison between serving officers, retired personnel and civilians working in the Defence domain who have a professional interest in geospatial data.
- To keep abreast of current issues in the geomatics arena.
- To recognise the most significant contributions to geomatics by serving personnel through the award of annual prizes.

The Association publishes the Ranger journal on a periodic basis and organises various technical visits and social events for its members. These meetings provide an ideal opportunity to meet a wide range of people, all of whom have a connection with some aspect of the geomatics profession.

The Council of the Association is currently widening its membership and improving its services to members. *If you want to keep in touch with the survey profession and friends in the business please come and join us.*

Membership is open to personnel who are engaged, or have been engaged, in Defence related geomatic disciplines at a management level. In addition, a candidate for membership must also be known personally to at least two Members, who, as sponsors, must satisfy the Council that he or she is suitable for membership.

The cost of membership is a modest £15 per year payable by standing order on the 1st January. New members joining while still serving get free membership for the remainder of the year in which they join.

Anyone wishing to apply for membership should contact the Association at its registered address or e-mail the Membership Secretary at membership@defencesurveyorsassociation.org



Major-General Eric Barton and his wife Pam relaxing on the garden seat that was presented to the General by the DSA to mark his retirement as President.

New Members

Ben Burrows: joined the Royal Engineers in 1942 and took part in the Italian Campaign during 1944 and 1945. After completing No 6 Army Survey Course ('50-'51) he undertook a tour with the Directorate of Overseas Surveys in Nyasaland (Malawi) and then became Senior Instructor Field Survey at SMS. Subsequent posts included Officer Commanding 84 Field Survey Squadron in Malaysia, the Long Photogrammetry Course, Assistant Director Survey FARELF, Commanding Officer 42 Survey Engineer Regiment and finally Assistant Director Survey BAOR from 1970 until 1973. He retired from the Regular Army and took up Retired Officers' posts in Training and Development and subsequently as the Survey Author at Hermitage.

Ted Halliday: was also a member of No 6 Army Survey Course after which he undertook surveys in Central and East Africa. Subsequent tours included: Second in Command 13 Field Survey Squadron; Deputy Assistant Director Survey at GHQ RE; Officer Commanding 13 Squadron; Senior Instructor Field Survey SMS; an Assistant Director appointment at Ordnance Survey; Commandant SMS. Following promotion to Colonel Ted was Chief Geographic Officer NORTHAG and then Deputy Director Survey and Production Ordnance Survey before retiring in 1979.

Andy Edgley: joined the Royal Navy and specialised as a Meteorology and Oceanography Officer. He gained wide experience across maritime and Joint Operational arenas and whilst at the Fleet Weather and Oceanographic Centre he ran the team generating and maintaining the embryonic Recognised Environmental Picture during Operation TELIC (Iraq War) and then continued his involvement with the development of this capability. His final tour of duty was on *HMS Illustrious*. He retired from the Navy in 2005 and joined System Engineering and Assessment Ltd.

Mike Mockford: had nearly 50 years of experience in intelligence, imagery analysis and military survey associated work, including 10 years in military targeting and the planning and management of targeting materials. He was involved in the control, management and design of military databases. He is experienced in Logistics and Maritime intelligence, the development and management of intelligence mapping and industrial analysis. During his service he had 9 years of teaching experience including transportation, military tactics, and industrial analysis. His appointments included an exchange tour teaching these topics to US Forces. He also completed a liaison tour with the Embassy Staff in Washington DC and tours of duty with NATO, in the Middle East and the Far East.

James Sibbald: served with the Royal Regiment of Artillery for 17 years undertaking the Instructor in Gunnery Course from January to December 1992 and the Design of Information Systems Course at Shrivenham from January to December 1995. Jim's appointments included Operational Officer/Battery Commander of a Depth Fire Regiment from July 2000 until January 2003 after which he retired from the Army. Jim is now Defence Account Manager with ESRI (UK) Limited. He has been a Fellow of the Institute of Directors since 1995.

Robin Arney: attended the Long Gunnery Staff Course (Locating) in 1969-1970 and instructed on the Long Gunnery Staff Course from 1970-1972 and again from 1981-1982. Other appointments included Officer Commanding a Locating Battery ('78-'81) and the Requirements Originator for RA Survey Equipment from 1990 until 1992. Following retirement from the Army Robin joined Leica GeoSystems where he is Sales Manager Special Products.

BOOK REVIEWS

Members knowing of newly published books that might be of interest to readers are asked to let the editor know the details so that a review can be published in Ranger.



Defence Geospatial Intelligence Emerges from DGIA De-Agencification

DGI MISSION

**Meeting Defence Needs for
Geospatial Information
and Imagery Intelligence.**

On the 1st of April 2005 Executive Agency status was removed from the Defence Geographic and Imagery Intelligence Agency (DGIA) and the organisation has adopted the new title Defence Geospatial Intelligence (DGI). There will be no significant changes to the organisation or management processes; however there are changes to the legal framework and the accounting obligations. As an Executive Agency the DGIA has not had a long life. It was only on 4th of April 2000 that the DGIA was formally launched and brought together Military Survey (Mil Svy), 42 Survey Engineer Group and Joint Air Reconnaissance Intelligence Centre (JARIC). The launch also marked the creation of the Defence Geographic Centre (DGC) at Feltham collocating Mil Svy activities at Feltham, Tolworth, Whitehall and Guildford. The original decision to converge was made primarily because these different Units were clearly inter-related and amalgamation combined their specialist skills and knowledge, progressively enhancing support to Defence.

Over the years the Agency has increased its outputs in support of Defence and made significant contributions to the support of operations mounted by Other Government Departments. The Agency has continued to be at the forefront of emerging technologies, the provision of digital data in vector and raster format and is a pivotal authority as the end user in the PICASSO Programme. PICASSO is now in its initial stages of procurement and will deliver an enterprise wide, integrated information environment, thereby enabling the DGI to provide a more effective Geospatial Information and Imagery Intelligence service to Defence and Other Government Departments.

The decision to de-Agencify has been made in response to significant changes in operational structures and business management processes across UK Defence. The Landscape Review in 2003 fulfilled the MOD's obligation to review all Agencies across Defence and opened the way for Executive Agency status to be removed from DGIA.

A Business Case to effect this change was prepared by DGIA and DIS staffs and, following a rigorous approval process by MOD, Cabinet Office and Treasury officials, Ministers finally agreed that Executive Agency status should be removed from DGIA on 1st of April 2005.

As a part of the de-Agencification process, the name of the organisation has been changed to Defence Geospatial Intelligence (DGI) and our logo has been modified accordingly. The Chief Executive's title within the new organisation is Director DGI.

The name has been chosen to reflect the organisation's developing capabilities as we move into the PICASSO era. It is implicit that Geospatial Intelligence is the combination of Geospatial Information and Imagery Intelligence, consequently embracing all of our existing core specialist knowledge. DGI uses this knowledge and our deployable capabilities to deliver increasingly integrated operational products and services to Defence and other Government Departments through the exploitation of both Geospatial Information and Imagery Intelligence.

DSA Visit to No 1 AIDU RAF

Alan Gordon

One of the key benefits that DSA membership has to offer are private visits to establishments that is strictly 'off limits' to the general public. Such an opportunity occurred on the 16th of March when a small party from the Association was privileged to be given a guided tour of 1 Air Information Documents Unit, the small RAF unit tasked with providing up-to-the-minute aeronautical navigation information not only to UK defence users but also to commercial customers world wide. The tour was particular interesting and enjoyable not only because it was hosted personally by the unit commander, Wing Commander Gary Barber ably assisted by WO Andy Fuller the technical expert, but also because the unit prints the Ranger.

Based at RAF Northolt, the 140-strong unit produces an impressive array of products both digital and paper (we learnt that the paperless cockpit is still a long way from reality – rather like the mythical paperless office). The staff are a mix of RAF personnel who all belong to the Air Cartographer trade group and civilians. Unique among service geospatial production agencies, the unit has a complete end-to-end chart and document production system starting with the receipt of data from multiple international sources through to high speed lithographic printing presses and the full range of finishing equipment necessary to despatch folded large-format charts and perfect-bound booklets worldwide. Needless to say, the process includes rigorous quality assurance procedures to ensure absolute accuracy and data currency at all times, essential as the unit's outputs are critical to flight safety. We were also given a detailed description of the current modernisation project to migrate the production system to a new one based on Laser-Scan's Gothic technology – this initiative is truly world leading and puts 1 AIDU at the forefront of geospatial technology. An article describing this new system appears in this issue of Ranger.

What's in a name?

Changing military unit titles is a very stressful business and the cause of endless discussion that usually leaves nobody completely satisfied. The recent changes to the organisation of the infantry have bred yet another batch of new 'brand names' which for most of the population will be meaningless. It has been said that the choice of new names has been unimaginative and has severed long established links with the amalgamated units. A case in mind is the new Yorkshire Regiment – considered a bland and all-embracing title totally divorced from the merged three regiments: the Prince Of Wales Own Regiment of Yorkshire, the Green Howards and the Duke of Wellington's Regiment – surely the powers that be could have come up with something on the lines of: *The Prince of Wales Own Green Wellingtons!*

BAE Systems creates a new systems integration business - INSYTE

BAE Systems, a long time sponsor of Ranger, recently announced the creation of a new world-class systems integration and C4ISR business, BAE Systems Integrated System Technologies (Insyte), through bringing together AMS UK and BAE Systems C4ISR Networked Systems and Solutions businesses. The creation of the new business has enabled BAE Systems to bring its systems integration activities into one significant, wholly owned business. The new company operates in the areas of joint, naval, land and air systems and Homeland Security.

DSA Visit to the D-Day beaches of Normandy

By Geoff Gathercole

Following on from the D Day 60th Anniversary Commemoration Symposium at the National Maritime Museum, Greenwich, a small group from the DSA joined a tour of the D Day beaches on the 4th October, organised by Leger Holidays. The first day was spent travelling to Dover for the crossing to Calais and on to the hotel in Caen, which was to be our base. The long coach journey was enlivened by video presentations on the background to the invasion and the subsequent battle for Normandy, and by commentary by Dr Jaqui Henderson, our enthusiastic and knowledgeable battlefield tour guide.

Our first stop next day was where the British 6th (Airborne) Division captured Pegasus bridge over the Caen canal very early on D Day. This has now been replaced by a much larger structure (built by a German firm) to meet modern transport needs, but the original is close by as part of an interesting museum containing a replica 'Horsa' glider and other relics of the action. We continued onto the immaculately maintained Commonwealth War Graves Commission Cemetery at Ranville where many of the paratroopers are buried.

The sandy Sword, Gold and Juno beaches are now crowded with holiday villas inland. However, it is possible from a study of the declassified maps of the beaches now reproduced by the DGIA to see how closely defended by fire and obstacles they were and how important it was to get the landed troops, vehicles and equipment off the beach and inland quickly. In our tour party we had two veterans, one who had been with the Royal Signals and the other with the Royal Navy bringing supplies, who were able to describe their experiences on the D Day beaches.

At Arromanches many of the remnants of the Mulberry Harbour are still in position off shore and the excellent museum contains a large scale working model showing how the various piers and sections coped with the tides. Merville Battery, a large German gun site constructed to fire shells directly onto Sword beach, is now a museum with bunkers and bomb craters little changed since early on the 6th June 1944 when it was heroically disarmed by the 9th Battalion Parachute Regiment.



A D-Day beach 60 years on

In the American area of operations, we visited the huge United States National Cemetery directly overlooking the steep slopes leading down to Omaha beach. The Pointe du Hoc nearby, again left unchanged since it was heavily bombed and shelled, was the scene of the famous cliff assault by the American Rangers. Travelling across land which had been flooded as part of the German defence system, we went to Ste Mere Eglise, where the US paratroops had dropped into the middle of the town, and then onto visit Utah Beach.

On the fourth day of our tour we explored the events after the 6th June as the allies fought inland. At Villiers Bocage, a town impressively rebuilt, we had described the actions of a German tank ace who with his Tiger tanks slowed down the advance of the British 7th Armoured Division. We then studied on the ground how in 'Operation Epsom' the 15th Scottish and the 43rd Wessex Divisions captured the dominant 'Hill 112' from the Hitler Jugend Division. Finally we went to the Polish Memorial 'Maczuga' at Montormel which overlooks the Falaise gap where the British, Canadian and Polish Divisions closed the only remaining escape route for the German 7th Army and thus brought to an end the Normandy campaign. This fine viewpoint was a fitting climax to a well organised and most interesting tour.

Photographs by John White



Geospatial Lessons Identified from Exercise Joint Venture

By Lieutenant Colonel Mark Burrows RE: CO 42 Engineer Regiment (Geo)

Introduction

Once a year, or thereabouts, the UK's Joint Task Force Headquarters sets itself up for a command post exercise and the Maritime, Land, Air and Logistic Components Headquarters, under command of the Joint Task Force Headquarters are put through their paces. No troops as such deploy outside the UK. The last exercise of this sort was carried out in November and was called JOINT VENTURE 2004.

This particular exercise scenario was based on some imaginary countries with ethnic, tribal and religious mixes, all of which were in some political turmoil. The scenario also included sufficient battle space for maritime, land and air forces to be deployed so that all the Component Command staff could be sufficiently tested. From a geospatial point of view, the charts, mapping and weather are real but the place names are changed to something imaginary.

One of the aims of JOINT VENTURE 2004 was to display and use the Recognized Environmental Picture (REP). This is effectively a common understanding of the sea, ground and weather/climate. The idea is that we should, for example, have a common grid system, common spheroid and even a common weather forecast for the whole theatre of operations: not separate weather forecasts (which are usually different) for each service.

A further aim was to set a tri-service "Environmental Cell" comprising Royal Engineers (RE) Geographic specialists, Royal Navy (RN) Hydrographers and Meteorologists /Oceanographers and Royal Air Force (RAF) Meteorologists.

The Exercise

The deployment took place on a misty November morning and all assembled at a wind swept airfield somewhere in Wiltshire. It was still dark and many had travelled from afar. Eventually the 'Environmental' staff came together comprising RE Geo Staff and members of the RN Hydro/Met community. We were subsequently joined by members of the RAF Mobile Meteorological Unit. More for historical and cap badge reasons, we were placed under the command of the Joint Force Engineer who kindly gave us the space and the facilities to operate.

After several days the scope for developing some synergy became more apparent. It was important to identify how the weather, for example, affected cross country movement across the land and sea states, and in turn how such conditions affected the overall planning process. Within the Joint Task Force Headquarters, 'Environmental' Briefs were given twice daily, and clearly stated how the changing circumstances might affect the changes in operational activity. Examples included:

- How increased cloud cover affected the collection of overhead, visible range and infra-red imagery, and therefore Radar imaging techniques needed to be used.
- How high levels of sun storm activity affected the propagation of High Frequency radios, therefore there was likely to be an increased demand to use satellite communication systems over a specified period.
- That beaches exposed to the prevailing winds should not be used as potential landing sites. Alternatives could usually be found, ideally ones with shelving shore lines, minimal tidal ranges and, more importantly, good road networks not far in land.

By the end of the exercise most of the planning community (the J5 staff) appreciated not only how the Environment affected the conduct of the operation, but also learnt more on how the environment could be exploited, rather than fought through. None of this was deemed to be rocket science: it is all military common sense. The difficulty though was to bring such information into the decision making process in a timely manner. History is littered with examples of commanders who either



Joint working - Lieutenant Commander Simon Wynn and WO2 Underhill

ignored the implications of the environment (Napoleon and his Russian Campaign, for example) and those who used their knowledge successfully, such as the Japanese Army in their attack on Malaya and Singapore in 1941.

Key Lessons Identified

The first point is that there is nothing new in combining the efforts of hydrographers, meteorologists and topographic surveyors in an attempt to get a sound understanding of the environment. The planning, prior to 5 June 1944, was a case in point where the effects of environment were well understood and played a significant role

in the decision making process. The Combined and Joint Planning Staff were fully cognisant of the weather situation and how it affected the sea state, which in turn would adversely affect landing operations, naval gunfire support and air/land co-ordination. A combination of bad weather and foul tides on 5 June was noted and decision was made to delay D-Day by 24 hours.

What has happened since? Possibly the single services have decided to go more their own way, coupled with the adage that battles are fought at sea (and occasionally in the air) but wars are won and lost on land. There is also a 'heavy infantry' perspective that the weather is there as a challenge, something to be fought through, rather than an opportunity which could be exploited.

During the JOINT VENTURE Exercise there was undoubtedly some synergy in getting all the environmental/geospatial community working together, a case of united we stood, divided we ran the risk of being marginalised. The strength was that it was possible to combine both the static information, such as the topography, with the more dynamic information, such as the weather and solar activity. The net result was that there was always some facet of environmental data that needed to be factored into the overall planning process.

The advantage of having officers embedded within the major headquarters was that they could show how the changing environmental conditions affected the current operations, and with more accurate predictions could influence future plans. The embedded officers need to be fully aware of how the planning process works and the current situation in the battle space. It is not sufficient merely to read out a weather forecast, or merely describe the ground: the environmental officer must draw deductions from what information he has, then show how it might affect the overall operational planning process. The officer needs to do this persuasively, with the aid of diagrams, imagery and mapping to ensure that his points are fully and accurately understood – all within a limited time span. As an aside, there was some lack of acceptance of a Maritime officer briefing about terrain, or for that matter, a Royal Engineer forecasting rainfall but in time, both earned the respect that was due to them.

The term 'Environment' was not widely understood within the Defence community – it conjures up ideas of Greenpeace and the 'Knit-Your-Own-Spaghetti' Society with a high proportion of its members wearing open toed sandals. If we stick with this term, then it needs to be understood better. There a number of ways that this can be achieved but probably the most effective is the steady attrition of deploying tri- service 'Environmental Cells' regularly on formation exercises. 42 Engineer Regiment (Geo) regularly supports formation exercises and would welcome the opportunity to deploy more frequently with Hydrographers and Meteorologists, so that the Geo Branches and Cells become more tri-service.

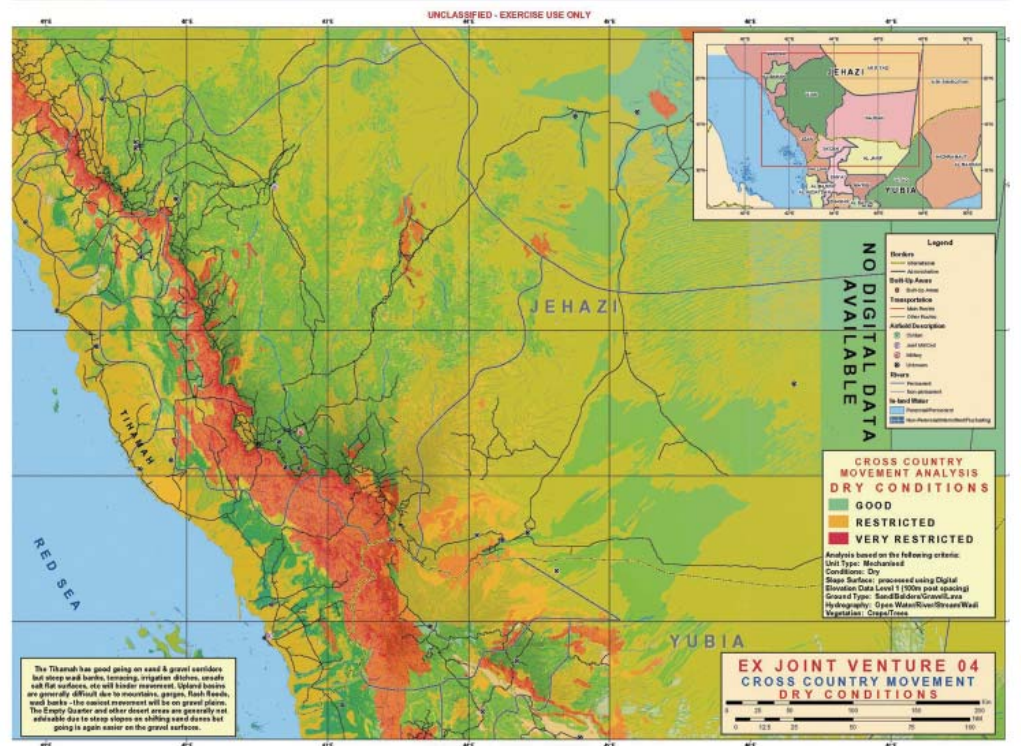
Conclusion

Overall the 'Environmental Cell' Concept was a success and collectively presented a common understanding of the sea, land and weather situation - alternatively known as the Recognized Environmental Picture. It was tri-service and could tap into a wealth of expertise. By the end of Exercise JOINT VENTURE 2004, the staff in both the Joint Task Force and Component Headquarters benefited from the additional timely information that was briefed into the decision making process.

A number of lessons were identified. Some of these are listed above, but all will be reviewed and taken up again on the next JOINT VENTURE Exercise, due in May 2005. Having embedded staff in Joint and Component Headquarters, it is vital and important that they make their presence felt and can influence their fellow staff officers. The Exercise itself could not hope to mirror reality precisely, but it certainly reflected much of the decision making and planning processes and timelines fairly accurately.

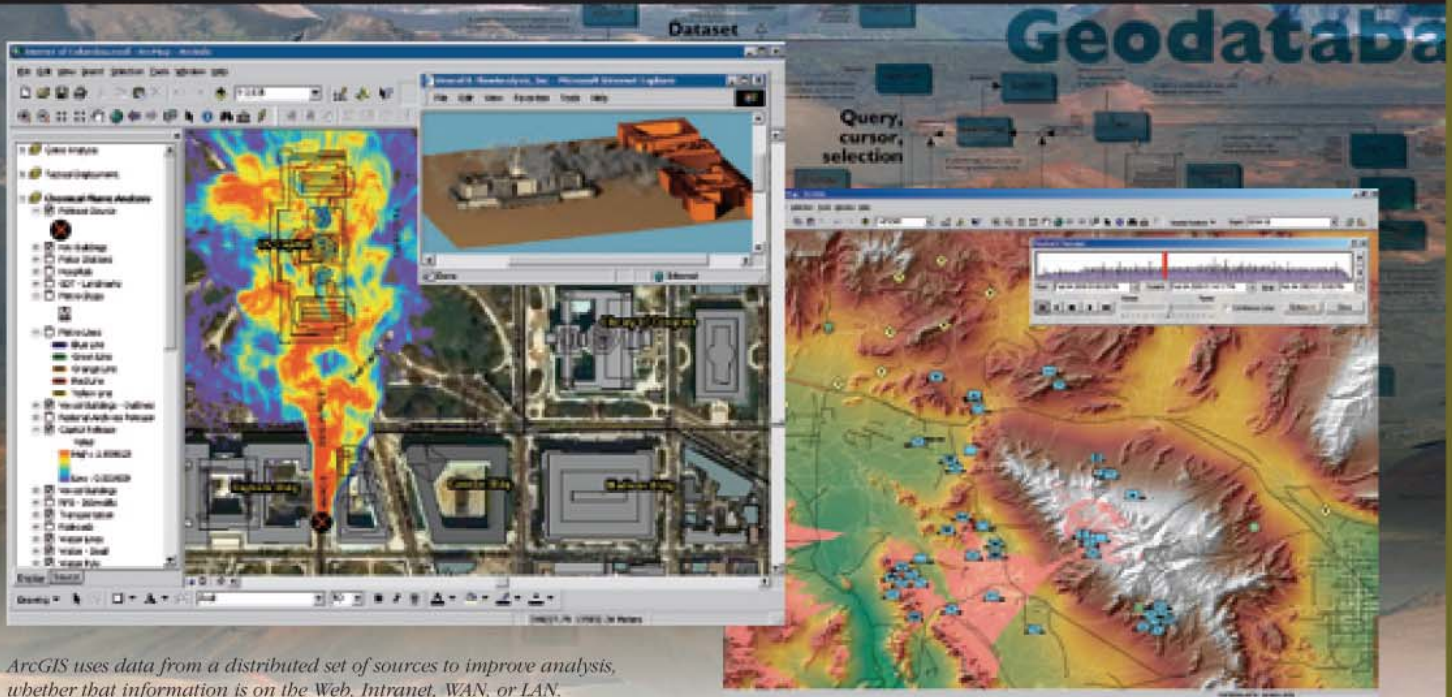
Collectively we are still in the early stages of becoming more Joint and getting the best out of the various tri-service geospatial (or Environmental?) communities. I am not sure about the term 'Environmental' – it still conjures up ideas of staff officers in open-toed sandals eating muesli but I am currently bereft of suggesting any better alternative.

In the short term, the way ahead is to keep up the profile of a united RE Geographic and Hydrographic and Meteorological Cell. The more that this concept is exercised, the more the benefits will be realised. Eventually, the tri-service geospatial cells will become better understood and accepted by the rest of the Defence Community.



Cross Country Movement graphic - a typical exercise product

GIS Is Making Defence Information Systems Spatial



ArcGIS uses data from a distributed set of sources to improve analysis, whether that information is on the Web, Intranet, WAN, or LAN.

ArcGIS offers a MIL-STD 2525B solution that provides unit symbology and tactical graphics.

Make Better Decisions Faster

Geographic information systems (GIS) have become more than just a specialist's tool. ArcGIS™ from ESRI is being used by defence organisations around the world to create powerful spatial information infrastructures. Commanders are discovering that digital maps and spatial analyses help users make better decisions faster.

Built upon modern standards, ArcGIS integrates into the IT infrastructure and can be used to create entire enterprise solutions or stand-alone applications. The same IT that delivers information to your desktop can now deliver and integrate spatial content. This includes situational awareness and decision superiority tools that help achieve battlespace dominance.



DEFENCE AND INTELLIGENCE USERS EMPLOY GIS TO

- Provide terrain analysis.
- Display a Common Operational Picture.
- Create effective facility management systems.
- Integrate battlefield operational systems.
- Perform visibility analysis.
- Develop contingency plans.
- Visualize data in 3D.
- Provide timely decision support.
- Track explosive ordnance removal.

In the United Kingdom contact:



info@esriuk.com
www.esriuk.com
+44 (01296) 745 500

Worldwide inquiries:



defense@esri.com
www.esri.com/defense
+1 (909) 793 2853

Survey Production Centre “Hillside”

Targeting Nazi Germany from Disraeli’s Mansion

By Alan Gordon

Night after night for five years streams of bombers, at first dozens but soon hundreds, headed from airfields in East Anglia out over the North Sea and across Germany to take the war to the Nazi heartland. Incredibly dangerous, 55,000 crew members were destined never to return, these raids were for a long period the only means by which Britain could strike at the enemy. Each of these raids, some such as the Dam Buster operation to become legends but mostly just a relentless listing of the names of major German cities – Essen, Hamburg, Dortmund and so on – all started life in an elegant Victorian mansion in rural Buckinghamshire near High Wycombe for Hughenden Manor was the home of Air Intelligence 1b, the Air Ministry branch responsible for the production of the target maps needed to plan and carry out each and every mission.

Benjamin Disraeli, the renowned Victorian statesman, spent over 30 years living in Hughenden Manor until his death in 1881. Some 60 years later this splendid stately home looked rather different following its requisition by the Air Ministry. Rooms once graced with elegant furniture were now filled with utilitarian ‘Government Issue’ drawing tables and the grand entrance hall was no longer manned by a butler but by Air Ministry Policemen. However, the Ministry did initiate one significant enhancement by installing electricity for the first time.

The head of the establishment was now a Military Surveyor, Major AP Quaife MBE RE, Officer Commanding the unit that was re-titled Survey Production Centre with the code name “Hillside”. The unit, eventually over 100 strong, comprised a mix of uniformed RAF and WAAF personnel and male and female civilian staff covering the complete mix of skills required to draw and print the 200 copies of each target map required by HQ Bomber Command.

‘Hillside’ was organised into a control office, intelligence department, four drawing offices, checking, camera, plate-making, printing and despatch sections and all the necessary support functions. Most were housed in the manor itself but the camera section was in the Ice House, Despatch had a Nissen hut in front of the house and the MT occupied the stables.

Most of those that worked in the Drawing Offices had before the war been cartoonists, artists, designers or architects. Each of these newly trained cartographers drew two target maps each and every week, week in, week out for years – no mean feat considering the basic tools and techniques then available.

The complete target map production process involved a number of units based at different but nearby locations. The Strategic Bombing Campaign planners selected a target and PR aircraft were then tasked to fly the photography necessary to produce the map. Interpreters at the Central Interpretation Unit (CIU) at RAF Medmenham extracted all the data possible from the imagery and sent the information 10 miles down the road to ‘Hillside’ where a target map was compiled, drawn, printed and 200 copies despatched to Bomber Command at Naphill 3 miles away. Here the details of the raid were planned and then the maps were sent to the airfields where the squadrons tasked for the mission were based. Immediately following the raid PR aircraft would be sent to photograph the effects of the bombing which was then assessed



North front during the war

TARGET NO 3 (k) 20 (-A).

EAGLE'S NEST

BERCHTESGADEN nr. Salzburg (Germany).

Lat: 47° 57' N.
Long: 13° 02' E.
Alt: 6050 feet (-A)
Circles: 1 mile
Scale: 1:63,360

NOTES:-

B = Wachenfels (Alt. 3,200 Feet).
(Co-ordinates are for A)

Relevant Map
160/Rev. 1944
1:100,000.

BERCHTESGADEN

TRUE NORTH

BEARINGS ARE MAGNETIC

330°/MAG. 340°/MAG. 350°/MAG. 360°/MAG. 010°/MAG. 020°/MAG. 030°/MAG. 040°/MAG.



A Hillside product - the target map for the raid on Hitler's alpine retreat



Inspection by Colonel JCT Willis OBE

by CIU, records updated and, in most cases, the relentless cycle started again with the production of updated target maps for the next assault.

In 1942 the Geographical Section General Staff (GSGS) was re-titled War Office Survey Production Centre with the code name 'Hygrade' after the factory building in which it was housed. Some time later the title changed to 1 SPC with 'Hillside' becoming 2 SPC (Air).

The end of the war meant that the unit had to leave the requisitioned manor and so in 1946 2 SPC vacated its stately home and moved to Bushy Park where its main products became approach and landing charts and other graphics necessary to support military and civilian air users. In June 1962 the two SPCs moved to the old Ordnance depot site at Feltham and amalgamated to form The Survey Production Centre RE, a title that lasted until 1970 when it became the Mapping and Charting Establishment RE (MCE RE). In the ensuing 35 years there have been many changes in title and organisation until today Hillside's successor is known as the Defence Geographic Centre.

And what of the manor house at Hughenden? In 1947 it was given to the National Trust who have carefully restored it to its former glory. The house now contains most of Disraeli's furniture, books and pictures and the garden is much as it was when Disraeli's wife Mary Anne designed it. This year, to mark the 60 years since the end of the war, the National Trust is mounting an exhibition to show the work of 'Hillside'. They collected remarkable first-hand stories from people who were there in such secrecy all those years ago, many of whom settled locally and still live nearby. The DSA are planning to organise a private visit to the exhibition later this year.



No. 1 Drawing Office



Laser-Scan

Don't hide from your data issues

Laser-Scan does smart things with spatial data. 35 years of experience, handling billions of features in National Mapping agencies like Ordnance Survey Great Britain, Institut Géographique National France, National Geospatial-Intelligence Agency, United Kingdom Hydrographic Office and the Royal Air Force means we have developed market leading data quality management solutions for geographic information.

Laser-Scan's software solutions allow you to increase value through the power of spatial data. We do this through delivering high quality data:

- Cleaning
- Generalising
- Conflating
- Structuring
- Maintaining

Laser-Scan Head Office
Cambridge, United Kingdom
Tel: +44 (0)1223 420 414
Fax: +44 (0)1223 420 044
email: info@laser-scan.com

Laser-Scan Kongsberg
Kongsberg, Norway
Tel: +47 32 299060
email: info@laser-scan.com

Laser-Scan Ireland
Dublin, Republic of Ireland
Tel: +353 (0) 1 820 2699
email: info@laser-scan.com

www.laser-scan.com

The Aeronautical Production System (APS)

Introduction

No. 1 Aeronautical Information Documents Unit (No. 1 AIDU) of the RAF publishes aeronautical information in graphical, textual and digital format for use by UK military and allied forces. In conjunction with Laser-Scan, the Unit has developed an Aeronautical Production System (APS). This system has been designed and built to enable No. 1 AIDU to maintain a single aeronautical database and produce both paper and digital products from it.

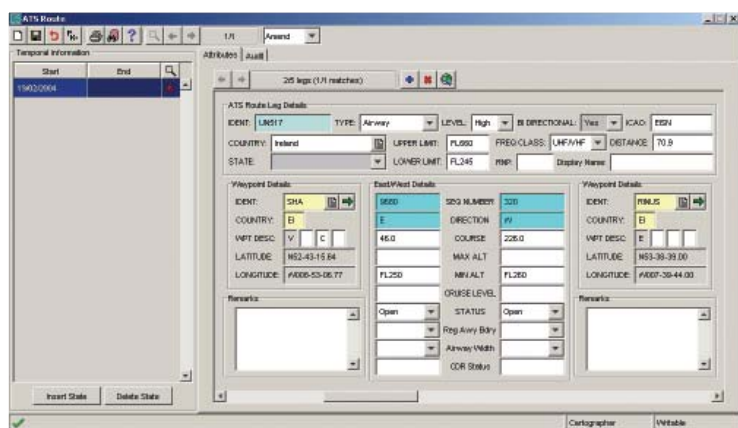
The Challenge

Prior to the development of the APS, charts were held as individual files. Each chart's files were maintained separately by a data maintenance team. Since numerous charts overlap one another, one change to the source data could impact many charts. Other paper and digital products were also affected in the same way. Updating the charts involved much duplication of effort and led to possible inconsistencies between the products. No. 1 AIDU wished to implement a system that could produce and maintain a variety of digital and paper products, including En-Route charts, using a single main data store; an Aeronautical Object Oriented Database (AOODB).

No. 1 AIDU is constrained to a 28 day Aeronautical Information Regulation and Control (AIRAC) production cycle. This constraint resulted in peaks and troughs in the work efficiency and prevented amendments being made to the products beyond the current cycle. They required a method for

making amendments to the source data regardless of which cycle the amendment pertains to, effectively updating their information at time of receipt in advance of the need for publication.

No. 1 AIDU also wished to automate its chart production process. Although digital, this was originally a highly interactive task as, although the features and objects on each chart had been digitised, they contained no intelligence. If features have intelligence they can decide how to represent themselves depending on the type of chart and their interaction with other features on the chart.



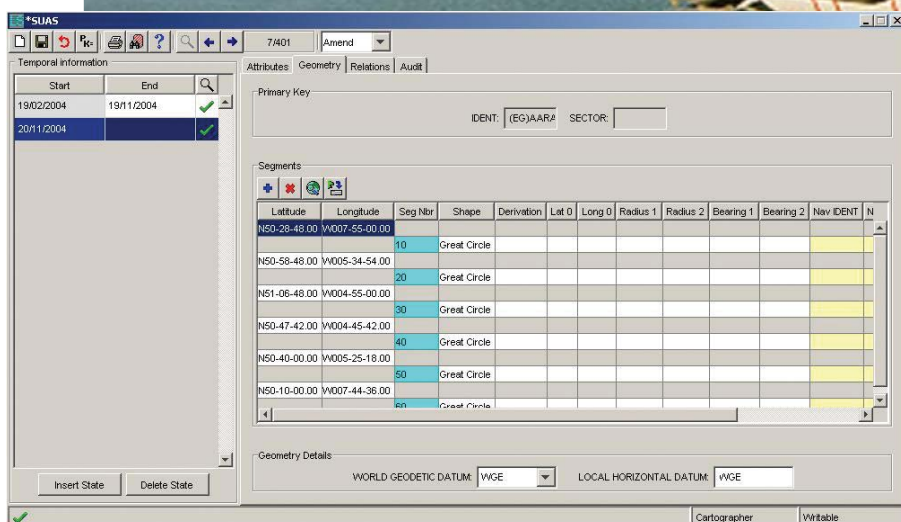
ATS Route user interface

THE SOLUTION

The foundation of the APS solution is the AOODB. The database schema of the AOODB is based upon the Digital Aeronautical Flight Information File (DAFIF) specification. DAFIF is the primary source of global aeronautical information and No.1 AIDU is responsible for maintaining a core area of the data with the remainder maintained by NGA (National Geospatial-Intelligence Agency), USA. The relational DAFIF specification has been implemented in Laser-Scan's Gothic geo-processing environment. Implementing the specification in Gothic's object-oriented architecture has provided the opportunity to build intelligence into the data.

In order to amend the data a custom graphical user interface (GUI) and application was built, using Laser-Scan's Java-based application development environment. The GUI has proved to be intuitive to use and extremely user friendly.

One of the first products to be generated from the APS is digital DAFIF data. Where necessary the AOODB DAFIF schema has been extended to allow for product specific attributes to be



SUAS Geometry user interface

stored. In addition to this, geographical data (coastlines and international boundaries) are stored in the AOODB for use by all products. These additions will allow other Flight Information Publication (FLIP) products, initially En-Route charts, to be derived from the system.

BENEFITS

Single continuous database

Laser-Scan's technology allows No. 1 AIDU to continuously model the whole world within a single geographical dataset. This allows aeronautical features to cross the International Date Line as well as North and South Poles.

Efficiency

The APS temporal functionality overcomes the production constraints placed on No. 1 AIDU by the 28-day AIRAC cycle. Laser-Scan's solution allows amendments to the database at any time, regardless of the amendment's activation date; this allows air cartographers to make updates beyond the current cycle and spreads the workload more evenly.

Excellent data quality

The DAFIF specification contains an extensive set of validation rules. The APS will be the first system to fully implement these rules. Data can be amended using a suite of purpose built user interfaces. As each amendment is committed it is validated against the rules. Invalid data will be rejected thereby ensuring excellent data quality.

Intelligent charts

Features with intelligence know how to display themselves when interacting with other features. For example, airspace boundaries use different styles of representation depending on whether or not they share a boundary segment with another feature. This intelligence is achieved through a combination of attribution and flexible topology.

New charts, using different geographical boundaries, can be quickly defined enabling No. 1 AIDU to react swiftly to changing worldwide events.

Better text handling

In appreciation of future phases and products beyond En-Route Charts, Laser-Scan has developed an export interface that incorporates a third party desktop publishing system: Adobe™ FrameMaker™. This will allow the system flexibility in producing heavily textual products, for example En-Route Supplements in addition to graphical and digital products.

FrameMaker™ also offers the potential to eliminate other elements of the current flowline in the future. This would offer additional cost-effectiveness benefits to the pre-press phase in the production of FLIPs.

Improved printing

Laser-Scan further developed the existing Gothic functionality to support the use of different inks printed products. This development supports the need for colour separated plotting, as well as allowing No. 1 AIDU to specify colours as spot or process colours.

Improved text placement

The new interface with FrameMaker™ enables supplementary text panel data to be collected directly from the AOODB as part of the automated label generation and text placement routines.

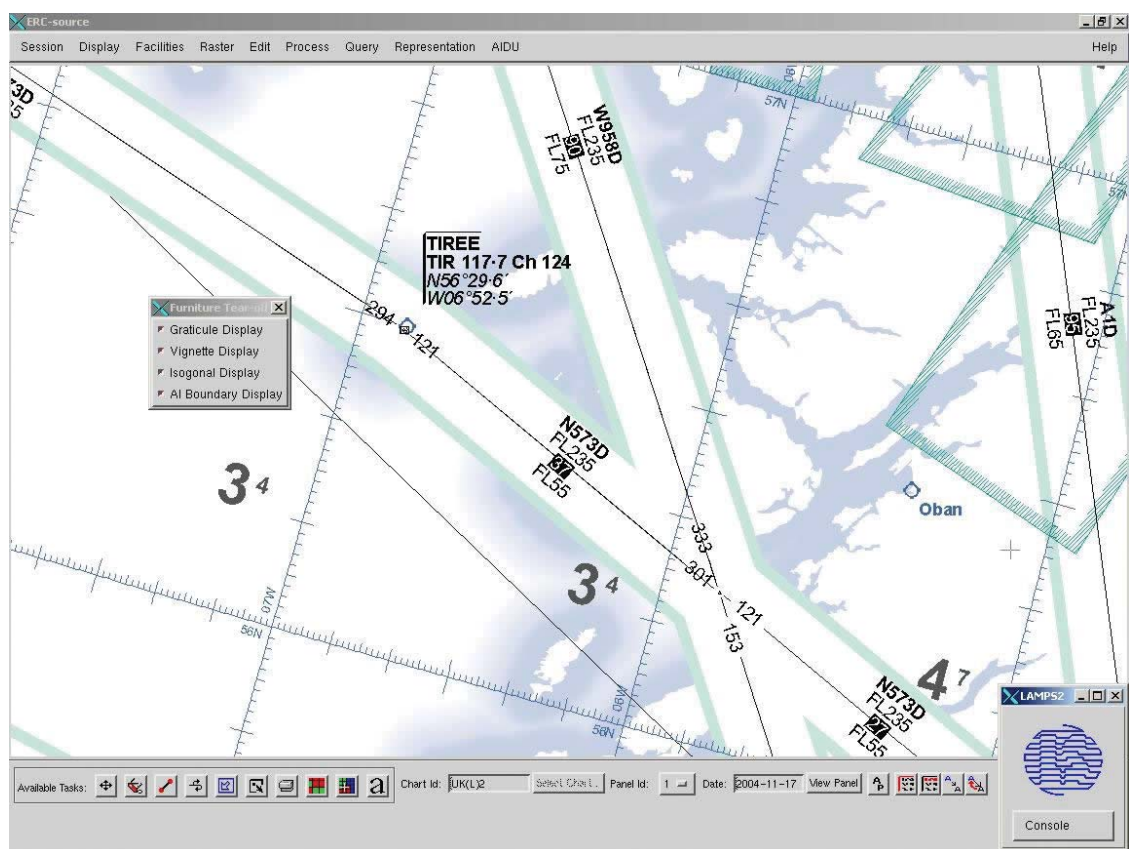
CONCLUSION

The APS has enabled No. 1 AIDU to improve data quality and consistency by maintaining all its data in a single database. This enhanced level of data quality is vital in creating user confidence and satisfaction as well as improving aircrew safety. Additional and improved chart editing, colour and text placement functionality allows the Unit to create products in multiple formats.

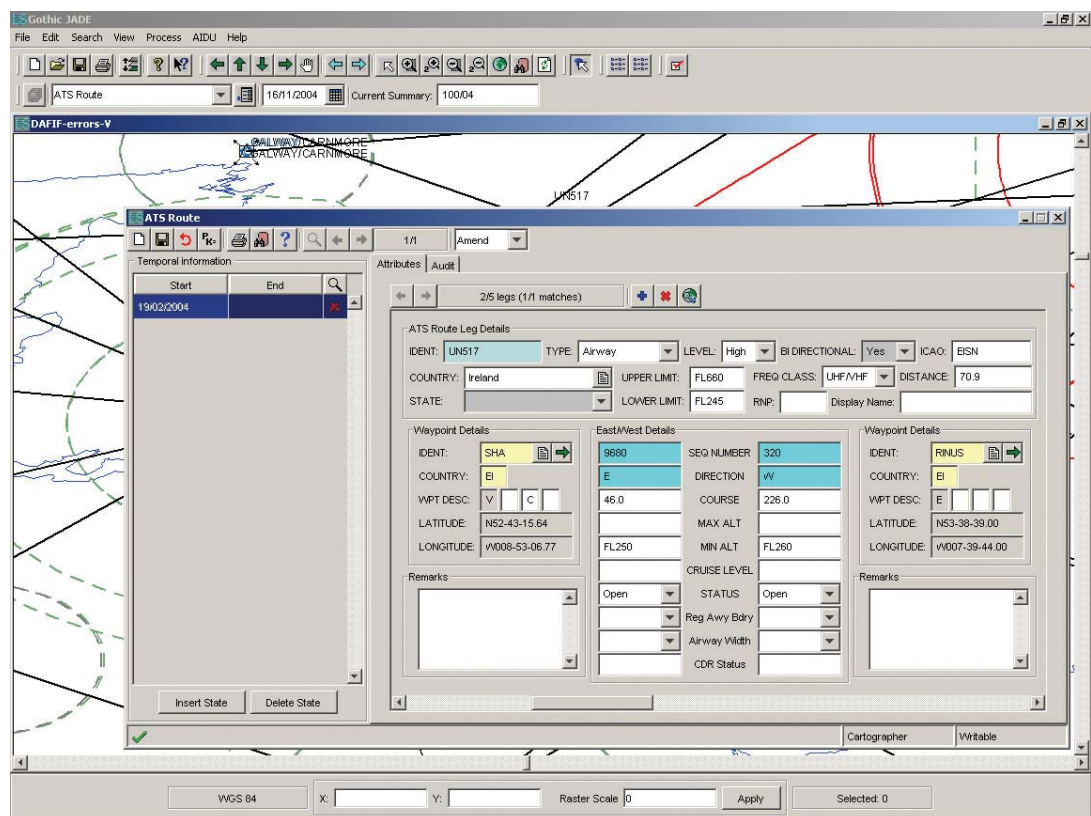
No. 1 AIDU has also achieved a greater level of efficiency. The creation of a single data source minimises the duplication of effort as well as reducing inconsistencies. This has led to substantial time and cost savings. The increased levels of productivity have allowed the Unit to develop its product ranges over a number of platforms as demanded by a dynamic customer base.

Wing Commander Gary Barber, Officer Commanding No. 1 AIDU said:

“No. 1 AIDU is delighted with the solution offered by Laser-Scan, and looks forward to continuing its long-standing relationship. The Gothic APS is an exciting technological leap forward, and the increased utility and data integrity that the system provides will make a significant contribution to flight safety.”



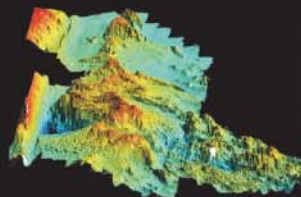
En-Route Chart production



APS user interface

Professional instrumentation for deepwater surveys

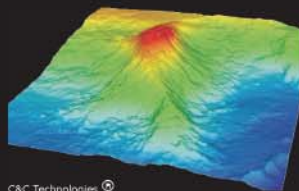
The instruments interface directly to the ship's data network and are prepared for synchronised operation to eliminate interference problems. Data Management and Data Processing solutions are available.



Norwegian Petroleum Directorate ©

EM 120

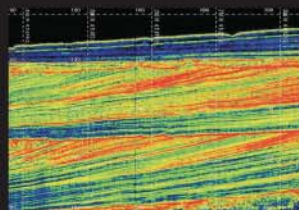
EM 120 is the leading multibeam echo sounder system for full ocean depth surveying and mapping. It offers stabilisation of acoustic beams for both yaw, pitch and roll, and produces clean, high precision bathymetry as well as acoustic seabed imagery/sidescan. Due to high power transmission of acoustic pulses and low noise receivers, the maximum swath coverage can be up to 25km. EM 120 can be integrated with a higher frequency system to an optimal seabed mapping system for all water depths. It is prepared for integration with SBP 120 sub bottom profiler, and interfaces directly to on-board data networks.



C&C Technologies ©

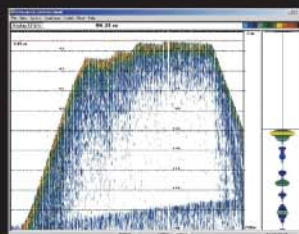
EM 300

EM 300 multibeam echo sounder is designed to do mapping from 10m depth to beyond the continental rises, including the shallower ocean basins. It operates down to approximately 5000m depth with swath widths up to about 5000m. Small transducers and compact electronics make the installation easy, and the system accuracy is generally well within the IHO standards.



SBP 120

SBP 120 is a sub bottom profiler for hull mounting, for operation in all water depths. It is a narrow beam profiler, beamwidths can be 3, 6, or 12 degrees. The system produces pitch/roll stabilised beams over a 30 degree swath and the system operation is optimised by integration with a multibeam echo sounder.



EA 600

The EA 600 echo sounder can store its echograms in digital format. You can even file them on a standard CD on the built-in recorder. Retrieving and printing the echograms is easy and convenient, using the echo sounder software on a standard computer. Therefore, you do not need to store paper echograms any longer and the echograms are easy to file, copy and distribute. EA 600 has support for multiple pings in the water, as well as precision tracking of pingers.

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



KONGSBERG

HMS Scott: Sumatra Survey

By Lieutenant Commander Louisa Gritt RN: Operations Officer HMS Scott

Introduction

On 26 December 2004 *HMS Scott* lay alongside in Cape Town getting ready to go to sea and begin her survey season in the Indian Ocean. At the same time a huge earthquake off the coast of Sumatra

caused an enormous tidal wave killing over 200,00 people and causing enormous devastation around the Indian Ocean. Sailing on the 27th of December, as *Scott* began to make her way around the southern tip of Africa and up along the coast of Madagascar the scale of the disaster began to emerge. As she neared the northern point of Madagascar the ship received a directive from CINCLFEET ordering her to turn right and head for the Far East. The ship was being re-tasked in support of the Tsunami aid effort, to be the first deep-water survey vessel in the area of the earthquake epicentre. Stopping off in Diego Garcia



HMS Scott en route to Sumatra

for a short fuelling visit the ship arrived in Singapore to take on stores, conduct watch rotation and embark 3 civilian geologists, Doctors Tim Henstock, Lisa McNeill (Southampton Oceanography Centre) and Dave Tappin, (British Geological Survey)

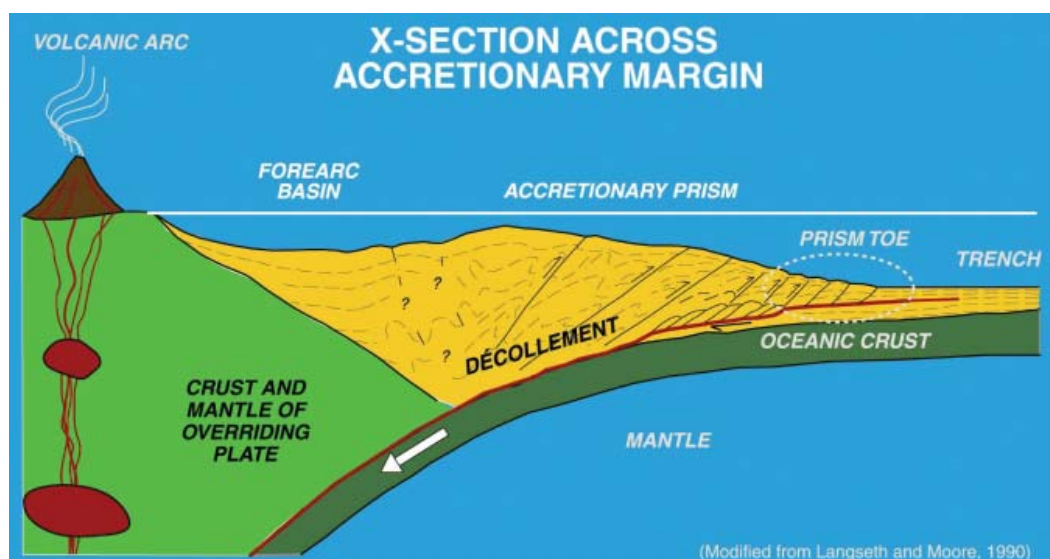


Diagram 1 showing a typical cross section of a subduction zone showing the main tectonic features. The survey collected data over the deformation front, accretionary wedge, outer arc high and forearc basin.

Scott sailed in late January and arrived on the survey ground on the 26th of January 2005, exactly one month after the earthquake had occurred. Taking advice from the embarked geologists *Scott* began to survey along the tectonic boundary between the oceanic Indian plate and the continental Eurasian plate. This is a classic subduction zone area, with the plates moving together at about 50-70mm per year forcing the oceanic plate under the continental plate (See diagram 1).

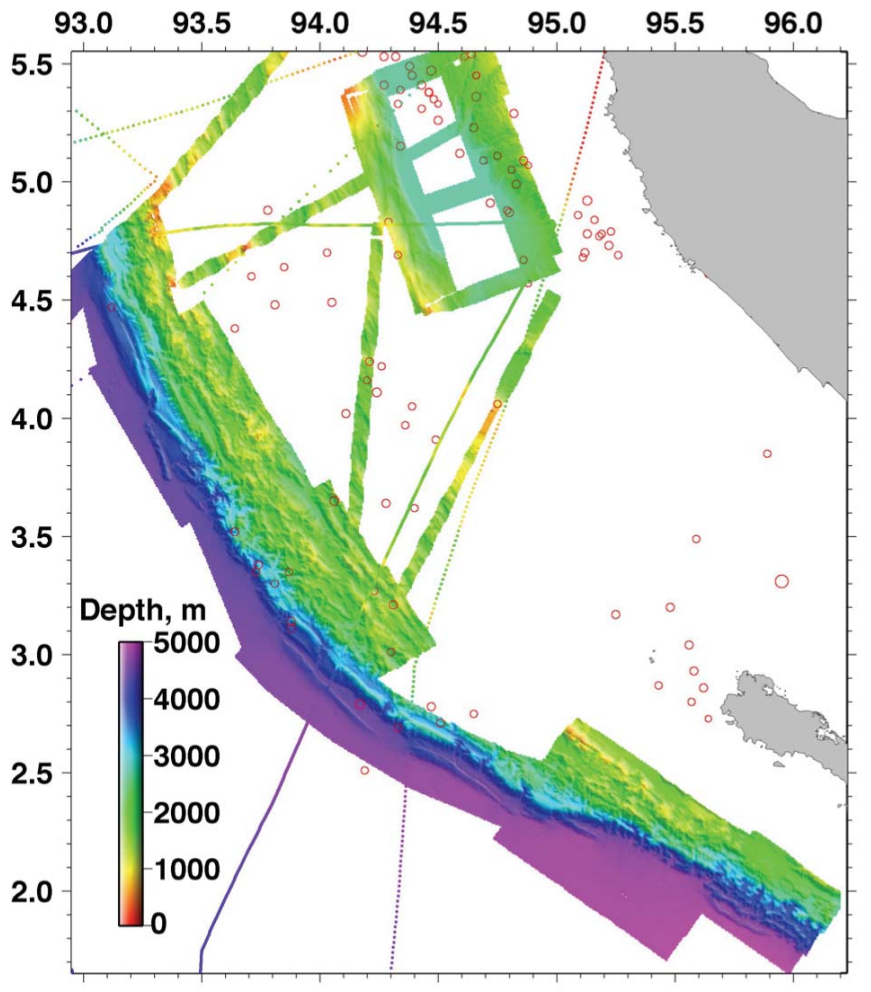


Diagram 2 showing the area surveyed during January and February 2005

26th. In addition, because this area was relatively poorly known in terms of marine geological and geophysical data, the embarked geologists were keen to map morphological changes across the area, to develop ideas on the structure and to plan for future surveys.

Scott's primary role is to gather bathymetric and oceanographic data to update bathymetric charts and so she was ideally suited to carry out the geologist's task. Equipped with her state of the art multi-beam sonar system she has the ability to collect depth information over a swathe of seabed several kilometres wide, allowing the ship to accurately survey up to 150 square kilometres of ocean floor every hour.

The geologists were particularly excited at being invited to embark in *Scott* for the period of this survey as this was the first time that a ship had been on the survey ground so soon after such an event collecting such high-resolution data. Although *Scott* has conducted non-military tasks in the past it was the first time that the Royal Navy and the United Kingdom Hydrographic Office (UKHO) had developed any sort of partnership with the United Kingdom academic community.

Aims of the Survey

The aims of this survey were to acquire swath bathymetry over the southern part of the rupture zone of the 26th December earthquake, identify seabed structures and their relative ages and to try and identify anything that might have happened on the

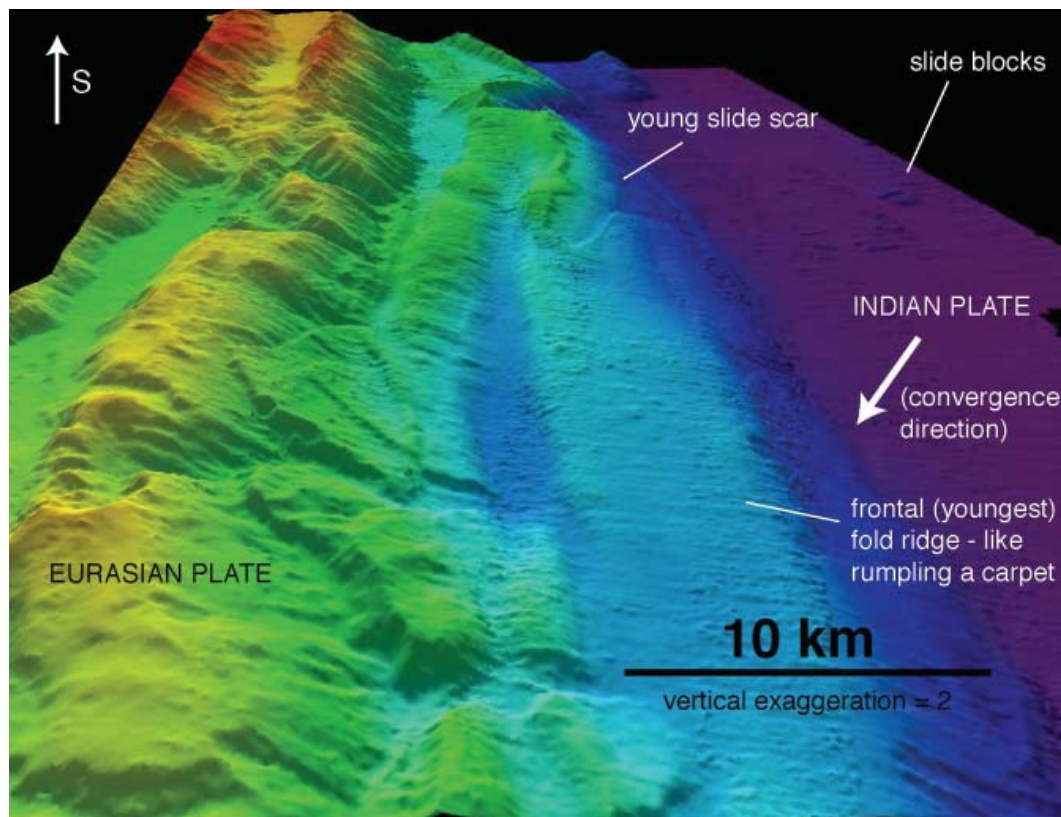


Diagram 3. Showing the plate boundary between the Oceanic Indian plate and the continental Eurasian plate. Evidence seen of “young” slide scars that are targeted for further investigation.

Survey System

Scott is fitted with the High Resolution Multi-Beam Sonar System (HRMBSS) and a fully integrated Ocean Survey Programme Survey System (OSPSS). This system utilises a combination of navigation, sonar, and gravimetric measurement, display and mass storage equipment to produce a highly accurate bathymetric end product for rendering to the UKHO at Taunton.

OSPSS consists of several major constituent parts which constantly “talk” to each other. They can be broken down into the following sub-systems:

- a. Navigation and Time
- b. Sonar
- c. Processing

Navigation and time sub-systems

The prime function of the Navigation Sub-system is to develop, process and record time correlated ship’s position in terms of latitude and longitude. The navigation sub-system takes real-time information from a variety of sensors and sources to provide accurate positioning and inertial motion compensating to beam steering. The Navigation and Time sub-systems consists of a number of components including two GPS receivers, two EM Logs, an Acoustic Doppler Profiler (ADCP), three Ring Laser Gyro Navigators (RLGNs), a track keeping system and a Time and Frequency System.

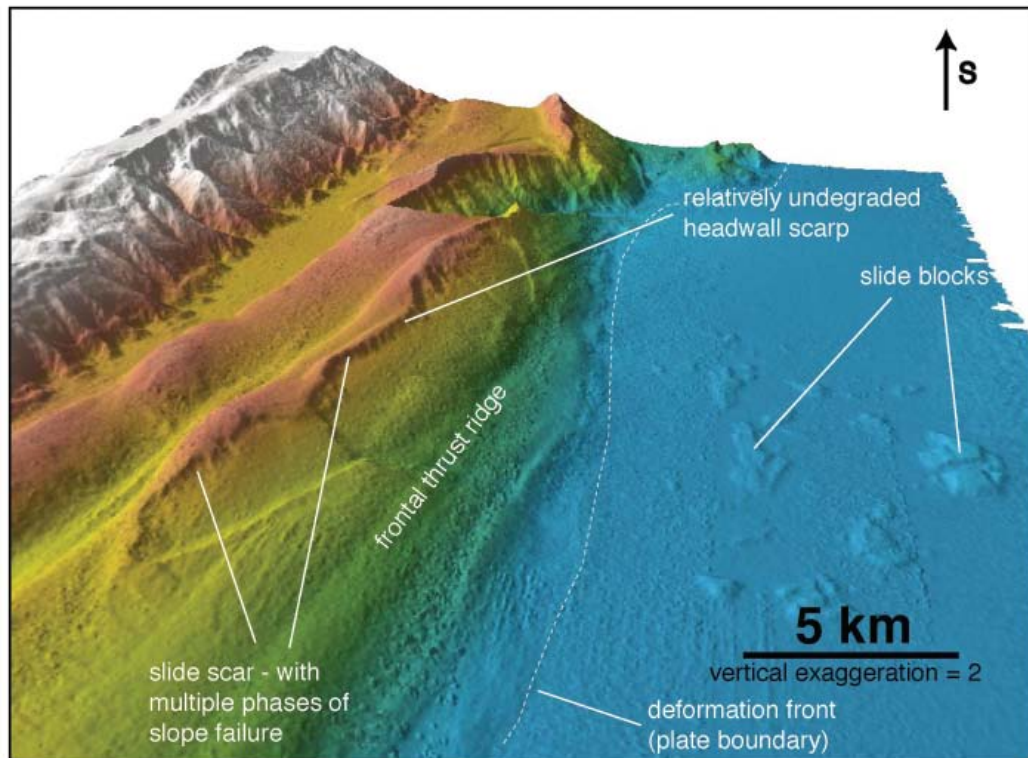


Diagram 4. Shows “young slide scar with angular blocks from slide on Deep Ocean floor.

Distributed navigation data consists of ship’s Best Present Position (BPP), ship’s velocity and the various parameters from which this data is derived. Ship’s BPP is distributed as Latitude and Longitude Data. Velocity is distributed as velocity components aligned in North/South, East/West, Fore/Aft, Port/Starboard and vertical directions. This is measured by both GPS, two EM logs and the ADCP. BPP is developed in real time utilising Ring Laser Gyro Navigator (RLGN) aided position data, which has been developed by the RLGN by applying a Kalman Filter Process to raw GPS measurements. GPS is noisy in the short term but highly accurate over time. Combining of GPS/RLGN data gives highly accurate BPP filtered data. The filtered data also contains PLV data from the EM Logs/ADCP and Navigation Computer that aids in countering drift during GPS failures/outages.

The Time and Frequency System consists of three (two operational and one spare) Rubidium Frequency Standards (atomic clocks) that create the “time stamp” and reference frequency for mission space GMT. The system supplies GMT to the OSPSS, Gravimeters, RLGNs and the Navigation System for comparison with GPS time.

Sonar sub-system

The function of the Sonar Sub-system is to develop, process and record time-correlated depth data using the above systems. The High Resolution Multi-Beam Sonar System (HRMBSS) measures the depth of the ocean floor down to a maximum design depth of 6,000 fathoms (approximately 11,000 metres). To accomplish this, HRMBSS transmits a 7ms pulse every 12/15 seconds in deep water and a 3ms pulse every 3, 4 or 6 seconds in shallower water. This is known as the ping rate. Ping rate is dependent on depth and processing speed.

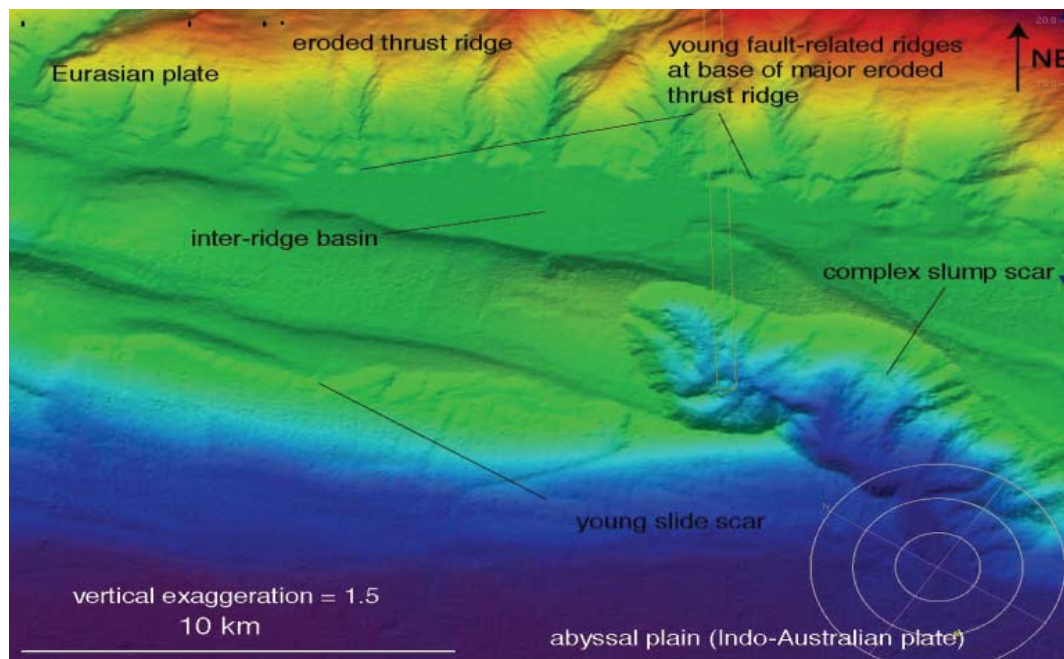


Diagram 5 Showing Multi-phase deformation (image produced using CARIS software)

The sonar transmits on a low frequency and the travel time and return angle are used in a ray-trace algorithm to determine initial depth. This initial depth data is processed and refined until acceptable convergence is achieved. Compensation for pitch, up to $\pm 10^\circ$, and roll, up to $\pm 15^\circ$, is made during transmission and reception respectively. Final processing of the return signal entails ray-bending corrections and an iterative technique to determine final cross track, along track and depth position for each of the 361 data points across the swathe. These are merged with navigation data from the Navigation System to enable geodetic placement and charting as the final product.

The Sound Velocity System provides data for use in HRMBSS in computing refraction corrections by using sensors, XBTs and historical Generalised Digital Environmental Models (GDEM) to obtain an accurate SV profile. An initial XBT cast is made on arrival at the survey area and periodically thereafter dependent on the dynamics of the geographical area. There are two types of XBT used in Scott, T5 and T7. The T7 collects data down to a depth of 750m where after the GDEM is used (although this may be done at any depth less than 750m if data is poor at any point). The T5 collects data down to 1800m.

Processing

Once sonar and navigation data have been collected onboard processing occurs before the data is forwarded to UKHO. CARIS software is used for viewing the data and removing noise from the outer and centre beams.

Conduct of Operations

During this particular survey the line plan was based on the guidance from the embarked geologists. They were keen to head straight for the accretionary wedge and work from the deep ocean inwards towards the shallower water. The features on the edge of the accretionary wedge generally being the youngest. Every two days blocks of data were transferred to the CARIS software, processed by the ship's survey recorders and passed to the geologists for their interpretations. Based on the data already collected decisions could then be made which were the most important areas to revisit in the limited time available. The diagrams show some of the data collected.

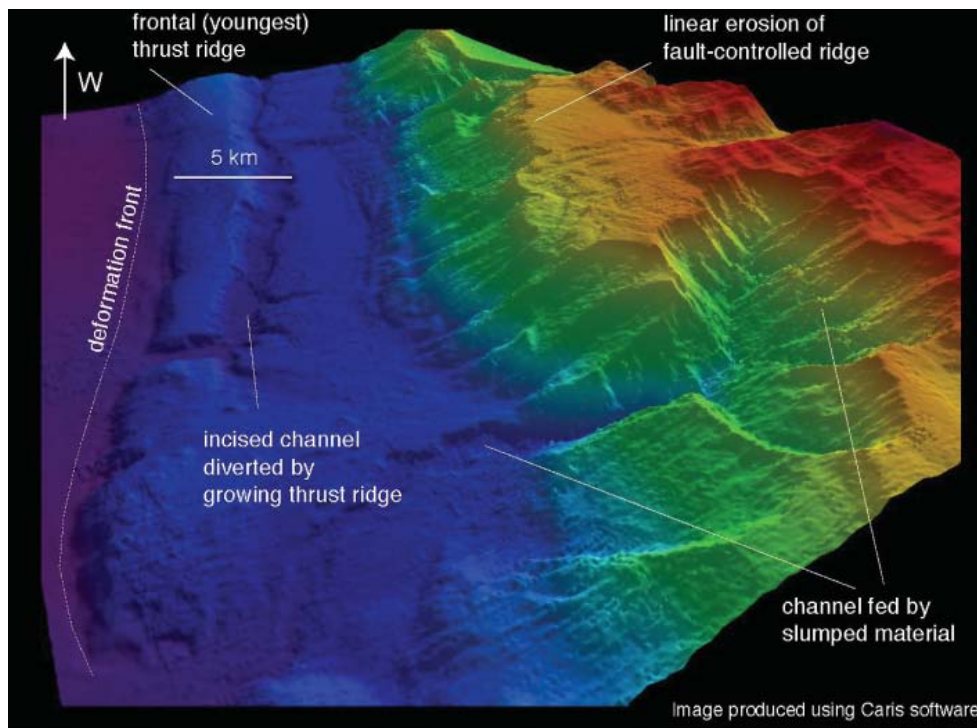


Diagram 6. In some other cases there was direct evidence that channels pre-date the fold and have abandoned a previous course. In this case the channel probably cut through the lower end of the fold when it was smaller, and now maintains a canyon as the fold grows

The future

Operating on a non-military task, the survey took 20 days, steamed around 4,745 nautical miles and surveyed 19,500 square miles of the seabed in depths of water ranging from 1,100 – 5,000 metres. As a result of the data collected further expeditions to the area have been funded to further investigate some of the features first identified. The data gathered by *Scott* will not only go towards producing a new bathymetric chart but, will also provide a base map for any future investigations in this area. The survey was deemed an enormous success not only for the RN and promotion of UK plc but it has also helped drive the UK academic community to the forefront of world-wide research in this field.

British Cartographic Society Historical Military Mapping Special Interest Group

The Historical Military Mapping Group (HMMG) is a forum for all those interested in any aspect of the history of military surveying and mapping. It is run as a special interest group of the British Cartographic Society (BCS), but membership of the BCS is not a requirement for membership of the HMMG, it is open to all and membership is free.

Next Meeting.

The next meeting of the HMMG will be held during an evening session of the BCS's 42nd Annual Symposium at the University of Plymouth on 2nd September 2005 in the Portland Square Building adjacent to the Sherwell Centre. D.S.A. members are welcomed to attend. Full details may be obtained from the BCS Administration Officer, Ken Atherton, on (01823) 665775 or at admin@cartography.org.uk.

Next Seminar.

Following the successful seminar on D-Day Mapping held at the National Maritime Museum, Greenwich in June 2004, the HMMG is planning to hold another conference at Portsmouth University in Spring to Summer 2006. The theme of the seminar and the exact dates are not yet decided but full details will appear in the next issue of *Ranger*. It is hoped that members of DSA will once again support this event.

Fast, Pinpoint Reflectorless Measurement Up to 350m Get the Job Done Even Quicker with SFX



■ Exceptional Range and Accuracy

Rely on Series030R Total Stations for high-precision reflectorless measurement of distances from 30cm (1ft.) to 350m (1,140ft.). Sokkia's exclusive RED-tech EDM delivers fast, precise measurements with superior accuracy of $\pm(3 + 2\text{ppm} \times D)\text{mm}$. What's more, an ultra-narrow visible laser beam ensures pinpoint accuracy with challenging tasks.

■ Unprecedented Productivity

All three models (1", 2", and 3") come equipped with the finest Sokkia technology, including comprehensive data collection software (Expert) and original absolute encoders. Each model offers user-friendly operation, weatherproof design, and a guide light option to help boost productivity in more situations than ever.

NEW Internet Connectivity with SFX



Sokkia Field-info Xpress (SFX) brings Internet support to Series030R Total Stations to let you send data to and receive data from virtually anywhere. Simply connect the total station to an Internet-enabled cellular phone for immediate data exchange between worksite and office. SFX eliminates wait time to get the job done quickly, giving you an even greater edge in data management

and efficiency.

Faster, smarter surveying with Sokkia.

Reflectorless Total Stations with Integrated Data Collectors

Series030R

SET1030R3 • SET2030R3 • SET3030R3



SOKKIA

The ultimate surveying, calculation, mapping and design software

■ Designed from a surveyors point of view

Mapsuite+ version 3 is the ideal true object orientated CAD software especially made for survey, calculation, mapping and design purposes and has been developed from a surveyors point of view. Whether you are a civil engineer or a landscape architect, a surveyor, a tunnel designer or a database manager, Mapsuite+ has the right application for your job.

■ Mapsuite+ basic modules

Mapsuite+ consists of three gradually build up basic modules; Survey, Earthworks and Design. Each module offers a balanced amount of functionality. The Survey module is perfectly suited for processing topographical data, the Earthworks module is designed for generating comprehensive volume calculations and finally the Design module is the ultimate road-design tool.

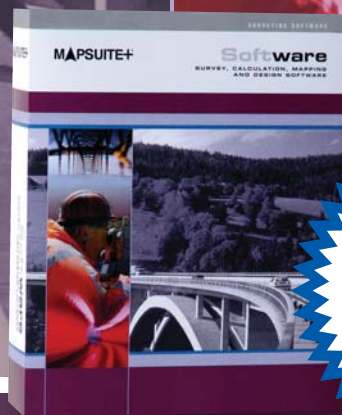
■ Benefits

- Very short learning curve
- Intuitive user interface
- Supports all major formats
- Affordable pricing
- High speed processing
- Professional customer support
- Intensive maintenance
- Regular market driven updates
- Worldwide coverage with the Mapsuite+ community

■ Mapsuite+ special modules

In addition to the basic modules Mapsuite+ offers seven special modules. These add-on's which can be installed within the basic modules are designed to accommodate users who have special requirements. Next to special modules for net adjustment, rail traject design and tunnel design there are modules to import mapsheets, modules to link to internal and external databases and modules to use Mapsuite+ connected to a surveying instrument.

Visit www.mapsuiteplus.com for more information and a free 30 days trial version.



**30 DAYS
FREE TRIAL**

MAPSUITE+

Geo People



JAMES SIBBALD BSc MSc FIoD

Defence Account Manager ESRI (UK) Limited

Born in Glasgow and after attaining his Bachelor's Degree in Natural Philosophy (otherwise known as Physics) from The University, Glasgow, Jim dabbled briefly with a civilian career before going to Sandhurst in 1986. He was commissioned into the Royal Regiment of Artillery; winning the Earl Robert's Memorial Sword on his Young Officers' Course. On joining his first regiment, 27 Field Regiment, he was warned immediately for Northern Ireland. This was the start of a very interesting first tour of duty which ranged from Internal Security duties, the Prison Officers' Strike, operating with the Ghurkhas in Hong Kong to Ceremonial Duties where he was Captain of the Guard at Windsor Castle.

Following Junior Division of the Staff College, Jim was posted as Battery Captain (BK) to 129 Dragon Battery which was in 40 Regiment Royal Artillery based in Hohn, Germany and part of 7 Armoured Brigade. On the invasion of Kuwait in August 1990, the Regiment was warned for duty in Saudi Arabia and deployed mid October on Operation Desert Shield. On the successful completion of the Campaign, Jim was awarded The Commander's Royal Artillery Commendation.

Returning to the United Kingdom in December 1991, Jim completed the Gunnery Staff Course at The Royal School of Artillery, Larkhill and was posted as OIC BATES Training Section for 2 years. In January 1995 the Army presumed that BATES was a computer system and they sent him on the Design of Information Systems Course at Shrivenham based on this misconception. After conning his way on the course he got a Master's Degree and won the GEC Marconi Prize for Best Student.

Posted to Headquarters Land Command this was where Jim's interest in GIS really began, mainly due to having a few beers with the Geo officers in the Mess. As the Staff Officer Grade 2 (Weapons) Business Analyst he was responsible for the technical and geographic aspects of the implementation of Project GP3, subsequently called Project ACSAS, which was a C2 application from 4-star to Battlegroup headquarters.

On returning to Regimental Duty as a Major, Jim was Battery Commander (BC) of 46 (Talavera) Battery and Operations Officer for 32 Regiment Royal Artillery, which at that time had MLRS and Phoenix. It was not long before operational duty called again and the final two years of Jim's military career was spent on the Foot and Mouth outbreak, the Fireman's Strike and especially on United Nations tour in Cyprus as Sector 2 Civil Affairs Officer.

The UN tour was an excellent finish to 17 years of military service particularly with regard to the successful negotiation of the clean-up of three "forgotten" cemeteries within the Buffer Zone; making possible the permanent return of families to visit and perform services after being denied access by 27 years of conflict.

On leaving the Forces in 2003, Jim joined ESRI (UK) as Defence Account Manager. Although a "Field Gunner" Jim felt that he had dabbled sufficiently as an Amateur in the "Black Art" that is Geo to join the Defence Surveyors' Association; and they agreed!



WO2 (SMIG) JASON CARTWRIGHT RA

Sergeant Major Instructor Gunnery for Survey and Battlefield Meteorological System

First and foremost I would like to say it is an honour and a privilege to be the Royal Artillery representative for the Association.

I joined the Royal Artillery in the summer of 1989, carrying out my basic training at Woolwich with 17 Training Regiment RA. With the hopes of becoming RA technical soldier I was unsure at the time of this trade but the recruiting sergeant said it was a 'good job'. On completion of basic training I complete a basic signals course and after a short Christmas leave I was posted to 94 Locating Regiment RA stationed at Larkhill in Wiltshire.

After a short period of time I was offered a place on the Surveyor Royal Artillery (Basic) course, which covered various instruments including Halls & Watts theodolite No 2 Mk 4, MRA 5 EODM, steel tapes and beacon banderole set - to name but a few.

A couple of years passed and experience was gained so I was then asked to complete the Surveyor Royal Artillery (Advanced) course which was conducted at the Royal School of Artillery (RSA). This time the course looked in detail at survey processes covering key areas such as traverse, triangulation, transformation, astro observations, change of grid and others that gave rise to many a late night with pencil and calculator.

Geo People

During the autumn of 1993 I completed my final survey qualifications which enabled me to command a survey section or troop. The detachment commander qualification looked at all the survey processes available to the RA surveyor and concentrated on the reconnaissance side of survey.

Recently I graduated on the Gunnery Careers Course (Tgt) which runs at the RSA over an 11 month period and I was selected to be the Sergeant Major Instructor Gunnery for Survey and BMETS (Battlefield Meteorological System).

The Royal Artillery is going through great change in its survey policy. Weapon and locating platforms are embracing dynamic GPS/INS which will allow the platform to produce its own data in a very short time frame. Unfortunately this has resulted in the demise of the survey trade, which has led to the surveyors within 5 Regiment RA being re-traded within various STA disciplines.



JOHN KNIGHT

Principal Lecturer, Royal School of Military Survey

Born in 1952 and brought up in Maybush, Southampton opposite the Ordnance Survey it seems almost inevitable that I ended up working in the surveying profession. My interest in maps and surveying took off at Peter Symonds' School, Winchester and continued at Bedford College, University of London where I read Geography. In the early seventies this was a wonderful environment; not only because of its location in the heart of Regent's Park, but also because the college was predominantly female. Studying in London also allowed one to build a course from units across the University and this enabled me to take up surveying through the undergraduate modules delivered at University College.

After graduating I went to work for Hunting Surveys where within the space of a few months I gained experience ranging from hydrographic surveying in Scapa Flow to large scale surveys of the A33. But having been offered a place on the post-graduate surveying course at UCL, my time with Hunting Surveys was short lived.

Whilst at UCL the opportunity came up to compute and adjust the British Antarctic Survey (BAS) network, a major undertaking, not least working with punched cards for the data processing on an IBM 360. It was at this time that the Gothenburg University Terminal System (GUTS) was introduced, one of the first terminal based networks in the UK that enabled jobs to be managed remotely rather than having to carry trays of punched cards across the university each time a program was to run. It was during my time at UCL that I was encouraged by Doug Mason, a former OC of 135 Independent Field Survey Squadron RE, to join the TA. However I soon discovered that the Royal Artillery also undertook survey work and opted for the Gunners instead!

Whilst working on the BAS data, Dr Arthur Allen introduced me to Neil Field, head of the Department of Surveying at Ahmadu Bello University in Zaria, Nigeria. Within a few hours I was offered a lecturer appointment and a few months later I found myself working in Nigeria. It was in Nigeria that I met my wife, Lilia.

I was then offered a lecturing post at North East London Polytechnic (NELP) where, through its links with the University of Technology in Lae, Papua New Guinea, I grasped the chance to escape from London back to the tropics. A few years later I had the opportunity to take a year's secondment to the Ordnance Survey where I became involved in developing software for adjusting GPS networks when the OS took delivery of its first GPS receivers.

Through the short courses we ran for industry at NELP, I was asked to consider applying for the post of Principal Lecturer at the Royal School of Military Survey, where I have been ever since. After years as an educator and trainer I enrolled on a distance learning Master of Science programme and graduated in 2003.

In my time at Hermitage I have seen a number of significant changes. The first was the award of Masters degrees from Cranfield University to Officers on the Army Survey Course and more recently the opportunity for soldiers to gain Science Foundation Degrees through Sheffield Hallam University. I have also seen many changes in personnel, with the number of civilian teaching staff growing from four when I arrived to 20 today. When first appointed, I was told that the School of Military Survey was looking for someone to provide continuity in the teaching staff; I am not sure that outlasting eight Chief Instructors and a similar number of Commanders was what was in mind!

Award of Science Foundation Degrees to Class 1 Military Engineer Technicians (Geographic)

By John Knight, Principal Lecturer, Royal School Of Military Survey

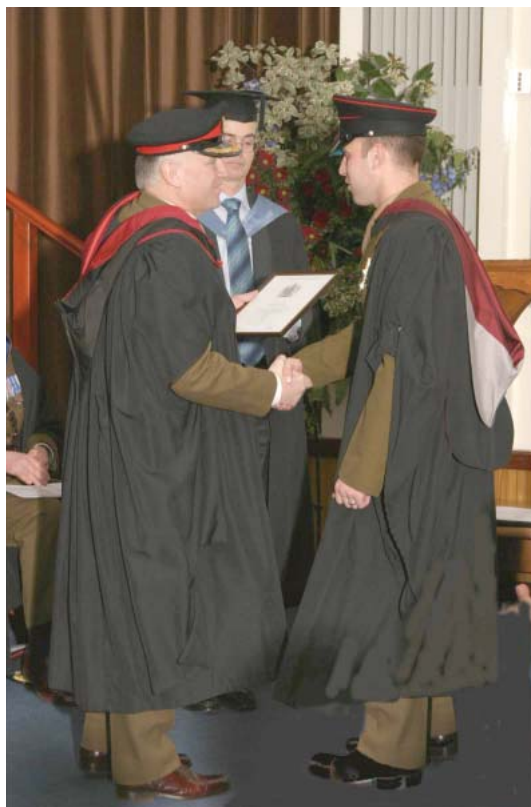
The Royal School of Military Survey celebrated its first Graduation Day on 11th March 2005 when 19 Sappers and JNCOs on the Science Foundation Degree (FDS) in Applied Computing (Defence Geographic Information) were the first to graduate on completion of their Class 1 Military Engineer Technicians (Geographic) course. The occasion recognised their achievement in gaining the award from Sheffield Hallam University.

The first Foundation Degrees were launched in 2001 and are designed to give people the intermediate technical and professional skills that are in demand from employers, and to provide more flexible and accessible ways of studying. They are equivalent to Level 5 in the National Qualification Framework and equate to the second year of a Bachelor's degree, giving graduates an opportunity to go on to gain a full degree with one additional full year of learning. The award represents the culmination of more than four years of study for the soldiers, combining formal teaching, work-based learning and in some cases operational experience. In effect the programme is a 'thick sandwich' course with 24 to 30 months experience in units between Class 2 and Class 1 courses. The introduction of this Foundation Degree with Sheffield Hallam University has provided many benefits, giving better on the job training and experience for young soldiers, which in turn means these soldiers are better prepared for operations.

This FDS in DGI is designed to provide students with a sound knowledge base as well as technical and personal skills, so that they are able to undertake the acquisition, analysis, production and dissemination of geo-spatial information for use in support of all types of operations from peace-keeping to war fighting. Specifically the programme aims to equip students with relevant qualities and skills necessary to:

- use a wide range of techniques in the provision of geographic support to Defence. This requires students to undertake critical analysis of sources of geo-spatial information, and the generation of appropriate geographic products to satisfy requirements
- communicate effectively results of geo-spatial analysis in a variety of forms, frequently to senior personnel with little or no understanding of the processes involved
- undertake further training, develop existing skills, and acquire new competencies to enable them to assume greater responsibility within Defence organisations
- provide a sense of the need for continuing professional development.





E-in-C awarding the Walke prize, awarded to LCpl Steve Avis

Whilst the Army has well established processes to design and deliver effective training, the partnership between SHU and RSMS required both sides to be flexible to enable the Universities regulations to fit in with military practices and systems. In developing this programme, we had to be certain that we kept a focus on the military requirement - that is to provide trained soldiers who will have an operational role, whilst adhering to academic standards. The emphasis Foundation Degrees place on integrating academic and work-based learning made this qualification highly suited to our soldier training.

This was the first time that a Sheffield Hallam degree awards ceremony was held anywhere in the United Kingdom away from the University and this is a measure of the importance with which the University views its relationship with the Corps of Royal Engineers and the significance of the new Foundation Degree course developed jointly with the Royal School of Military Survey.

University Vice Chancellor, Diana Green, accompanied by senior staff and the University Mace Bearer, traveled to Hermitage to present the awards in front of senior Defence personnel including the Air Vice-Marshal Peach (Director General of Intelligence Collection), Brigadier Sexton (Engineer in Chief), Brigadier Rigby (Director Defence Intelligence Joint Environment), and Colonel Cross (Regimental Colonel).

In opening the ceremony, the Chief Instructor, Lt Col Ross Thurlow RE, looked back at the heritage of the Royal School of Military Survey before describing how the training requirements have moved away from traditional survey and mapping into the exploitation of Geographic Information in a wide range of geospatial disciplines.

School Staff, VIPs and Graduands





Vice Chancellor making a presentation to Percy Kimber

In her address to the graduands, Professor Green, emphasised the importance of graduation in the life of anyone who has studied hard and earned the right to collect the certificate that marks their achievement. She also recognised the importance that both Sheffield Hallam University and the Royal School of Military Survey place on their reputations for high quality teaching combined with excellent student care.

A special award was made by the Vice Chancellor on behalf of SHU and RSMS to Major Percy Kimber, SO2 Training Branch, in recognition of the contribution he has made in bringing about this Foundation Degree. For many years he has been a keen advocate of developing a recognised qualification for the soldiers to acknowledge the high standard of work that they achieved.

After the awards were made, the Engineer in Chief, in his address, recognised the benefits of training to ensure that Geographic staff provide the highest quality information to support operations. He emphasised the importance of the quality of information through examples where errors in spatial data have led to disastrous consequences and he reminded those present that these errors could have strategic impact well beyond the tactical area of conflict. Brigadier Sexton also looked to the future and emphasised the importance of efficient sharing and exploitation of information in the Network Enabled Capability. He noted that whilst geospatial data will form a cornerstone to these developments, it is the knowledge and skills of those graduating that will help Defence to exploit the information and technology.

In closing the Ceremony, Colonel Attwater, Commander of the Geographic Engineer Group, reminded those graduating that they have an important role to play in the provision of geographic support to defence. Developing Brigadier's Sexton's theme, Colonel Attwater re-emphasised the role that geographic staff play in ensuring that decision makers have the best view and understanding of the terrain so that their decisions maximise the chances of operational success and minimise risks.

Following the ceremony, a reception was held for the graduates, guests, families and staff of the School. It was a great opportunity for senior officers and academics from SHU to mix with the graduates and to hear about their studies at Hermitage and experiences on operations.

Congratulations to all those who graduated, prizewinners and to those who were awarded their Foundation Degrees in absentia. I am sure that most of those present share LCpl Andrew Fitchett's thoughts on the day: "The graduation made all the hard work worthwhile and it was good to get together



Prize winners with Kevin Porter, Air Vice-Marshal Peach, Vice Chancellor Diana Green, Mace Bearer and Brigadier Sexton



with all the boys off the course. The degree is really good for my future career and will help to transfer to civilian life.”

Award of Prizes on the Science Foundation Degree

The graduation ceremony provided an ideal occasion to recognise outstanding student achievements through prizes. LCpl Lea received the Sheffield Hallam University Prize from the Vice Chancellor for the best academic performance on the common modules across all three Geographic trades. Awarded for the first time, LCpl Lea received

a certificate in a silver frame and a leather and silver scroll holder, both with the Sheffield Hallam University Coat of Arms.

Royal Engineers Association prizes were presented by Brigadier Sexton to LCpl Dicken and Cpl Gourlay, as the best Class 1 students within their employments. Brigadier Sexton also presented the long established Walke Prize, awarded jointly to LCpl Avis and Spr Jones, for their academic merit, outstanding leadership and team spirit throughout the course.

With Foundation Degrees placing great importance on the relationship between academia and industry, it was most appropriate that Mr Kevin Porter was able to attend the graduation to present the Terry Straeter prize on behalf of BAE Systems. Dr. Terry Straeter was the President and CEO of GDE Systems, a company which specialised in advanced digital technologies to design, develop, manufacture and support quality defense electronic systems for tactical and strategic forces of domestic and international customers. In addition to his leadership in the defense electronics industry, Dr. Straeter served in a number of technical positions at the NASA Langley Research Center. He obtained his Masters Degree in Mathematics from the College of William and Mary and a PhD in Applied Mathematics from North Carolina State University. In addition to his business acumen, Dr. Straeter has provided his leadership skills in supporting various professional, charity and community organizations, including the Security Support Association and the United Way. Dr. Straeter is retired and resides in San Diego, California with his wife, Jinny.

The Terry Straeter prize was awarded to LCpl Asquith for presenting the best project in the discipline of digital geographic data production and exploitation.



Photographs reproduced with kind permission of Ede and Ravenscroft Photography Ltd



Breaking the Barriers...

- We develop rigorous customer requirements (SRD)
- We drive down cost of ownership
- We extend the life of legacy systems
- We provide clear linkage of research and development to MW
- We believe in open systems for communications and software
- We employ state-of-the-art modelling, visualisation and demonstration to provide verified TRLs
- We deliver equipment
- We understand the issues in delivering a JE

... Managing the Future



SEA, Beckington Castle, PO Box 800, FROME BA11 6TB
Tel: 01373 852000 Fax: 01373 831133
email: info@sea.co.uk web: www.sea.co.uk

Early Days of Sound Ranging on The Western Front

By Tony Grange-Bennett

As a generalisation, it seems fair to say that sound ranging in the First World War is a subject about which very little has been written as compared with the vast literature on many other aspects of the Great War. This may be due to the fact that it was an activity that the British wished to keep secret and in consequence very little was allowed to be written about it during the war even in reports and communiqués.

When the war broke out sound-ranging, the identification of the location of an enemy gun by recording the times at which its report reaches various fixed positions, simply did not exist in any of the armies. Credit for taking the first practical steps has to go to Professor Noordmann, an astronomer with the Paris Observatory whose initial idea was to have three men with stopwatches who would each record the moment the sound of a gun report reached them. The men would be positioned along a measured length or base. In Paris, he started to test his stopwatch ideas and he also consulted with Lucien Bull at the Institut Marey. Quite brilliantly, Bull came up with the idea that the recording could be done more accurately by a line (or base) of microphones connected to a string galvanometer, an instrument that measures small changes in electric current. Lucien Bull, who was actually half-English or maybe half-Irish, was perhaps the first of many brilliant scientists, physicists, mathematicians, etc. who came to work on sound ranging.

Hearing about the experiments in Paris, the British army despatched a committee of three to evaluate the situation. Two of the three were Royal Engineers and one was a Royal Artillery officer. The Artillery officer did not stay long, but the Royal Engineers with great foresight recognised not only the potential of sound ranging, but also that Bull's apparatus appeared the best bet. One of the Royal Engineers was Major (later Brigadier) Harold St. John Loyd Winterbotham, a survey expert who was to play a major role in the practical development of sound ranging.

As a result of the Committee's report, the British Army decided to test Bull's Apparatus and one set was delivered in October 1915. Basically the set consisted of microphones connected to the strings or wires of the galvanometer. A record was made of any movement in the strings by having a lantern behind the strings throwing their shadows on to a cine film. In addition there was also a time wheel revolving in front of the lantern that produced a series of vertical time lines on the film representing intervals of 1/10th second, subdivided to read to 1/100th second. As a microphone picked up a gun report, its string would kick and so it was possible to see when the gun report had reached each microphone. It is interesting to note that although Bull's apparatus was steadily improved in detail as the war proceeded, the apparatus as a whole remained as originally conceived by him - a notable achievement.

Of course, knowing the differences in times between the microphones is only half the story. Each piece of film had to be checked out by a Computer - not, of course, a PC sitting on a desk, but a human computer - the most important member of a sound-ranging team. The Computer had to read and interpret the film and hopefully find a pattern of kicks that would help him to identify the location of a gun report. Using the time differences between the microphones, the next stage was to plot these differences onto the



Drawing by PS Willats of the entrance to Observation Post "Tina" which was originally a German gun pit.

plotting board using strings of fine gut that were laid out according to the time differences between the microphones with the aim of obtaining an intersection indicating the position of the gun.

Another very important job was that of the Forward Observer. As it was not feasible to have the apparatus permanently running, it was necessary for it to be switched on just before a gun report reached the microphones. This was achieved by having a forward observer in a survey post positioned in front of the microphones and only about half-a-mile from the enemy front-line. The forward observer's job was to listen for a gun report and then immediately press a switch to start the recording apparatus. He had about two seconds to do this before the gun report reached the microphones. The observer's job was crucial and a section was unable to find any locations without a skilled forward observer.

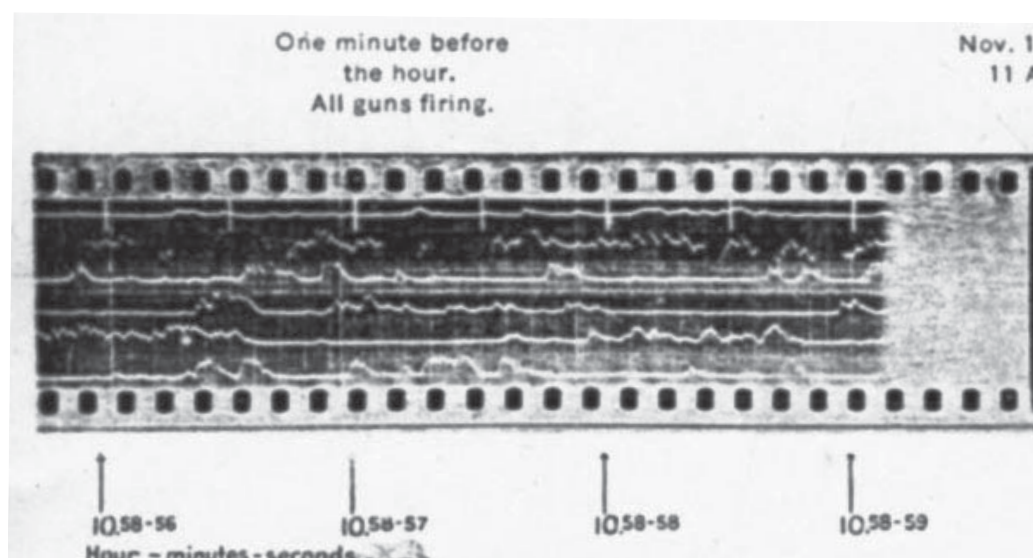
As already mentioned, the British Army obtained its first set of apparatus in 1915. To operate it, the First Sound-Ranging Section RE was formed and sent off to see what it could do on the front line from Dickebusch to Mont Kemmel. In charge was an inspired choice – Lieutenant (later Sir) (William) Laurence Bragg RE. Within a few months, he had been awarded the Nobel Prize for earlier work on X-rays and Crystal Structure. Bragg's new sound ranging section was named 'W' Section and comprised only two officers and six other ranks of which four were drivers. The difficulties he faced were considerable and a shortage of manpower was only one of these. The section's first task was to establish a base and space out the microphones which then had to be wired up to Bull's apparatus at the Base HQ. There were numerous problems and very few gun locations were obtained. Bragg himself was to write:

"For the first year, from October 1915 onwards, sound-ranging was really a washout though we tried to pretend that it was not. Clearly we had to find a selective microphone which responded to the right kind of noise if sound-ranging was to be any good."

With perseverance and inspired experimentation, the problems that prevented sound ranging from performing as had been hoped were gradually overcome. The best example of a problem that was brilliantly solved concerns the microphone. The first microphones were completely non-selective and, as well as the gun reports, additionally picked up rifle shots, mortar fire, human voices, etc. More seriously, they also picked up the noise of the shell-wave - the noise of a high velocity shell passing through the air. Usually, the noise from the shell-wave was louder than the gun report which was drowned out. Bragg describes amusingly how a new type of microphone was invented which was able to distinguish between the gun report and the shell-wave:

"At our billet at La Clytte the farmhouse had the usual primitive sanitary retreat, cosily situated as an annex leading out of the kitchen. When one sat down, one closed the only aperture between the hermetically sealed farmhouse and the outer world. A six-inch gun fired over from an emplacement about a quarter of a mile behind. The rending shell-wave only affected the ear, but the pressure of the scarcely audible gun-wave behind it caused one to rise slightly but perceptibly. Obviously there was a good deal of energy in the pressure-wave, and if only we could use it our difficulty was solved."

Another member of the team, Corporal (later Major) WS Tucker was able to use the knowledge acquired. There were two holes in the wall by his camp bed and he noticed that the pressure of the gun report caused freezing



Sound trace immediately before and after the Armistice at 1100hrs of the 11th of November 1918

jets of air to hit his face as he lay in bed. Out of all this, Tucker invented a new type of microphone that was to bear his name - the Tucker microphone. A heated wire was stretched over a small aperture in a sealed container. Pressure from the gun-wave forced cold air through the aperture and cooled the wire and lessened its electrical resistance with the result that a kick was recorded by Bull's apparatus. The Tucker microphone revolutionised sound ranging and turned it into an exact method for the location of enemy batteries. Not only could the Tucker microphone concentrate on the gun report, but it was possible to ascertain the type and calibre of a gun firing by studying the way in which the strings kicked in Bull's apparatus.

With the new microphone, sound ranging was very much on the map, but it would always perform poorly when the wind was blowing away from the microphones towards the German lines. On the other hand, it did possess the very significant advantage that fog and mist were no barriers - indeed fog and mist provided ideal conditions for sound ranging. And it didn't matter how well hidden or camouflaged a gun might be, a sound ranging section could find it as soon as it fired. Initially the line or base used by a sound-ranging section to lay out its microphones was generally too short. Improvements of performance were attained when it was realised that there were distinct advantages in having a base of about 9,000 yards in length and some 4,000 yards behind the front line with the microphones equally spaced along the base.

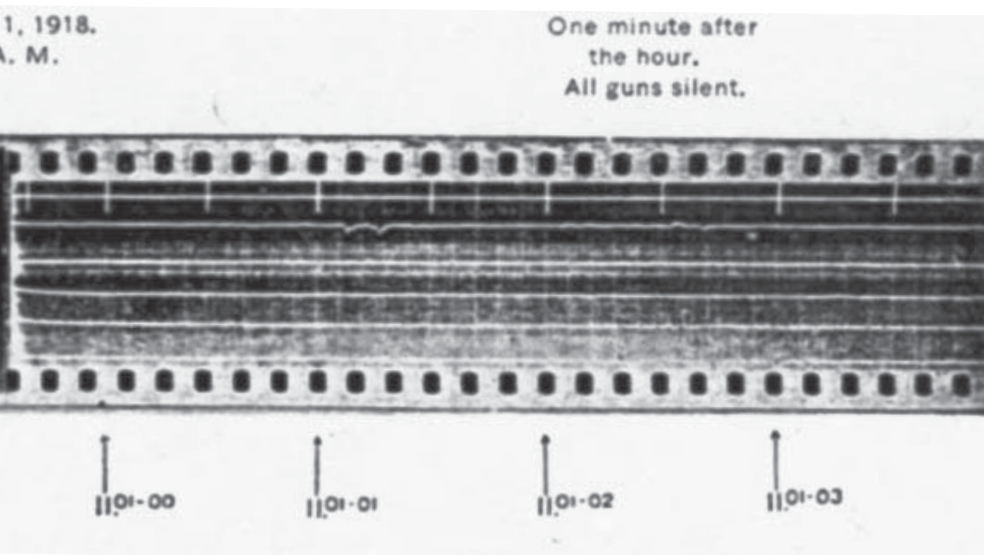
Notwithstanding the lack of immediate success and before the Tucker microphone had been developed, it was decided in early 1916 to form seven new sound-ranging sections, given the letters Z to R (but not U), and to allot two sections to each of the four armies then in the field. These sections became part of the four new Field Survey Companies RE (one for each army) which had been formed to handle all the topographical survey and map work as well as the observation work, which included sound-ranging and also flash-spotting, another artillery observation technique that was being developed alongside the sound-ranging.

Following the introduction of the Tucker Microphone and other improvements, sound ranging went from strength to strength and more and more the Counter-Battery officers of the Royal Artillery came to appreciate its value. At one time, there were 29 sound ranging sections operating on the Western Front and numerous successes were achieved. For example, Major-General Franks, the Inspector-General of Artillery, had this to say about the Battle of Messines:

"The results of Sound-Ranging were absolutely astounding. Between air photographs, the Field Survey work, flash spotting at night and the Sound-Ranging, we had over 90% of the German guns absolutely accurately located and in every case the Sound-rangers were right - they had beaten everybody in accuracy."

After the war, it would seem that the sound rangers themselves were often irked to find that their achievements and successes often seemed to be overlooked. Their attitude may well be justified as most of the books and articles written about 1918 and the advance to victory make few references

to sound ranging despite the fact that it is possible to argue that the work of these units had an importance that was out of all proportion to the relatively small number of personnel engaged in the work. Of course, this is not true of all the books and articles, and the more authoritative authors do give recognition to the achievements of the sound-rangers in the later stages of the war.



In "Flash Spotters and Sound Rangers," John Innes very strongly feels that the tanks received too much credit for the successful attack at Amiens on 8 August 1918. He argues that it was only proper utilisation of the services of the Survey Battalions (to which the Survey Companies grew) that made possible the successful attacks of 1918, and that the influence of these units on the tactical use of the artillery was very much greater than the scanty references to their work in official histories would seem to indicate.

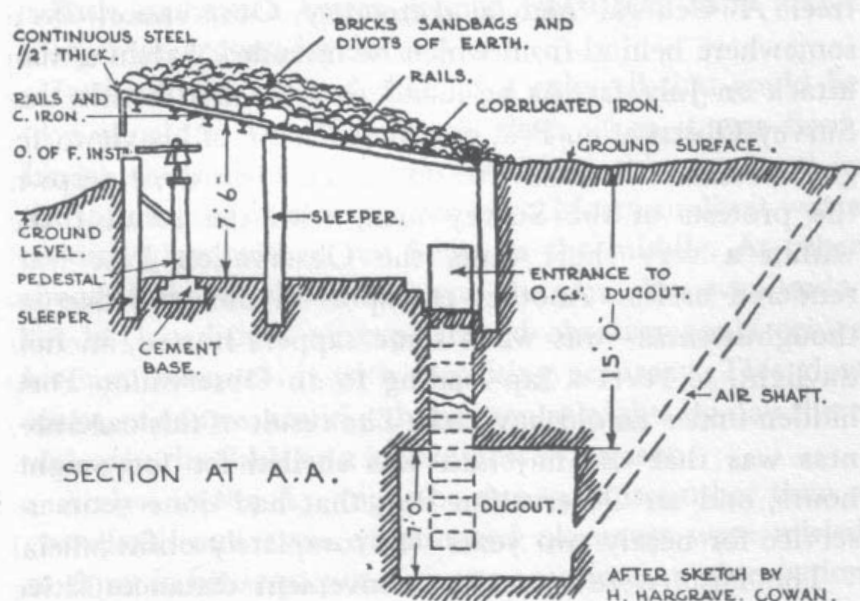
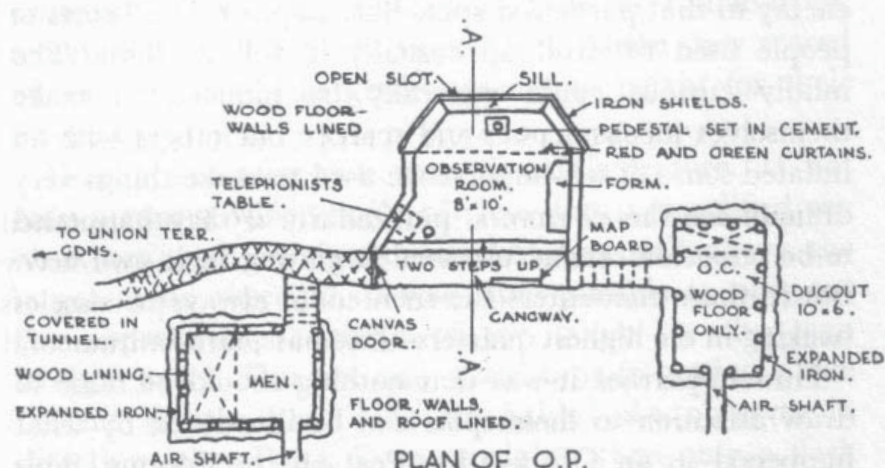
This is what Innes writes about 8 August: *"It should be realised that many of the enemy batteries had been withdrawn far to the rear a week before the attack took place, and it was not the Tanks who found out where these guns were hidden and silenced them. It was the Sound Rangers who discovered where they had gone; the artillery who silenced them; and the Topographical Sections of the Field Survey Battalions who made it possible for the artillery to hit these targets without previous registration."*

"At Amiens, the whole battlefield was shrouded in mist for a week before the attack. The Germans were "windy" and withdrawing their guns to new positions in the rear. How did we get to know this, when we could see nothing clearly beyond the front line? The Sound Rangers found that batteries that were usually active were silent, and they kept on locating the position of new batteries to the rear. If the attack had opened without this information what would have happened? The artillery support must, without doubt, have been very much less effective than it was. Vast quantities of ammunition would have been wasted on empty gun-pits for two-thirds of our bombardment was directed at the enemy guns - and whole hosts of enemy guns would have been free to retaliate without molestation"

Whatever the view taken on Innes's comments, there can be no questioning the fact that sound-ranging had come a long way from Lucien Bull's experiments in Paris in 1914.

Acknowledgements:

My thanks are due to Colonel Mike Nolan who made available to me a range of articles and reports on the subject of sound ranging. Much useful information was also obtained from "Sound Rangers and Flash Spotters" by John R Innes.



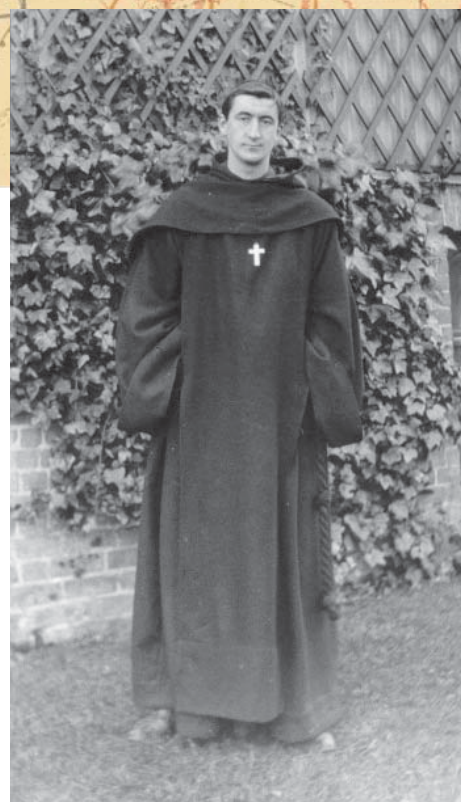
SKETCH OF SURVEY POST WITH LIVING ACCOMMODATION ATTACHED

Diagram of a survey post with attached living accommodation on the Somme. Many surveyors lived and worked under these conditions for months on end.

A Monk goes Sound Ranging

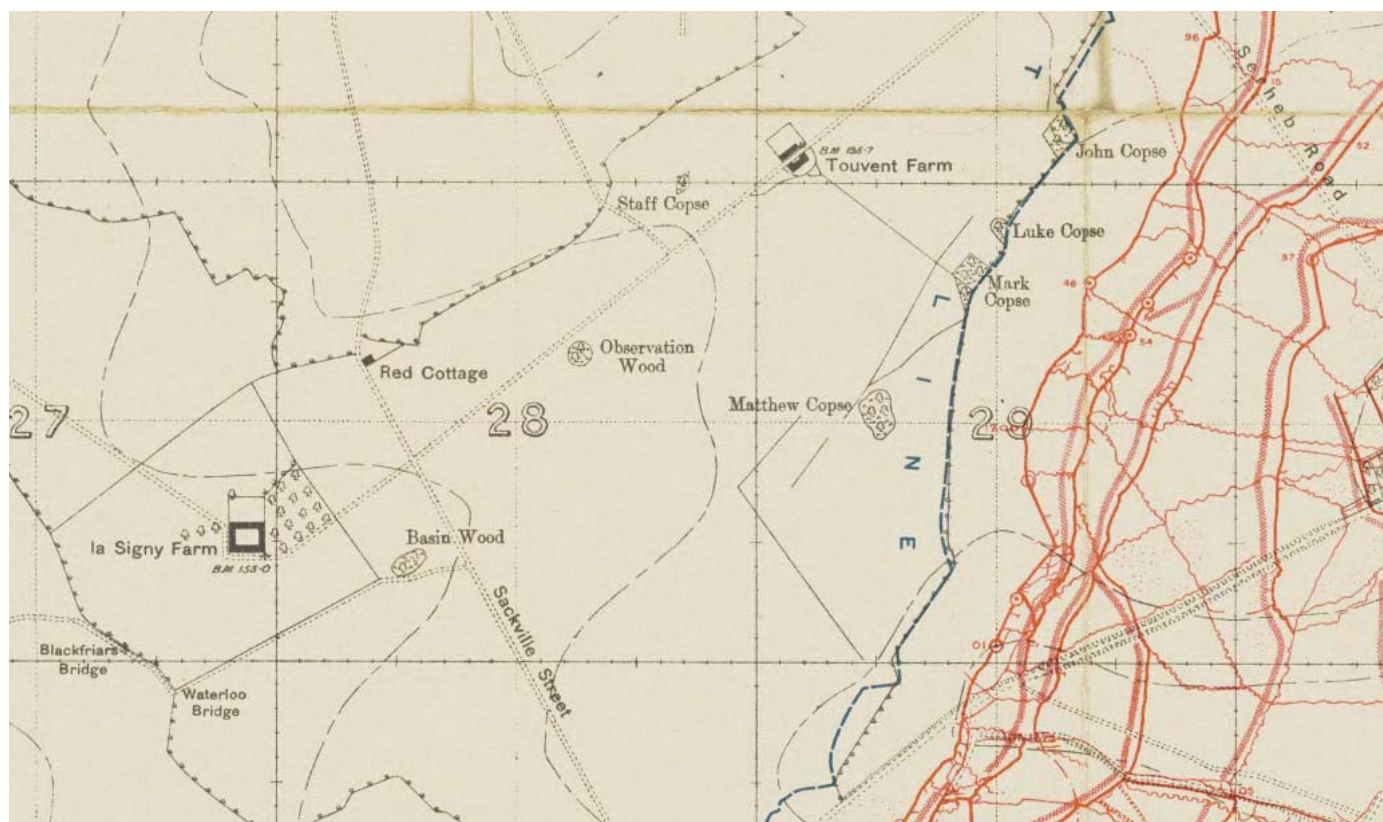
By Tony Grange-Bennett

The Somme, 1916. Sound-ranging Section 'R' had laid out its base running 4,000 yards south of Hébuterne and opposite the German fortified village of Serre with its HQ located in an orchard on the edge of Courcelles-au-Bois. The section only had one survey post and this was positioned in a corner of a field south-east of La Signy Farm. The view from the survey post looked down the slope to the four copses standing in front of Serre. On 1 July 1916 this area became one of the great killing grounds of the Somme battle as the gallant Pals Battalions attacked towards Serre and were mown down in their hundreds. The noise of battle was so great that the ineffectual Driancourt carbon microphones being used by 'R' Section were unable to provide the section with any German gun locations and the observers in their survey post must have looked on helplessly. And one of those observers, Lance Corporal John Lott, must surely have reflected on the irony of his situation, for John Lott was a Monk - a Brother of Charity - and by some strange quirk of fate the four copses that were in his view were known to the British Army by the gospel names of Matthew, Mark, Luke and John. What circumstances had brought this gentle monk to this terrible location?.....



Brother John Baptist Lott OSP

John English Lott had been born in Ashen House in Ashen, a small village in Essex, in 1875 and was the elder son of a yeoman farmer. The census of 1881 shows that at that time his father, John Green Lott, was farming 235 acres and employing 7 men and 8 boys. The early years of John English Lott would have been spent on the farm and during this period he will have started to acquire the range of practical skills that were to serve him well in later life.



Trench map covering La Signy farm and showing the four copses; Matthew, Mark, Luke and John (57D NE 3&4 (parts of). Edition 2 correct to 23/2/1916 Hébuterne)



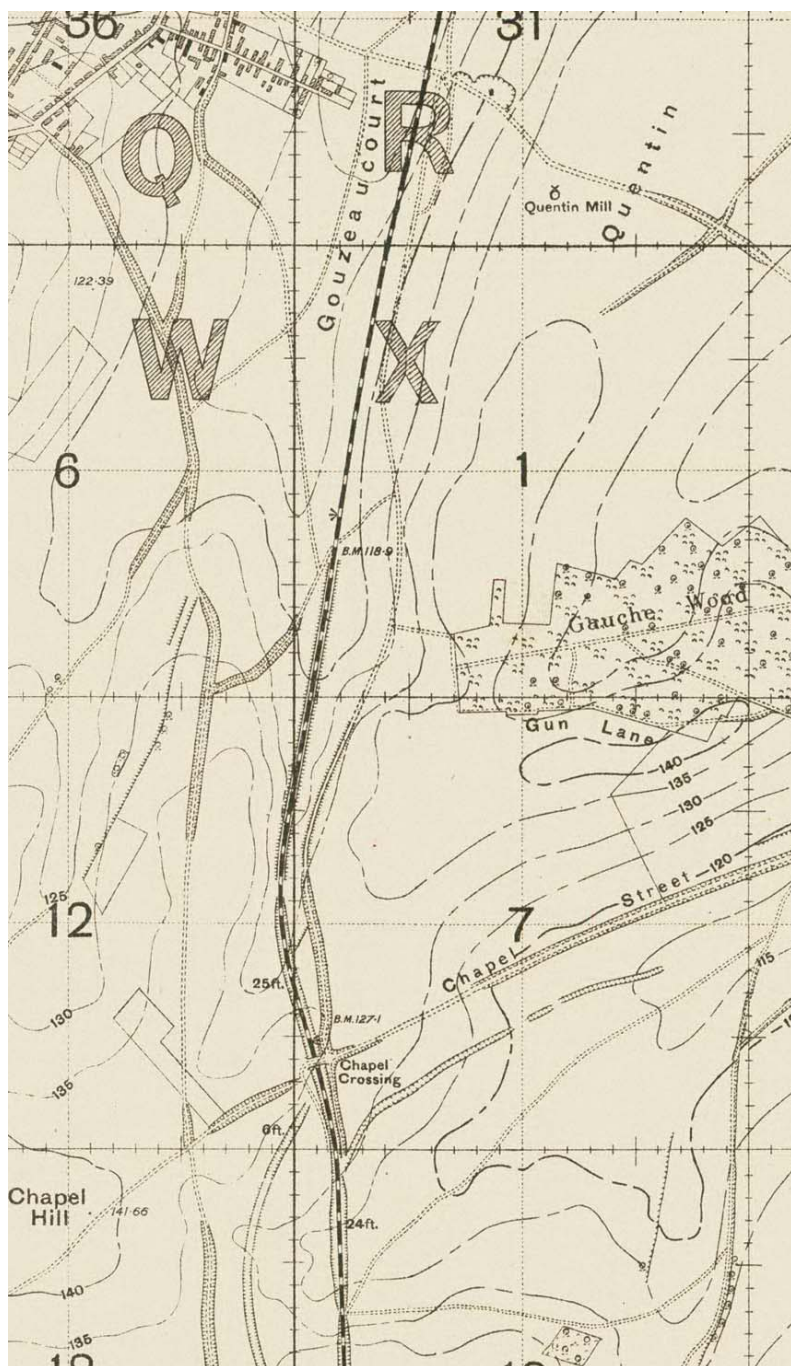
2nd Lieutenant John English Lott MC

John's early education, together with that of his two brothers and two sisters, was conducted at home by Miss Harris, the governess. In 1888, he became a boarder at Framlingham College where he demonstrated that he was an able scholar by winning the prestigious "William Goldsmith Scholarship". He became a school prefect and, like other public schoolboys of his era, he will also have absorbed to the full the concepts of patriotism and loyalty to the crown.

In 1892, John Lott left Framlingham College and went to work in a bank. The fact that he chose a career in banking strongly suggests that he possessed numerate skills to a high level. In 1896 or early 1897, the young Lott attended a service in a City church and heard a sermon delivered by the Reverend Charles Plomer Hopkins, more usually known as Father Michael, a powerful and persuasive preacher. In dramatic fashion this sermon was to change John Lott's life completely and utterly.

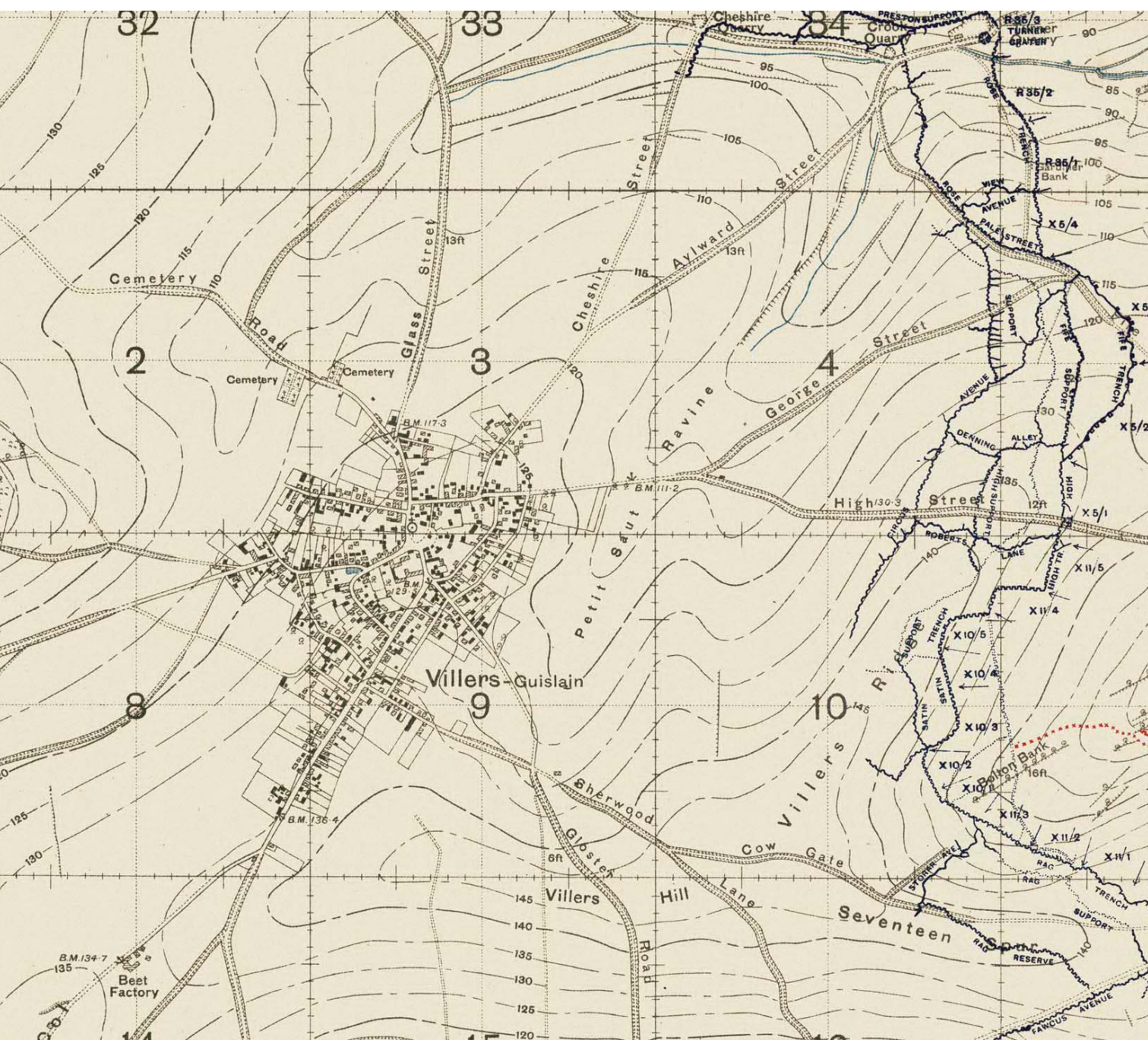
As a young man, Father Michael had gone out to the mission fields and had soon adopted the cause of merchant seamen who found themselves facing major difficulties in the river ports of the Indian subcontinent. This cause was to become his life's work. Initially, he operated the Seamen's Friendly Society, which developed first into the Society of St. Paul and then in 1891 into the religious Order of St Paul (OSP). In 1894 he arranged for a house to be established in Barry, South Wales, as a base in the UK for recruitment, training and administration, and also as a rest home for unemployed or aged sailors. This was soon found to be somewhat inadequate and in 1895 it was decided to build a Mother House for the Order at Alton in Hampshire. Father Michael returned to England and set to work with energy and determination to raise the financial support that he needed in order to found the Mother House that was to become Alton Abbey. He preached widely all over the country and was able to attract recruits or novices including John Lott who resigned his position at the bank and joined the Order on 1 November 1897.

The site of his new Abbey was a completely undeveloped site without even a reliable source of water, situated in rural isolation about two miles south of Alton. Initially, to provide some living accommodation, corrugated iron huts were constructed in the wood. Such was the





situation that John Lott found when he arrived as Novice or Aspirant in 1897. Two years later, he took his vows and became a 'professed' member of the Order. As a Monk or Brother of Charity, he became known as Brother John Baptist Lott, O.S.P., or just Brother John. In the years that followed, he was to become a key figure in the building of Alton Abbey and in the life of the Community. The Abbey archives show that Brother John was a man of remarkable all-round abilities who successfully took on a host of different roles - running the farm, building the Abbey, writing for the magazine, fund-raising and so on. When specific problems arose, he often seems to have acted in a capacity that would now be known as a trouble-shooter and there seems little to which he could not turn his hand.



Trench map of Guislain (57C SE 4. Edition 3a correct to 20/11/1917 Villers-Guislain), the vicinity in which Lott was mortally wounded.



On the outbreak of war in 1914 Father Michael decided that he would formally release all the Brothers from their vows of obedience to the Order so that they were free to enlist in the Armed Forces if they wished. John Lott, who was then 39 years old, was one of the first to volunteer, choosing the 21st Battalion of the Royal Fusiliers - the 4th Public Schools Battalion – which he joined 11 November 1914 as a Private.

John Lott landed in France with the battalion on 14 November 1915. Three weeks later, he received a slightly odd posting as he was attached to the 176th Tunnelling Company RE which was employed on operations in the Givenchy-Cuinchy sector. The tunnelling companies were supported by temporarily attached infantrymen, drawn from a variety of units to act as labourers and this seems likely to have been John Lott's role. The tunnelling companies were not solely involved in mining activities, although this was, of course, their main purpose. They were also involved on a range of other work including the digging of saps, trenches for cabling, subways, dugouts for signals and other purposes. John Lott's considerable experience of construction work that he had acquired at Alton Abbey is likely to have stood him in good stead and made him a valued member of his unit. In March 1916, he was transferred to 173rd Tunnelling Company RE working in the Hulluch-Double Crassier sector. This sector was in the coal mining areas to the west of Lens. The Double Crassier consisted of two long parallel mounds of mining spoil across which the German trenches cut at right angles.

The 21st Battalion Royal Fusiliers was disbanded on 24 April 1916 with many of the men being commissioned. Lott applied for a commission but was not accepted. Instead, he was transferred to the 26th Battalion Royal Fusiliers (the Bankers Battalion), but continued to work with 173rd Tunnelling Company. It is hardly surprising if he was feeling somewhat jaded when he wrote to his friend, Brother George Columba Smith, at the end of April 1916:

"Very many thanks for your letter for my birthday. I am having a pretty hard time just now & not much opportunity of writing. You will have heard that my commission application failed on account of age. I may be able to have a further try later on."

"The water here is all of doubtful purity. In fact it all has to be treated with chemicals - chlorinated they call it. As I don't want to get sick by anything of that sort & one can get water sometimes apart from regulation supply will you get me some tablets from Boots or other chemists. They supply them as I have seen them advertised. I would also be glad if you could send me bivouac cocoa tablets & a small solidified methylated cooker. This colliery place is full of dust when mud dries up. It would be fearfully hot here today were it not for the strong wind that is blowing."

However, shortly after he had posted this letter word must have reached him of a possible opportunity to obtain a transfer out of the mining company and on 16 May 1916 he wrote:

"Sorry I was not able to write just as your parcel arrived before we went to trenches last time & this time I have been very busy with a matter I hope will mature eventually with my transfer into a Survey Company."

Lott's busy activities on his own behalf had a successful outcome as he was posted to the 4th Field Survey Company on 9 June 1916 and became a sound ranger. If Lott was pleased to have obtained his transfer, it is

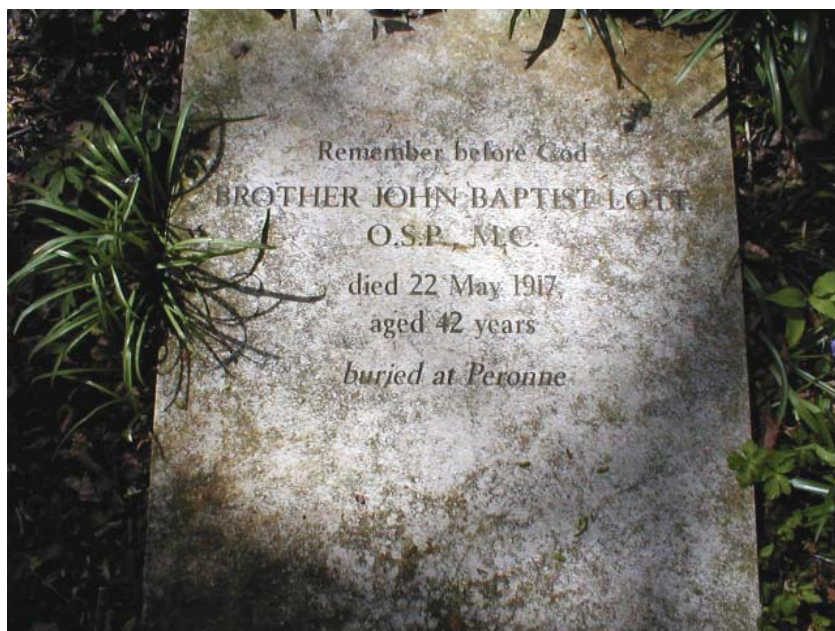


Lott's original grave in France



very likely also that the 4th Field Survey Company was equally pleased to have obtained such a dependable and experienced recruit as the acquisition of the right calibre of men had long been an ongoing problem for the survey companies.

The company was formed in late February 1916 under the command Captain (later Major-General) Malcolm Neynoe MacLeod RE, as part of the Fourth Army HQ. Two sound ranging sections, 'S' and 'R,' joined the 4th FSC at the end of March. Macleod's first problem was to obtain competent officers and men to handle the highly technical aspects of his survey company. Efforts were made to recruit scientists and academics from the UK, but to fill his establishments he was obliged to circularise other Army units asking them to submit the names of officers and men considered suitable for the various duties. It seems highly likely that the 26th Royal Fusiliers put forward the name of Lance-Corporal John Lott. On the 4th of June 1916, on a form signed by MacLeod, John Lott joined the 4th FSC and became a sound ranger and it seems clear that he joined 'R' Section. The sound ranging units were unconventional, not only in the form of their organisation, but also in the way they were run. Very likely, John Lott was well suited to this unconventionality. In his book "Flash Spotters and Sound Rangers," John R Innes tells us that it was usual for the men to stay in one post or in one section for quite a long time and that they lived a real 'communal' life. 'Communal' is an interesting choice of word and it has to be appropriate for a Monk! Innes also talks about 'the old men' and says that there were a good many with the Survey and that they were always an inspiration and example to the younger men.



Lott's memorial stone in Alton Abbey cemetery

In letters to his friends in England, Lott provides them with some information about his duties. In one letter he writes:

"I am quite well and intact. My work, about which I am unable to tell you, is very interesting, and requires my living in a dugout about half a mile from the German front. I am in dugout 3 days, and then go to our camp about an hour's walk in rear for the 4th day. There are 4 of us on this duty, one man going to camp each day, leaving 3 on duty. I have not lived in a building for about three months. In tent or dugout all the time. The camp is situated in an orchard, which is very nice."

In another letter he reports that he was *"writing in a dugout 17 feet below surface, shells were whistling overhead, and several had fallen nearby, but, beyond being smothered in dirt, he and his comrades in the dugout had so far been untouched."*

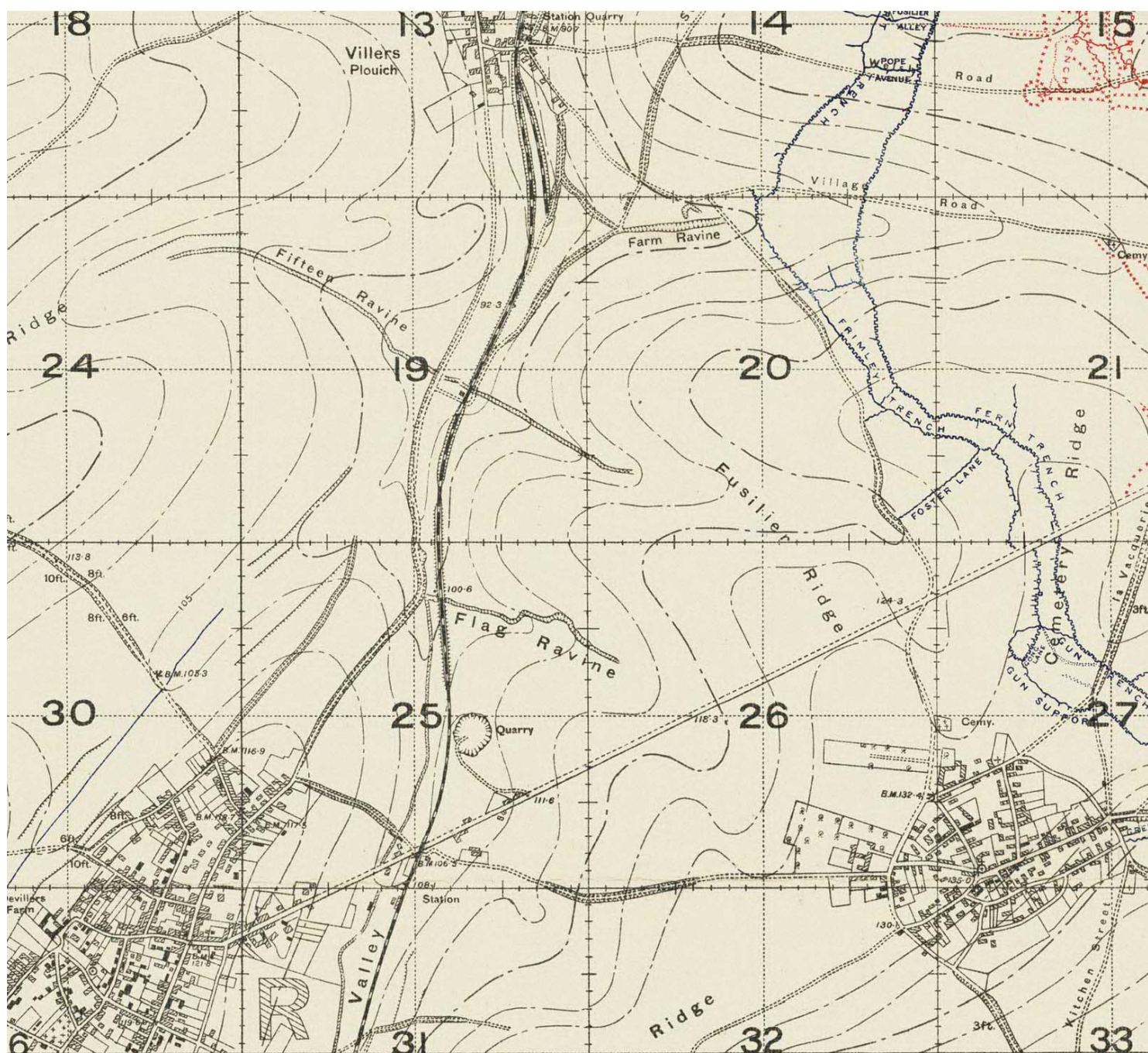
Clearly Lott is in an observation post but in itself the information provided by him would not be sufficient to identify his location with any accuracy. However, fortunately it corresponds closely with the descriptions written after the war by Lieutenant P Rothwell of 'R' Section about his section's first base on the Somme in 1916. It is not difficult to see that he and Lott are both writing about the same place as Rothwell tells us that:

"The Section's HQ was first established in a farmhouse in the centre of Courcelles-au-Bois, but the enemy soon put incendiary shells into it and burnt it down. This necessitated a move to a more open position at the north edge of the village..... in an orchard". Lott mentioned an orchard in his letter.



"The Section's first observation post lay under a hedge corner just south of La Signy Farm, facing Serre..... It was approached over a crest from Colincamps by way of a communication trench. It was a perilous matter to leave the trench, for the slope was frequently swept with premature shrapnel from our own field guns, whose shells just cleared the crest with an excruciating din." As was related in the opening paragraph of this article, the Observation Post had a view of the slope leading down to the front-line in front of the copses, Matthew, Mark, Luke and John, and the point has already been made that it was a strange coincidence that John Lott, the Monk, should find himself observing the bitter fighting around the four copses with the gospel names.

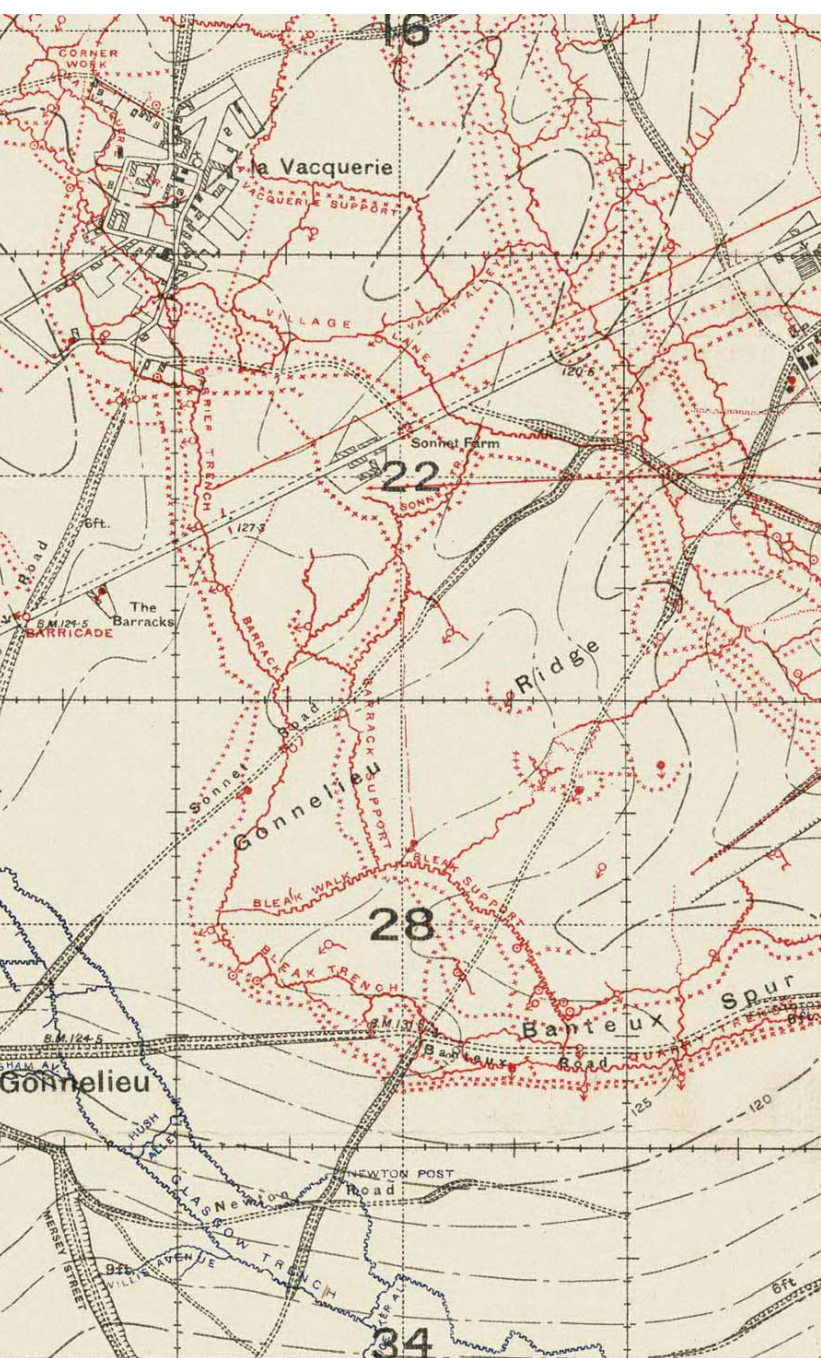
'R' section was transferred to the 5th Field Survey Company in the new 5th Army on 19 July 1916 and Lott went with them. Later in the autumn, he was selected for special training with 'W' Section,





but in October he was taken ill with influenza and did not return to duty until the end of the month. On 1 November, he was promoted Corporal. At this stage, he made a second application for a commission and it seems likely that he was encouraged to do this by his former OC as MacLeod signed his application with a special request that he be posted to 4th FSC. This second application was approved and on 29 December, 2nd Lieutenant JE Lott reported for duty with 4th FSC and joined 'S' Sound Ranging Section. It seems reasonable to assume that he took the position of Officer I/C Forward Observers.

In early 1917, the Germans withdrew to the Hindenberg Line and delays occurred before the sound ranging sections came forward to take up new positions but by the beginning of May 1917, 'S' Section was established on a new base running north to south from Havrincourt Wood to Villers Guislain with its HQ near Gouzeaucourt. This was part of the 8th Division's front.



Its two survey posts would have been about 1,000 yards from the front line. Fierce fighting took place on this section of the front on 5 May when the 8th Division launched an attack on La Vacquerie. This was the last offensive action by the Division before it went into reserve ten days later. On 7 May 1917, John Lott may have been in one of the survey posts or somewhere in the vicinity when he saw a party of soldiers hit by fire which wounded all the men of the party. Lott immediately went out and started to bring in the wounded even though the area was still under continual shellfire. A piece of shrapnel pierced his steel helmet and penetrated his brain. Severely wounded, he was carried back to safety and rushed to 55 Casualty Clearing Station near Péronne.

Two days later, a telegram was sent by 55 Casualty Clearing Station to the War Office with the brief message: "2 Lt. J.E. Lott. G.S.W. Head." It was not until 13 May that the War Office sent a telegram to his father, John Green Lott, then living at Colchester. This telegram read: "*Regret to inform you that 55 C.C.S. reports 8th May 1917 2/Lt. J.E. Lott, 4th F.S. Coy, R.E. dangerously wounded 7th May. Gunshot wound head. Further news will be sent when received.*"

Clearly, John Green Lott did not feel that the notification had been sent to him with adequate expedition and he raised his concerns with the War Office who replied to him on 14 May:



“Military Secretary presents his compliments to Mr Lott and regrets delay in notifying him that his son, 2 Lieut. J.E. Lott was wounded. This delay was due to the fact that no next-of-kin had been registered for this officer and that same had to be obtained from the Records Office, Hounslow, which naturally occupied a few days in so doing. Directly any further news is received of his son it will be communicated to Mr. Lott at once.” (N.B. In fact, the telegram to the Records Office had not been sent until 12 May).

On 18 May and again on the 22 May, the War Office sent further telegrams to JG Lott saying that his son’s condition was unchanged. Then, on 23 May, JG Lott received a tragic final telegram from the War Office:

“Deeply regret to inform you that 2 Lt. J.E. Lott, R.E., 4th F.S. Coy. died of wounds 21st May 1917. The Army Council express their sympathy.”

The telegrams seem to suggest that John Lott may never have recovered consciousness. For his actions on 7 May 1917 the award of the M.C. was approved and a local chaplain pinned the ribbon of the medal on his breast a few hours before he died of his wounds. The citation for the M.C. reads:

“For conspicuous gallantry and devotion to duty. A party went out to recover the body of a comrade and came under heavy fire, which wounded all the men of the party. This officer went to their assistance, helped to dress their wounds and carried them to a place of safety. This was carried out under continuous shellfire.”

Brother of Charity - Hero on the Western Front. Perhaps the epitaph of this remarkable man should be that he died as he had lived - in the service of his God, his Country and his fellow men.

When he was buried, it was reported that his men had erected a substantial cross over his grave and this is very evident in the photograph of his original grave. Today, his grave in the La Chapelle British & Indian Cemetery at Péronne is marked with a CWGC headstone whilst a Memorial Stone lies in the cemetery at Alton Abbey next to the grave of Father Michael Hopkins, the founder of the Order of St. Paul. It was the author’s chance discovery of this Memorial Stone that caused him to start his research into the life of Brother John Baptist Lott, O.S.P.

When the war ended, the Order of St. Paul was left with only four members. Father Michael died in 1922 and later the Order of St. Paul was absorbed into the Order of St. Benedict and it is members of this Order that are now in residence at Alton Abbey.

Acknowledgements:

I am indebted to Dom Andrew Johnson, OSB, the archivist at Alton Abbey, who made available to me his own research into the life of Brother John. Information from Canon J.A. Fitch, a nephew of John Lott, and from Ann Hoole, of Framlingham College, was also most useful. Details of John Lott’s army service were obtained from the National Archives. Other books consulted included “Artillery’s Astrologers” by Peter Chasseaud and “Tunnellers” by Capt. W. Grant Grieve. The trench maps shown were obtained from the “IWM Trench Map Archive on CD-ROM” published by the Naval & Military Press. John Lott’s headstone in France was photographed by Dan Finnegan.

face group

A specialist, business services organisation
providing client - focused solutions

‘It is the close relationship we build with our clients that defines us’



To find out more visit: www.facegroupuk.com

Contact: John Green direct: **01242 250600** or e-mail: green@facegroupuk.com

SOCET SET® for photogrammetry and mapping.

New: direct interface to ESRI® Geodatabase;
ClearFlite® for identification of airfield vertical obstructions.

SOCET GXP™ for image analysis and geospatial intelligence.

Software from BAE Systems.

Geospatial Exploitation Products
Sheraton House, Castle Park
Cambridge CB3 0AX

Tel: 01223 370022

Fax: 01223 370040

Email: socetgxp.emea.sales@baesystems.com

BAE SYSTEMS