The Ranger 2024

Journal of the Defence Surveyors' Association

Limited Edition DSA Members

Registered Charity No: 221816

December 2024

Defence Surveyors' Association Spring Event

The DSA is planning a Spring visit to Salisbury, Wiltshire, on Tuesday the 1st of

April or Tuesday the 8th of April 2025.

The event will be planned to encourage DSA members, their partners and friends, and others from similar organisations and associations.

The Rifles Berkshire and Wiltshire Museum will host the presentations and lunch. The outline programme

- 10:30 Arrival and Coffee.
- 11:00 Talk 1 – 'The New Forest in WW2.
- 12:00 Talk 2 – TBC.
- 13:00 Buffet Lunch.
- 14:00 View Map Collection.

There is also the potential for a tour of The Cathedral afterwards.

Salisbury Cathedral

Other attractions in the Cathedral Close include:

- Salisbury Museum.
- Mompesson House (NT).
- Arundells (home of Rt Hon Edward Heath).

Details will be sent to members in the New Year

Rifles Museum

Arundells

The Ranger 2024 - Contents

Editorial

In this edition of the Ranger, we have three major articles relating to personal experiences. Two articles concern surveying in Africa and highlight the numerous challenges and difficulties the surveyors faced. The projects were in remote and challenging terrain, and the surveyors often had to trek for days to reach survey stations.

The environmental conditions were harsh, and tasks often occurred in extreme temperatures and challenging climates. In these underdeveloped areas, progress could be slow due to poor road conditions and natural obstacles.

A significant aspect of the work involved training local survey staff. The training covered various aspects, including the operation of modern equipment like the MRA 101 tellurometer.

Today, the descendant of the Military Surveyor is a Geographic Specialist responsible for producing and supplying geographic information and products to a wide range of Defence organisations. The role is to create technical products that provide vital information for military commanders to make mission-critical decisions. The vast outdoors is in the past. Unfortunately, we do not have input from the Geographic organisations. Current operations and technical developments are always of interest.

The third significant article differs greatly from any previously published article in Ranger. A DSA member of the Council had a career at sea, and he writes about his broad experiences, which include surveying at sea.

From France, a very welcome article on “The 31e et 32e Compagnies Géographiques” is complemented by a Military Survey in the Faroes during World War 2. The reports on the Hughenden visit and the D-Day Museum seminar cover the relevant historical events and activities.

In the past, we have looked to the future and space. Again, there is a very informative article from a survey point of view on navigation in this developing technology and science.

Two articles relating to the surname “Wood” portray the different experiences of two Military Survey Warrant Officers in World War 2 and highlight the broad involvement of the Military Survey in the war.

135 Squadron undertook a battlefield tour in June; a summary of the tour is included.

The 2024 AGM decided to return to a hard copy of Ranger. After six months, a digital version will be posted on the website. Producing a hard copy places some limitations on the design and size of the journal. It is impossible to include every article submitted, and the priority has gone to original articles. Where an article has previously been published, it tends to slide down the priority list. However, particularly with historical articles setting them in context, adding commentary and broadening the scope can add value. There are a couple of articles that, with a bit more work, will be excellent for publication in 2025.

Every member and others are encouraged to send articles. The earlier in the year, the better, as there are often considerable exchanges between the author and the editor reviewing the article to ensure that all parties are happy before publication.

Comments from the Chairman

Over the past 12 months, the Council has been busy meeting with various other organisations and people to understand the changing world of the geographic specialist and the possible future for the DSA. In 2025, the Council intends to put to the membership recommendations for the future of the Defence Surveyors Association. The Council has also started to consider how the centenary in 2027 might be celebrated.

A year ago, the Council decided to copy the minutes of council meetings to the members. This keeps members informed of activities and ideas and encourages feedback and suggestions rather than waiting for the annual general meeting. It is essential to keep the members in the picture. Therefore, the “Comments” for this year are brief.

Activities during 2024 included an informative and social visit and a highly successful seminar. A programme for 2025 is under consideration, and given the support in 2024, we look forward to another successful year.

The most significant change has been in our banking arrangements. We have moved to digital banking. It has been an uphill struggle, but as of the end of October this year, we achieved success. Rest assured that all the relevant security measures are in place and that all payments must be digitally signed, at least in duplicate. For those who attended the seminar in September, you will have noticed that we have moved to digital ticket booking. This has made life considerably more straightforward for the organisers.

One significant item on a relatively long list of things to do is to refresh the DSA website to meet its future needs. Technology, communications, and organisations' needs are changing, and we do need to keep up with the times.

Defence Surveyors’ Association

In 1927, a group of officers who had contributed to the tremendous success of the Artillery in 1917-1918 by the provision of counter-bombardment data from Sound Ranging & Flash Spotting and led by the Nobel Prize-winners Sir Lawrence Bragg and Harold Hemming formed the Field Survey Association as an old comrade’s association and a known pool of expertise if called upon for another war. The association was in abeyance during the Second World War, but many members again saw active service. The Association resumed activities in 1945. In 1997, the Field Surveyors Association was renamed the Defence Surveyors’ Association more appropriately to reflect the multi-disciplined changing nature of Geographic Intelligence support to the three Services.

The DSA aims to promote an understanding and appreciation of defence surveying, mapping, charting, and geospatial intelligence in historical, current, and future contexts and keep past and current community members in touch. Members come from the defence, industry, academia, and private sectors.

Major General Roy Wood: President (2012 to 2024)

Roy's last day as president was the DSA Seminar at the D-Day Museum on September 19, 2024.

Roy Wood joined the Field Survey Association in 1973. He saw it morph from its pretensions of rescuing the nation in times of crisis into the DSA with its seminars and visits, which have given members great interest and pleasure. He served as Treasurer for nine years and then as President for twelve years. The DSA Chairmen and Council Members have greatly valued his wise words and guidance.

Ramus Prize

The Council awarded Roy Wood a Ramus prize for outstanding service. The prize is an engraved bowl. While the bowl was presented at the seminar, the engraving was not complete but has since been finished, and the bowl is with Roy.

The Red Sea Hills with Directorate of Overseas Surveys (DOS) 1977

Alan Milne

Sudan and Khartoum

In October 1977, a DOS survey party of three surveyors assembled in Khartoum to start a project in the Red Sea Hills. The project aimed to provide photo control for a series of map sheets at a scale of 1:100.000. The Sudan Survey Department (SSD) were also a participant. They provided four surveyors and a sizeable workforce.

The Terrain

The Red Sea Hills Province, a unique and challenging terrain, lies in northeastern Sudan, between the Red Sea and the Nubian desert to the west. The main city is Port Sudan, a bustling hub with a harbour for imports and exports. The road distance between the capital, Khartoum, and Port Sudan is 825 kilometres, and a railway connects both cities. Both cities have airports. The topography to the north and west of Port Sudan is a sight to behold, with mountains rising to 7,500 feet, dry wadis meandering amongst the bare black rock, and little vegetation interspersed with seyal trees.

Port Sudan

Resources

The DOS team comprised the project leader Harry Green with Mike Napier, and Alan Milne, with three Landrovers and a Bedford MK truck for transport. Steve Hartley replaced Mike in December. The Sudan Survey Department (SSD) provided four counterpart surveyors and a substantial labour force with their Commer trucks and Toyota pickup vehicles. SSD also had a De Havilland Twin Otter survey aircraft equipped with an air survey camera. Survey equipment included Wild T2 theodolites, MRA3 Tellurometers, heliographs, and hand stereoscopes for photo point identification.

Plan

The teams moved to a base in Port Sudan. The DOS staff used a government rest house located on the harbour quayside.

The existing primary control survey network, a testament to the rich history of land surveying, consisted of trig pillars erected between the 1930s and the 1950s. Many of these pillars were built by the esteemed David Munsey, a survey lecturer at the Royal Military College of Science at the time I did my degree. In his day, base measurement was done by catenary taping! He spent a period as a survey director in SSD. He had worked with R C Wakefield on The Arc of the 30th Meridian 1935-1940, leaving a legacy in the field.

Satellite imagery, a novelty then, was used to plan movement, position new survey second-order control, and select desert campsites. Existing mapping was very poor and, in many cases, only mapped a couple of miles on either side of the journeys colonial officers made in the past. Particularly noting when and where water was available! Most of the planning was done on the first ERTS satellite imagery available at the time.

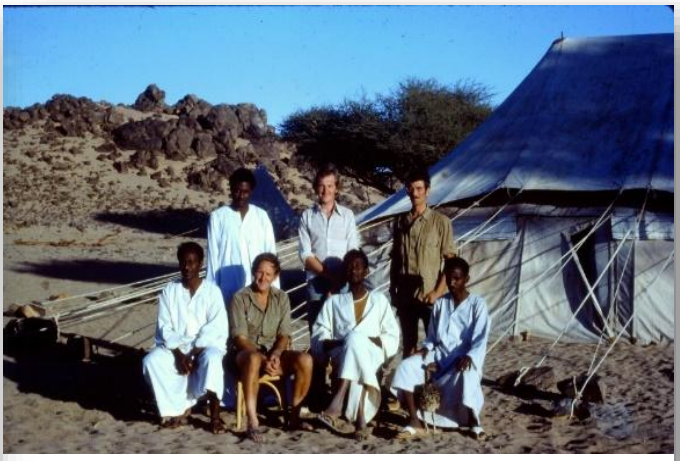
A bonus was having the SSD survey aircraft for air photography, and prints were immediately available to the team when photo point control was established.

Harry Green

The Team

Harry Green was a dedicated DOS surveyor, well known for his love of being in the field. He was committed to DOS's aims, bringing mapping and structure to many developing countries. He was an excellent leader, soft-spoken, and much enjoyed interacting with international survey teams. He was at home in the field, camp, and overalls, fixing a lorry clutch or other mechanical problem. He was a real mentor and an example to the survey apprentices he took under his wing.

SSD workforce



DOS and SSD Surveyors

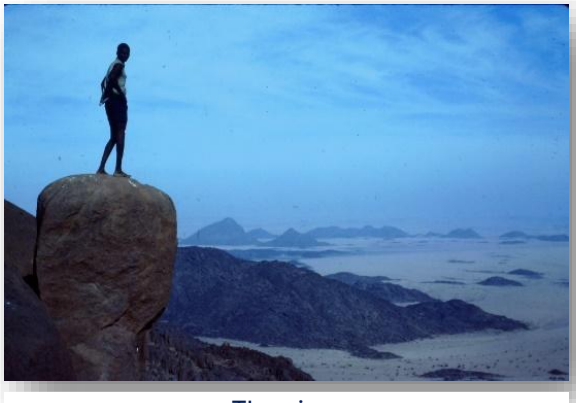
Work Progress October to December 1977

The first steps were taken in the North of the area. The terrain was very rugged, mountainous and dry. Operations took place some distance from any help. It was normally a two-day drive from Port Sudan to the campsite, navigated by wadis seen on the ERTS satellite imagery.

Early morning work started at 0600, and survey parties made their way by the best route possible to different survey points. Typically, it was chilly until the sun made itself felt. Perhaps an hour's drive to the base of the mountain. Some mountains had very difficult access, and the Landrovers performed well even in large boulder fields. It was wise to keep one's fingers free of the steering wheel! On reaching the base of the mountain, there was a stiff climb to the mountain top, with the support team carrying the equipment consisting of batteries, tellurometers, water, theodolite, heliograph, and notebooks. Survey pillars built by David Munsey were to be found on the tops of some mountains.

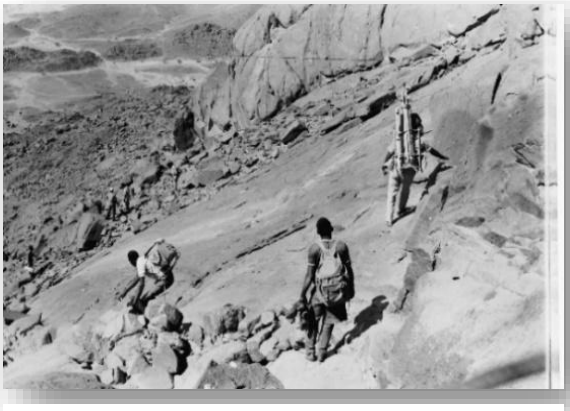
There were no paths, and there were always tricky boulders to climb. For survey targets, we used heliographs, and these were most effective. The most extended sighting I remember was some thirty miles away. In one situation, I needed help from a colleague to hold a tissue in front of the theodolite telescope to dim the bright light coming from the heliograph in the distance!

Trekking uphill with survey gear



The view

Survey pillar circa 1950s



Tricky descent

Helio in duplex mode

On a hilltop, whilst in Tellurometer voice contact with Harry and a Sudanese surveyor on the plain below fixing a photo point, the surveyor exclaimed that Harry had lifted a stone and been stung by a scorpion. He was in pain for two weeks before he recovered.

Changed camp every couple of weeks.

Observations were checked in the evening by the light from Tilley lamps. On return to base, these were photocopied and despatched to Tolworth, the DOS Headquarters.

An observing party

The major bonus was receiving fresh air survey photographs in the field, which allowed us to pick third-order photo control points without delay. On one occasion, a seyal tree was identified on the photograph, but since the photograph had been taken, the tree had been chopped down to make charcoal and was now a stump! Identifying photo points was difficult in the heat of the day; trying to prick the needle carefully on the print did not help with sweaty hands and brows.

Photo point identification - a challenge

Interludes

I was an Army Captain on secondment on my second tour with DOS. A naval emergency occurred following a courtesy visit from HMS Zulu, to which the expatriate community were invited to visit the wardroom. I received a message from the High Commission in Khartoum. Could I help a sailor needing evacuation from a naval task force coming south from the Suez Canal? This was a naval force headed by HMS Tiger, our last cruiser. The sailor had appendicitis, and the naval surgeon was not happy operating at sea. HMS Cleopatra, a frigate, sped to Port Sudan with the casualty. The sailor was lucky to arrive at the hospital in one piece, for the ambulance driver forgot to secure the latches on the stretcher and drove off with the stretcher shooting out of the rear doors! The appendectomy was successful.

HMS Zulu

We met a couple of British engineers who had been contracted to recycle the waste toppings from a gold mine in the middle of the desert. They were recovering the gold using sodium cyanide. We were invited to the first smelt.

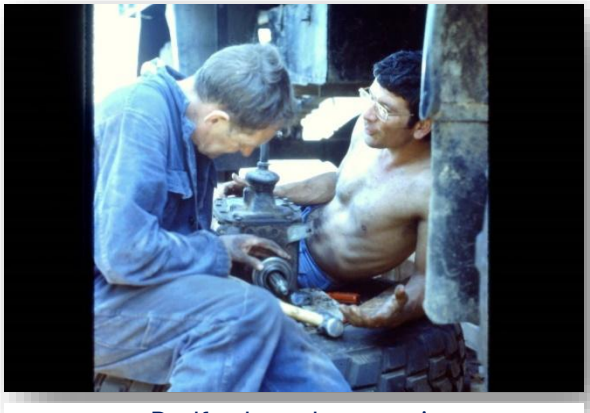
As a military man, I had to revise for my promotion exams while in the desert. This was difficult by Tilley light at night. The exams were to be taken in the High Commission in Khartoum. Arriving at Port Sudan airport for my 5 pm flight, I was told it would be delayed. The pilot of the DC10 had seen many pilgrims wanting to get to Mecca for the hadj and so decided to fit in three return flights to Jeddah in between! I joined the Defence Attache, a private pilot, on a flight back to Port Sudan in a charter Cessna aircraft.


Gold mine

Life in camp

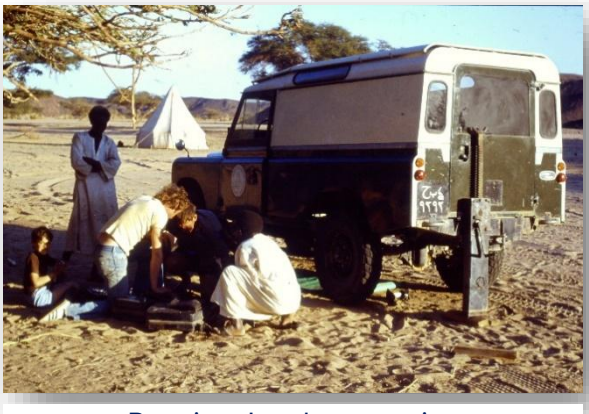
Camp life was relatively comfortable. There was filtered water; the paraffin fridge was very efficient if properly levelled, and ice was made. Fresh supplies were obtained from the market before driving to a desert camp, perhaps two days away. There was tinned butter from a UK consignment. I met the British Army Training Team (BATT) who were on exercise and with my Army connection we were able to add Army rations to our menu.

On one occasion, I returned to find nine baby scorpions in my bed sheets. I searched but could not find the mother, although I could hear her scratching about at night. She was eventually found when the camp moved.



Bedford gearbox repair

Tyres were subject to puncture from thorns and repairing the punctures was a constant challenge. Vulcanisation patches were very useful. Maintaining vehicles was an ongoing task with Harry using his skills to repair the clutch on our Bedford truck. We always carried a spare set of springs in the Landrovers; which were often overloaded, with a spring snapping at an awkward moment!



Repair to Landrover spring

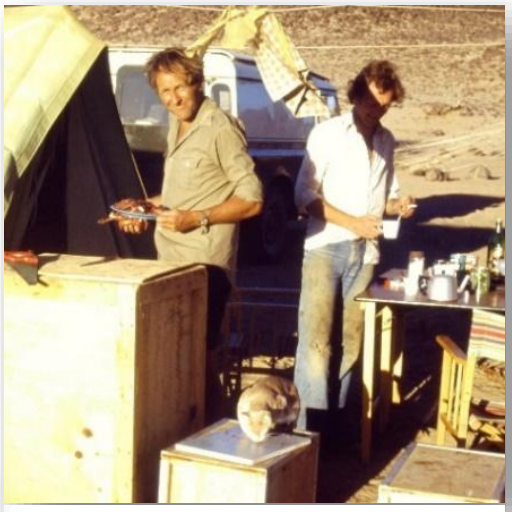
After tea, we often joined the SSD workers for a football game, with many of them playing barefoot.

Fresh meat was always a welcome addition to our diet. An ostrich egg provided two breakfasts for three. An SSD tanker truck brought water to the camp from Port Sudan. In the event water ran out, we drew water from camel wells, cleaned it with filters, and then boiled it before use.

Tyre repair

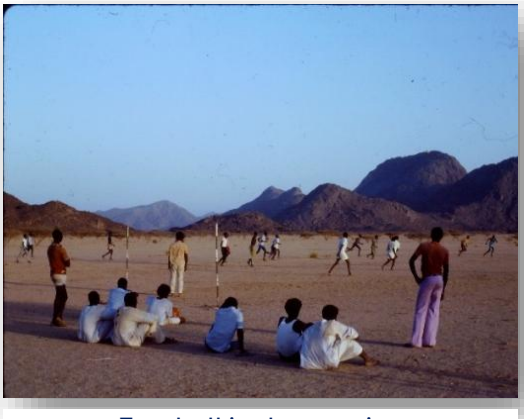
Fresh meat for dinner

Fresh Water



Herbert the travelling feline mopping up

Bedouin



Football in the evening

Work Progress January to May 1978

In the early part of the new year, we moved south, away from the mountainous area to more of a plateau, heading towards Kassala and the border with Eritrea. The terrain became more flat, without any prominent ground for survey stations. Survey observations were primarily based on the existing triangulation network of first and second order stations. The survey party was able to fix photo control directly from these stations and there was little need for long tellurometer traverses. In one situation Harry located a small hill on the desert landscape on which to set up his instrument. His driver sat down nearby and noticed something lodged in a crack in the rock. It turned out to be a wartime cigarette tin, and behold, inside was a piece of paper, as clear as the day it was written, recording that this was a survey point chosen perhaps thirty years earlier by the well-known surveyor John Wright. Counterpart surveyors were able to take on more of the observations. Dust laden air on the edge of large storms – haboobs – became more of a problem and visibility was reduced to one kilometre for short periods of two to three days. Photo point identification became difficult in those areas devoid of ground detail.

Haboob

Communications improved as we approached the west to east Haiya – Atbara railway and the north to south road between Haiya and Kassala. The dry stream bed known as 'khor' was the main obstacle to cross-country driving. These khors often had steep sides and soft sandy beds. Fewer vehicle springs needed replacing, although thorns and sharp stones continued puncturing the tyres.

Project End and Conclusion

Field work ceased in late May 1978. Photo control for fourteen map sheets at a scale of 1: 100,000 was completed. The project demonstrated the professional way DOS conducted its operations in developing countries and improved counterpart surveyors' skills. The survey party was fortunate to be supported by a large SSD workforce and the De Havilland Twin Otter survey aircraft. The project's success was in no small measure due to Harry Green's experience, skill, guidance, and resolve.

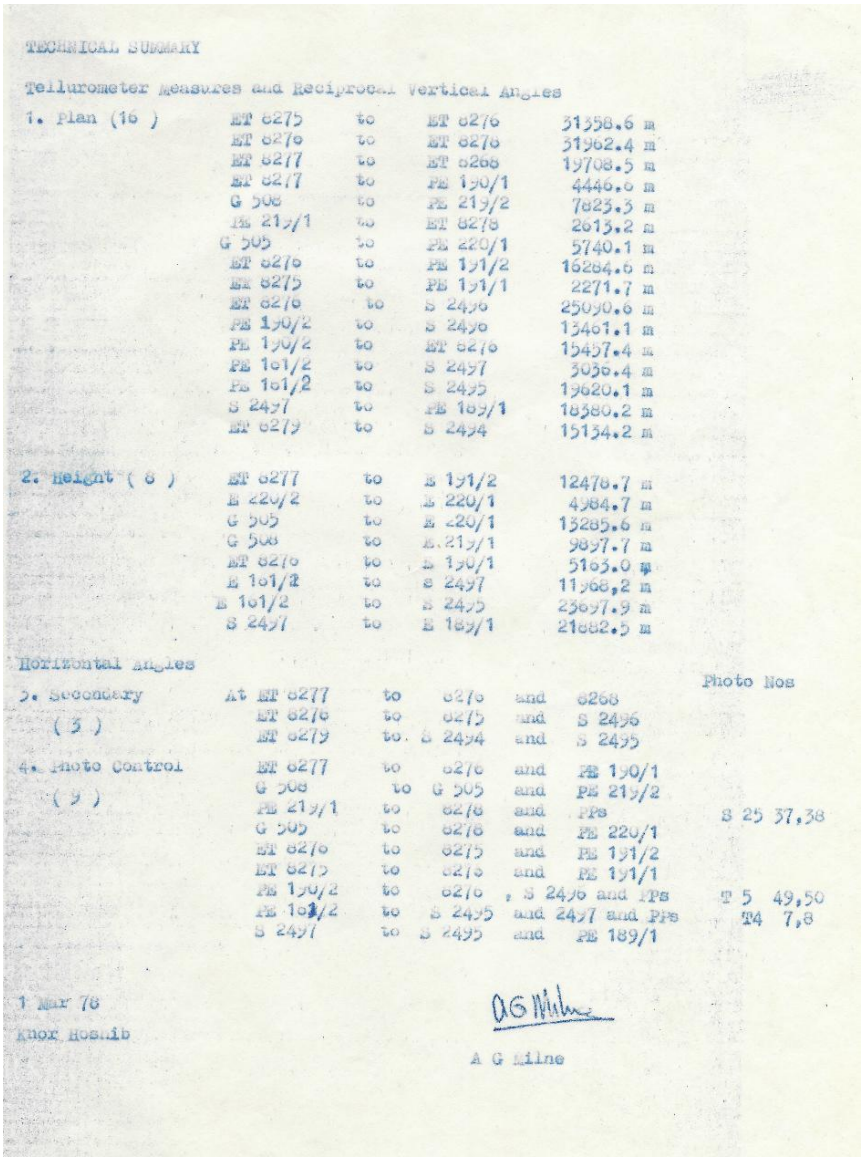
On the next page the table from the DOS annual report records the observations completed in this project.

SUDAN	TRIGONOMETRICAL STATIONS									DISTANCE MEASUREMENTS		HEIGHT POINTS FIXED	PRECISE LEVELLING
PROJECT	*Reconnoitred*		*Pre-marked*		*Built*	*Observed*		*Photo-identified*		*Long-range EDM*		*Tellurometer and vertical angle*	*Bench marks identified*
	New	*Old*	*New*	*Old*		*New*	*Old*	*New*	*Old*	*Lines*	*Km*	*New*	
Port Sudan	25S	28P 22S	5S	7P 5S	25S	25S 38T	22S 21T	39	26	89	1457	88	126

P=Primary S=Secondary T=Tertiary

The harsh working conditions on the project were typical of DOS activities in the field. Yet the experience of working with the Sudanese surveyors and their supporting workmen will remain a fond memory. GPS would eventually replace the 'old school' of traditional surveys.

An example of the monthly report sent to Tolworth shows my observations in February – all done on a typewriter with three copies produced using carbon paper.



TECHNICAL SUMMARY

Tellurometer Measures and Reciprocal Vertical Angles

1. Plan (16)	ET 6275	to	ET 6276	31358.6 m
	ET 6276	to	ET 6278	31962.4 m
	ET 6277	to	ET 6268	19708.5 m
	ET 6277	to	PE 190/1	4446.0 m
	G 506	to	PE 219/2	7823.5 m
	PE 219/1	to	ET 6278	2613.2 m
	G 505	to	PE 220/1	5740.1 m
	ET 6276	to	PE 191/2	16264.6 m
	ET 6275	to	PE 191/1	2271.7 m
	ET 6276	to	S 2496	25090.6 m
	PE 190/2	to	S 2496	13461.1 m
	PE 190/2	to	ET 6276	15457.4 m
	PE 161/2	to	S 2497	3036.4 m
	PE 161/2	to	S 2495	17620.1 m
	S 2497	to	PE 189/1	18580.2 m
	ET 6279	to	S 2494	15134.2 m
2. Height (6)	ET 6277	to	E 191/2	12478.7 m
	E 220/2	to	E 220/1	4984.7 m
	G 505	to	E 220/1	15285.6 m
	G 506	to	E 219/1	9897.7 m
	ET 6276	to	E 190/1	5103.0 m
	E 161/2	to	S 2497	11968.2 m
	E 161/2	to	S 2495	23697.9 m
	S 2497	to	E 189/1	21682.5 m

Horizontal Angles

						Photo Nos
3. Secondary	At ET 6277	to	6276	and	6268	
(3)	ET 6276	to	6275	and	S 2496	
	ET 6279	to	S 2494	and	S 2495	
4. Photo Control	ET 6277	to	6276	and	PE 190/1	
(9)	G 506	to	G 505	and	PE 219/2	
	PE 219/1	to	6276	and	PPs	S 25 37,38
	G 505	to	6276	and	PE 220/1	
	ET 6276	to	6275	and	PE 191/2	
	ET 6275	to	6276	and	PE 191/1	
	PE 190/2	to	6276	, S 2496	and PPs	T 5 49,50
	PE 161/2	to	S 2495	and 2497	and PPs	T4 7,8
	S 2497	to	S 2495	and	PE 189/1	

1 Mar 76

Knox Hosmib

AG Milne

A G Milne

SURVEY IN THE FAROES 1942

WO F H Wood RE

Mike Nolan

The 150th anniversary of the founding of 19 Field Survey Company in 1977 sparked my interest in the history of military survey, which has continued to this day. These brief notes are based on correspondence with the former Warrant Officer F.H. Wood in 1981.

Warrant Officer F H Wood RE

He joined the Survey Battalion at Southampton as a boy in 1925 and retired in 1949. He served the last few years of his engagement as a Survey Instructor at the School of Military Survey, Warminster.

As a young surveyor, he attended a one-year course in drill, musketry, fieldwork, and bridging at the Training Regiment at Chatham.

In 1937, he attended an Advanced Topographical Survey Course at Fort Southwick near Portsmouth and is believed to have served in 19 Field Survey Company after that. He did not accompany 19 Coy to Iceland but remained in the U.K., instructing Ordnance Survey civilians in trig surveying before they joined RE Survey units.

Following this, he was engaged for several years in survey work for the defence of the U.K. from Cornwall up to Sullam Voe, when, as he put it, “this now famous port was a lovely place of rock and heather with two small guns, probably 6-pounders to guard it against invasion.” He moved on to Sumburgh, where the RA was keen on DIY entertainment. A few ex-professionals were in

the units, and they auditioned everybody who stayed at the camp to find out if they could do anything to amuse the troops.

“Once, after a long hard day’s observing in the hills, some of us were moistening our lips in the canteen when the Committee struck. Anyone who has been suddenly confronted by three strangers and asked to sing will know how we felt. We were flabbergasted. Apart from “Nellie Dean”, the only song we could think of at such short notice was “The CRE”, which we rendered with all the assurance we could muster. I suppose Gunners get a bit tone-deaf firing their guns, or perhaps it was something we said in the song, but whatever it was, we were not invited to sing again. The BSM told me that the last bit of our “CRE” had turned out the fire piquet and stampeded a flock of sheep halfway up Fitful Head. However, the Gunners have their regimental song, and we were able to give them some assistance with it on several occasions. When the time came for us to go, we parted on very good terms.

We got to Scapa Flow in 1941 after the U-boat attack. The Orkneys were then bristling with AA guns, and, among other things, we had the rather depressing task of making the visible part of a sunken battleship’s mast an intersected trig for use as an aiming point by AA batteries.”

Two things about Orkney that stuck in his memory were the voracious midges—there were millions of them—and the peat—there were acres of it.
“Any land that would grow or graze anything was worth a fortune, and the only land available for building Army Camps was not fit for anything else”. The AA camp on Hoy was built on a peat bog 10 feet deep. The huts were built on piles and connected by duckboards, and more duckboards connected the huts to the guns, which were on firm, rocky ground. Going out in the dark in that camp was a hazardous business, especially when it had to be done at the double during stand-to.

A Typical Settlement

Roads on the islands were scarce and were only near the coastlines. Transport had to be borrowed if we were that lucky. Most of the reconnaissance, beaconing and observing had to be done on foot and during the few months we were there, my two pairs of Army boots were so worn by the rocks and heather my toes were showing through. When I returned to my unit, 522 Coy, I was told that I would be court-martialled for wilful damage to Government property, but I managed to escape that indignity.

Although the terrain was very rough, it had the advantage of being treeless, and it was possible to complete the reconnaissance and beaconing in one operation. Rock cairns and bunting were used for the beacons, which, in the clear air, could be seen for up to ten miles.

The trig scheme started with triple interlocking inaccessible bases from the two lighthouses. It closed on a base measured on a new runway, which was being built by a Construction Company RE. Trig points were established on most of the inhabited islands. At that time of year, stars were not visible, and sun azimuths were observed at each end of the 1500-metre base. The scheme was computed by machine and logs on two projections – Transverse Mercator and Cassini. The scale and azimuth checks agreed to 2 cm and 5 seconds. Before computing could begin, the conversion tables in Minor Trig had to be extended to include the latitudes we were working in. Levelling data had gone with the coordinates, but the coastline was steep and the tidal range relatively small, so we could establish a reasonable mean sea level for trig heights, which checked in very well at the end of the scheme.

With modern equipment, theodolites, and computers, the job would no doubt have been done much quicker and more accurately, but at the time, we were all quite pleased with the result."

Clarke, Eldridge and Wood

In 1942, he served in 522 Field Survey Company R.E. This unusual unit worked closely with the Ordnance Survey. As a Sergeant, he, with Sappers A.V. Clarke and W.J. Eldridge, was sent to the Faeroe Islands to undertake a special survey which was to supply ranges and bearings for the anti-aircraft and coast-defence guns and radar installations manned by the R.A.F. The trig records had been "lost", possibly by pro-Nazi Faeroese, and the only data he had to work with were the internationally known geographical coordinates of two lighthouses, which were on different islands several miles apart and not intervisible.

“We were restricted in the amount of equipment we were allowed to take. One 3.5-inch Tavistock theodolite, one Marchant hand-calculating machine, the Nautical Almanac, trig tables, minor trig, steel tapes, spring balances, a chronometer, barometers, and thermometers were about all we had. Owing to the weather and daylight hours in those latitudes, we had four summer months to complete the reconnaissance, beaconing, observing, and computing.

The defences were gradually built up, and there was plenty of work to be done for the 3.7-inch, 4.5-inch AA and 6-inch coast defence batteries. There were also Z Batteries, which were something new at the time. They comprised sixty-four rocket projectors covering about 100 square metres of ground. I never saw one of these batteries in action. They were supposed to put up a devastating box barrage, making things very hot for any German raiders. I don’t know what they did to the enemy, but they caused a good deal of alarm and despondency among the civilians who had an assortment of scrap metal clattering about their ears for what seemed a long time after the barrage went up. While I was at one of these sites, somebody thought it might be a good idea if all sixty-four projectors pointed in the same direction when being fired, a job the overworked site officer should have done. I was able to put them all in the correct, uniform orientation and hoped there would be fewer complaints from the townsfolk. We were not in the Faeroes long enough to become bored with the place, although this would not have been difficult in such a cold, inhospitable country.

The Faeroese people were in direct contrast to the climate and terrain. They are a seafaring race, directly descended from the Vikings, with their ancestors' blond good looks and forthright manner. In common with other seafarers, they are also partial to a drop of what they fancy. In their case, it often took the form of homemade schnapps, which was reputed to be a mixture of rhubarb wine and methylated spirits.

Entertainment for the occupying forces, including a battalion of Cameronians, was scarce. The period following a Grindurbod was a favourite time for relaxation. There were dances featuring the national Danska-danska, which seemed to be a kind of energetic polka culminating in the dancers splitting into two groups on opposite sides of the hall and then rushing towards the middle at top speed with blood-curdling shouts. It was a stirring thing which could quickly have gone wrong. With the Faeroese braking system full of schnapps and army boots full of feet, one wrong move could have turned the whole thing into a re-run of the Battle of Stamford Bridge.

The only other entertainment I participated in was when a mobile cinema unit visited one of the camps I was staying in and showed a gruesome film about VD. Usually, civilians were allowed in, but on this occasion, they were barred. The film was very explicit, and above the sounds of the projector and the soundtrack, the occasional loud thud could be heard as some apprehensive Romeo hit the floor in a dead faint at the sight of the internal and external ravages of the disease. There were more white faces than carnal thoughts as we left that Nissen hut, and for the next twenty-four hours, the camp was like a Trappist Monastery. The show probably did some good, but there were no known statistics of how many innocent young Glaswegian infantrymen had gone out into the cold light of the Aurora Borealis to a fate worse than death.”

Operation Valentine[1]

Operation Valentine was a British military operation during World War II that involved the occupation of the Faroe Islands. The operation took place on April 13, 1940, immediately following Nazi Germany's invasion of Denmark and Norway.

At the time of the occupation, the Faroe Islands was an administrative Province of Denmark. Following the invasion and occupation of Denmark on 9 April 1940, British forces launched Operation Valentine to occupy the Faroe Islands. On 11 April, Winston Churchill – then First Lord of the Admiralty – announced to the House of Commons that the Faroe Islands would be occupied:

We are also occupying the Faroe Islands, which belong to Denmark and are a strategic point of high importance, and whose people showed every disposition to receive us with warm regard. We shall shield the Faroe Islands from all the severities of war and establish ourselves there conveniently by sea and air until the moment comes when they will be handed back to Denmark, liberated from the foul thraldom into which they have been plunged by German aggression.

An announcement was broadcast on BBC radio. On the same day, a Royal Air Force (RAF) aircraft was seen over the Faroese capital, Tórshavn.

On 12 April, two destroyers of the Royal Navy arrived in Tórshavn harbour. Following a meeting with Carl Aage Hilbert (the Danish prefect of the islands) and Kristian Djurhuus (president of the Løgting, the Faroese parliament), an emergency meeting of the Løgting was convened the same afternoon. Pro-independence members tried to declare the independence of the Faroe Islands from the Kingdom of Denmark but were outvoted. An official announcement was later made announcing the occupation and ordering a nighttime blackout in Tórshavn and neighbouring Argir, the censorship of post and telegraphy and the prohibition of the use of motor vehicles during the night without a permit.

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[1] "The British Occupation of the Faeroe Islands 1940 – 1945" is a relevant article in British Army Review No. 94 of April 1990.

Alec Wood - Military Survey 1929 – 1948

A Military Surveyor in the Ordnance Survey and during World War 2

Roy Wood

The article is from the personal memoir of Major General Roy Wood - former Director General of Military Survey and President of the Defence Surveyors Association

My father was in France with 19 Field Survey Company when I was born in May 1940. He had enlisted in the Army in Guildford on 7 January 1924 when he was 15 and joined the second intake at the Boys Technical School, which had just moved from Aldershot to Beachley on the spit of land between the Severn and Wye. It later became the Army Apprentices' College Chepstow. While there, he completed a "Carpenter and Joiner "course, passed out of Boy's Service on 7 December 1926 as a Royal Engineer B3 Tradesman and moved to the Training Battalion for his basic military training. This was then at Brompton Barracks in Chatham, where I was later to do part of my Young Officers' Course in 1963-64. His first posting was to a searchlight unit in Blackdown near Aldershot, and his Pay Book records "AA Duties" from 27 November 1927 to 30 January 1929.

Searchlights did not hold his attention for long as on 31 January 1929, his "Nature of Employment" changed to "Survey Duties." (According to a report on technical developments of that time that I have seen recently, the Searchlight Battalion was involved in experiments to use the beams for survey observations, and it could be that this influenced his move.)

Survey Training 1933

The description of the survey training of the day says that new personnel were posted to the Ordnance Survey at Southampton for a short drawing course, then to Bristol for a "detail-survey" course. However, a 21st birthday card from his grandfather shows that by November 1929, he was in Lincoln with the Ordnance Survey and formally remustered from Carpenter and Joiner to Surveyor (Ordnance) A3 in February 1930. He was upgraded to A2 in August 1930 and to A1 in January 1936. At that time, the Ordnance Survey was manned by serving Royal Engineer officers and soldiers who carried out the peacetime surveying of the UK but had mobilisation roles with regular Royal Engineer units. Annual military training was under the auspices of a skeleton "Survey Battalion" based in Fort Southwick and Fort Widely on the downs above Portsmouth, but otherwise, they worked to all intents as civilians.

So, from that start in 1930 until 1939, my father was working in the UK on a variety of field surveying tasks for the Ordnance Survey. He was involved in some way with the major Re-triangulation project, which started in 1936. Still, most of his work during this period was large-scale revision – moving around the country with a small team identifying and plotting changes to

the existing 25-inch to-the-mile (1:2,500) maps. Until the systematic use of air photography for revision was introduced in the 1950s or later, this labour-intensive approach was the only way to record the rapid expansion of towns and all the other changes which were taking place in the landscape. Revision was probably what my father was doing in Lincoln in 1930, but I believe most of his pre-war years were spent in the South East of England.

With the approach of war in 1939, most of the military surveyors working in the Ordnance Survey moved to their mobilisation roles. At some point during that summer, my father reported to Fort Widley before deploying to France on 15 September with the British Expeditionary Force as a member of 19 (Army) Field Survey Company RE.

My father rarely spoke about his time in France, but official records tie in with some places I remember him mentioning. He was in one of the four topographical sections in the first echelon of the unit, which moved to an assembly area near Le Mans. While there, they set up a map depot and were busy reworking the triangulation records of Northern France and Belgium to make them consistent. I suspect something similar was done in 1914.

In December 1939, the unit moved forward to Frevent. The Company HQ and the draughtsmen took over a chateau in the village, but the rest made the best of a somewhat derelict sawmill. Over the next few months his topographical section was employed on check surveys of the French triangulation in the new area, extending it to support the field artillery and to provide a dense network for anti-aircraft gun positions. They also provided panorama photographs for every pillbox position showing ranges and bearings to all significant features in the landscape. Triangulation in the flattish terrain of Northern France meant using the prefabricated metal Bilby Towers, which could be built to raise the observer to 100 feet above ground. It was reported that, on a visit to the Company, the C-in-C of the BEF, Field Marshal Lord Gort, suggested his ADC should climb one and climbed it himself when the ADC declined. His Troop Commander in France, Captain Lew Harris, came to talk to my first course in the organisation in 1961 when he was Brigadier Harris, Director of Military Survey; we also met him in Tennessee in the early 1980s. I also recognised another officer in one of my father's photographs. David Bickmore was then a lieutenant in 19 Company, and I met him in the 1970s when he was running the Experimental Cartography Unit of the Royal College of Art.

19 Army Survey Company in France 1940

AW middle right, Lt David Bickmore front 3rd from right

The German offensive was launched on 10 May 1940. I have no evidence of where my father was at this stage, but the official history notes that the topographic sections were ordered forward into Belgium, where they were to take part in the revision and classification of roads in the BEF sector. Congestion delayed their movement, and they were able to complete just one day's work in Ellezelles, northeast of Lille, before the situation forced a return to Frevent on 17 May to set up

roadblocks and prepare for immediate evacuation. On the afternoon of 19 May, the order came to destroy or bury all equipment that could not be carried in the Company's vehicles and move to Boulogne's outskirts. By the 21st, they had moved nearer to Dunkirk, and the unit's main body embarked on the Dover Abbey on the 26th. Whether or not my father returned on this ship is not clear, as his record of service shows that he did not reach England until 1 June. The Company re-grouped back at Fort Widley and then went to Llandudno for training.

Apart from a visit soon after I was born, my knowledge of my father's service during the rest of the war is vague, with only a few names and places stuck in my memory. However, an envelope addressed to my mother postmarked Peebles 13 July 1942 identified from the official histories that he must have been in 519 Field Survey Company. 519 had been formed in October 1940 as part of the home defence forces to counter what then seemed a very real threat of invasion. They were initially based in Teffont near Salisbury, and this was indeed a place I had heard mentioned. Apart from some excitement caused by the issue and prompt return of tropical kit in March 1941, the unit stayed in Southern Command until September, with the field surveyors busy coordinating gun positions and AA batteries.

Then, in September 1941, the Company moved to the Combined Training Centre in Scottish Command where, as the official history says, they underwent special assault training. I have no evidence of my father's involvement but the unit's location in Victoria Park, Peebles provided the link to that envelope. The field surveyors were once again working hard to meet the demands of the coastal defences and the RAF who needed positions fixing for various airfield installations and, I suspect, for radar stations.

Sometime in 1942, my father attended an air survey course at the Survey Training Centre, which by then had moved from Fort Widley to Wynnstay Hall near Ruabon in North Wales. A story from Wynnstay tells of the Adjutant having a quiet beer in the village pub when he overheard the village postmistress relating how the soldiers from the camp cashed a surprising number of savings certificates but rarely bought them, followed by the railway booking clerk commenting on the number of rail warrants they seemed to have to distant places. On his way back to the Mess, the Adjutant took a detour via the print shop and, as he by then suspected, found presses running off near-perfect counterfeit savings certificates, rail warrants and some other desirable documents. The ringleaders were reported to have spent a few months where they could not use their printing skills.

519 Company moved to Dalmeny Park, South Queensferry, in September 1942 and on to Tadcaster between Leeds and York in January 1943. This was a time when planning for what was to be Operation Overlord was in full swing. Collecting information and producing special mapping of the invasion beaches and on into France and Germany played a vital part. 519 is recorded as printing Top Secret "Benson" maps for the landings from October 1943. I have no records covering this period apart from the grant of Paid Acting rank of WOII (CSM) on 28 November 1942, but by D-Day, he was running a map supply unit in Ascot in Surrey as a WO1. The control of the many and varied maps required by the invasion force needed great care in the handling. To maintain the deception that the attack would be in the Pas de Calais rather than Normandy meant that units trained on specially produced maps with false names and did not know the actual location of their beaches until they had embarked on their ships. Maintaining that security and ensuring units throughout the invasion force received the correct mapping bundles for their specific objectives were considerable challenges.

A "Permanent Pass with Plain Clothes from After Duties Daily to 08.30 hrs Daily" dated 14 December shows that my father was still at his map depot in Ascot at the end of 1945. However,

with the war now over, that unit closed sometime in 1946, and he was posted as Senior Military Instructor at the Survey Training Centre. This had moved from Ruabon in December 1945 to Longleat House, the Wiltshire home of the Marquess of Bath. The unit was in a hutted camp in the area now occupied by "The Lions of Longleat", which had been built as a hospital for US casualties. Despite its American origins, the camp was primitive, and the living conditions, in common with the country, were frugal. This was particularly so during the severe winter of 1946/7 when deep snow isolated the camp, and fuel for the coke stoves, which provided the only heating, ran out.

Despite these privations, the Centre was extremely busy. The difficulties experienced in 1939 of creating a military surveying and mapping organisation from the peacetime Ordnance Survey had been taken to heart, and the need for a professional Military Survey Service was recognised. This, together with the introduction of new techniques during the war, prompted a major review of training requirements and led to the introduction of a Long Course for Royal Engineer officers and a new soldier trade structure. It also saw the beginnings of courses for civilians selected for colony survey posts and with the newly formed Directorate of Colonial Surveys. (Later, the Directorate of Overseas Surveys or DOS when colonies became unfashionable)

Survey Training Centre at Longleat 1946

As the Senior Military Instructor – the top technical Warrant Officer – my father was in the midst of all these developments. In addition, he taught triangulation to the Long Course Officers, one of whom, the then Captain Mike Sexton, was Major General Mike Sexton and Director of Military Survey when I ran one of his staff branches in the 1970s. The Long Course became the Army Survey Course, and when I was a student in 1966/67, it was in very much the same format as it had started with my father's help. He completed his service and left the Army on 18 January 1948.

DSA Visit to Hughenden Manor on the 28 March 2024

On 28 March 2024, members of the DSA and others visited Hughenden Manor, a Victorian mansion in Hughenden, Buckinghamshire. The manor served as the country house of Prime Minister Benjamin Disraeli, 1st Earl of Beaconsfield. The manor has a long history, first recorded in the Domesday Book of 1086 as part of Queen Edith's lands. Over the centuries, it passed through various owners until it was acquired by Disraeli in 1848. Disraeli extensively renovated and expanded the manor, adding the Italianate formal gardens highlighting the bold colours he and his wife, Mary Anne, loved. Today, Hughenden Manor is owned by the National Trust and open to the public. Visitors can explore the manor house, gardens, and surrounding parkland and discover the estate's secret wartime past as the site of a top-secret World War II operation. The National Trust Collections also houses a diverse collection of portraits and personal memorabilia about Disraeli and his family.

Hughenden Manor

The visit's core was presentations on *Operation Hillside* and World War II Target Mapping. *Op Hillside* came into being because was that our initially strategic bombing was hopelessly inaccurate. Better mapping and improved navigation aids were therefore the solution. This happened at Hughenden Manor.

John Poules spoke about Hughenden and *Operation Hillside,* and Mike Nolan gave two talks: RAF Air Charts 1911 – 1945 and Target Maps. John did his National Service, maintaining RAF radar systems for the 2nd Tactical Air Force in Germany. After retiring from a career in Business Electronics, John trained as a volunteer adviser at the Citizen Advice Bureau for the last seven years and joined the team at Hughenden Manor as a volunteer. His role at Hughenden was to research the secret mapping work undertaken at the establishment during World War II. The code name for the work was *Operation Hillside*.

John delivered a well-researched and captivating presentation on the Manor and Operation Hillside - a covert map-making operation that occurred at Hughenden Manor. Situated in a

secluded location near Bomber Command, the manor provided the perfect cover for Hillside to operate discreetly and avoid detection by the enemy. Here are the key points: In 1941, the Air Ministry took over Hughenden Manor and transformed it into a secret hub for bomb-target mapping, known as "*Operation Hillside*". More than 100 individuals, including civilian cartographers and RAF personnel, were part of Hillside, working tirelessly to create detailed and precise maps for RAF bombing missions. The maps produced at Hillside played a crucial role in the success of various RAF operations, such as the Dam Busters raid and the D-Day landings. Additionally, Hillside contributed to other significant missions like *Operation Foxley*, a British plan to assassinate Hitler*, Operation Manna*, providing food to the starving Dutch, and aiding in the escape of prisoners from a Gestapo prison near Amiens. The wartime activities at Hughenden Manor remained undisclosed until a special exhibition was unveiled in 2005 to illuminate this hidden history.

Mike Nolan delivered two fascinating and thoroughly researched presentations, one before lunch on RAF Air Charts and the other after lunch on Target Maps. The depth of knowledge and detail in both presentations was hugely impressive. These presentations could be featured in a special edition of The Ranger, displaying Mike's expertise and benefiting the DSA. Collaboration between Mike and The Ranger will be vital to moving forward as events shape future actions.

The Hillside Drawing Room – then and now

Despatch Control

Lunch was taken at the Pole Cat Inn

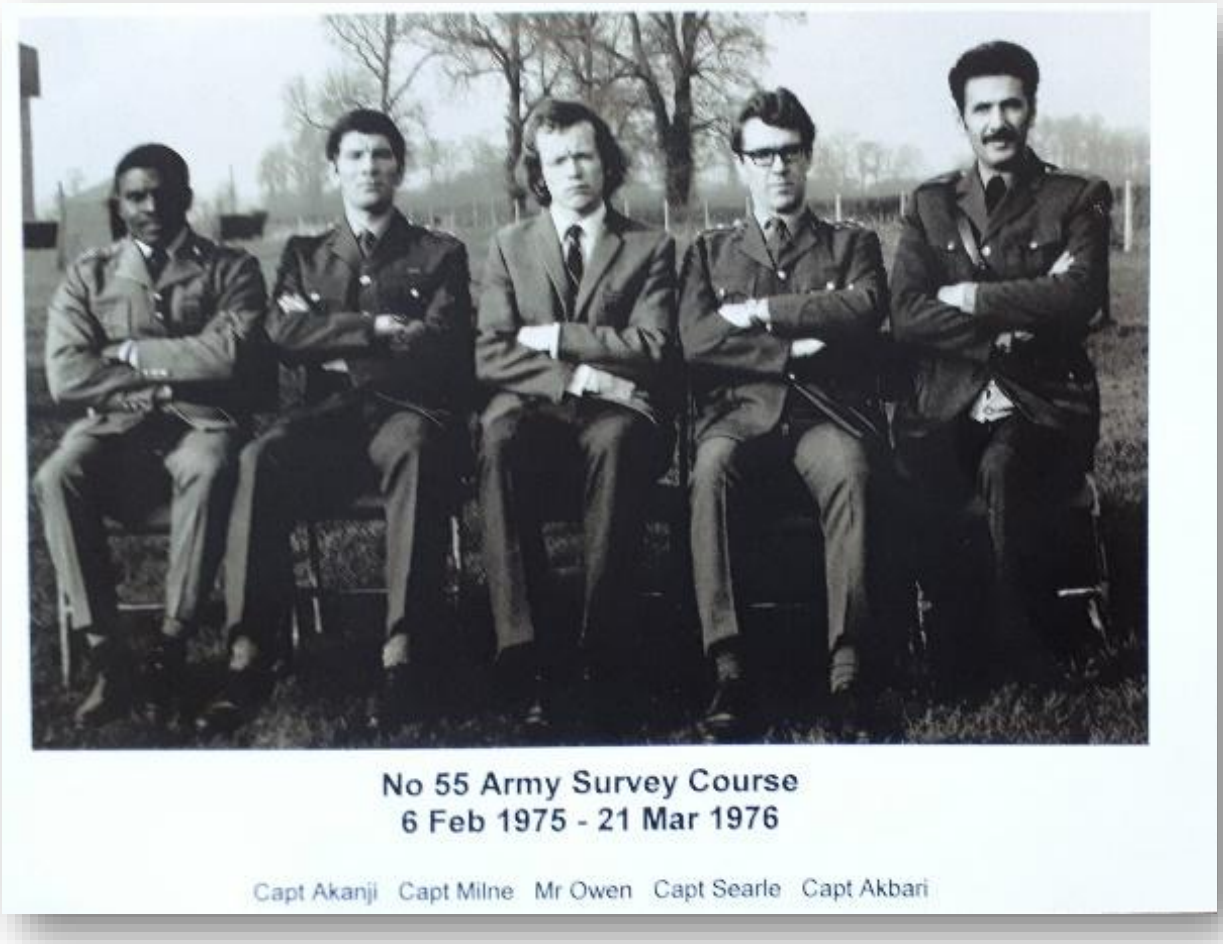
A Surveyor Reminisces on a Survey in Libya

(dedicated to Jim Walke – Civilian Instructor SMS Hermitage)

Robert Owen

I was recruited as a Map Research Officer of the Mapping and Charting Establishment in 1971. I worked at the Map Library in Tolworth, primarily associated with data research to produce the Joint Operations Graphic (JOG) worldwide series. Collaborating with other recent graduates, we researched the source material from mapping and documentation for the cartographic compilation of this JOG series. The series centred at that time on Eastern Europe and parts of Africa and for which I was put in touch with Alastair Macdonald, who had recent experience working with the Directorate of Overseas Surveys in parts of Africa, which was the subject of one of the JOG areas, to which I was assigned. Our collaboration and the importance of relationship building with Alastair and others was instrumental in the success of this project, as his first-hand knowledge of the status of roads enabled them to be reclassified into JOG road types.

In 1975, I was selected to attend the prestigious Long Survey Course - Army Survey Course No. 55 at Hermitage. This course, which I commenced in February of that year, was not just a learning



experience but a transformative one. I was among four other course members, all equally dedicated to honing their surveying skills.

My career as a surveyor took a significant turn when I transitioned to the private sector. I had the privilege of working with some of the best names in private practice, expanding my expertise beyond surveying to encompass geospatial data in its broadest sense. The 'account' that follows is a testament to the professional growth I've experienced over the years. It details one small project from many jobs and projects I've undertaken in the Middle East, North Africa, and more recently in Africa. My work shifted to land administration, GIS, and mapping policy for projects financed by international finance institutions.

In most cases on projects, they were of short duration and, from a technical viewpoint, were relatively simple and did not require significant resources or in-depth planning. They tended to involve the provision of base geospatial data for mapping or as the base for the design and later construction of infrastructure projects or, more recently, for building land-based databases. However, as with much overseas work, the real challenges are not necessarily the technical survey ones but those of adapting to new environments, relationship building (with everybody from clients to partners to taxi drivers and street sellers), camaraderie, living a life overseas where things work differently and remembering the good times and humorous events. This journey of adaptation and personal growth is a testament to the resilience and versatility required in our profession.

Surveys for proposed roads in El Marj, Eastern Libya, with W. S. Atkins (International Consulting Engineers) – the non-technical background

The job was to survey the land along alignments of numerous proposed agricultural roads (150 km or more in total) that were to be designed and built in Eastern Libya. Atkins already had an office in Tripoli. Some surveyors were also doing work halfway along the coast at Sirte, but I and other surveyors were to go to El Marj, in the east of the country, 100km east of Benghazi.

“Most of Al Marj was destroyed by a 5.6 earthquake on 21 February 1963, which killed some 300 people and injured 500 more. Major rebuilding was undertaken about 5 km (3.1 miles) from the old site and was completed about 1970.”

We flew to Tripoli and had a couple of days there. Then, we were given a vehicle to drive about 1100 km (700 miles) to El Marj. There were four of us: two engineers who were to select the routes for the roads and two surveyors, including me and others who joined later. We stopped halfway, stayed with colleagues in Sirte, and carried on the next day. But I have always been impressed by the fact that all the road and town signs are in Arabic, of course, so we were still determining how we would know when we got there - but we did!

We were accommodated in a small single-storey house that had been rented. It had one lounge/dining room, a bathroom, a small kitchen, three bedrooms, and six blokes. There was no

furniture other than a kitchen table and chairs, so we lived out of our suitcases and slept on camp beds.

We worked six days a week, with the first up in the morning driving to a local bakery to get bread for breakfast, and then we all went out, the transportation engineers in one car and, over time, four surveyors in two other vehicles. The engineers showed us the route on the ground, which they marked with big rocks placed at what they estimated would be the intersection of the road's straight lines. The route designs were off-road over rough but primarily rocky terrain, with loads of fierce-looking dogs occasionally threatening you. A stoop down to the ground to pick up or pretend to pick up a rock usually scared them off. The job was to survey the position and height of the selected route with a bandwidth of up to about 100 metres along the route, mostly around 40 - 50 metres. The instruments were a theodolite to measure the angles and a distance

Spacious luxury accommodation, two per room

Relaxing after exhausting day

A rainy day in the garden

Preparing the equipment

measuring equipment mounted above the theodolite, which was pointed at the prism carried by usually the more senior of the two-man surveying team. The surveyor then wandered back and forth along the route with the prism while the instrument man was taking angles and distances.

Every so often, when the range became excessive (500 – 600 metres), the instrument would move to the next fixed point, having detail measured up to it. Hence, the survey system was “constructing” a network of “survey stations” from which detailed observations were taken. To ascertain the “direction of travel/orientation” of the survey system, i.e., whether it was going north, south, east, or west, we had 1:50,000 USA maps. Still, we also carried out sun observations, which provided greater direction accuracy (and avoided the need to do closed taverses). The data was then logged onto a primitive data logger, which in due course was taken back to the head office in Epsom for processing. There was no internet in those days.

Surveyor looking down through gorge towards the sea which we had to survey

Discussing the day ahead

The above photos show some of the varied terrains encountered, from difficult mountainous areas to deep valleys leading down to the Mediterranean Sea to the flat farmland. In the two-person photo are two surveyors, one of whom was an excellent young engineer learning the ropes. He was deaf, and sometimes, when any of us were working with him because he was a beginner at surveying (he wasn't a surveyor but an engineer and was given the job for some experience), he would understandably get flustered with the instrumentation and take a long time with the measurements. The person at the other end, me or another surveyor, would get agitated and release expletives. Because we could be 500 or 600 metres away from him and he was deaf anyway, we assumed that he couldn't hear. But he could lip read and let us know in no uncertain terms afterwards. So, we were kinder to him after that!

There was no lunch usually; we just worked through the day with a "cool box" water container. When they estimated the job in terms of how long it would take, it was assumed that Libya was a desert country, forgetting that while most of it is desert, the coast is quite verdant and bushy! So, the work was taking longer than anticipated. After finishing around 4 or 5 p.m., we headed back to the house wondering if, at least in the first week or so, we had turned the water taps in the right direction because the water supply was in a tank on the roof, which was filled from the local system once a day or perhaps it was every second or third day. You had to ensure the correct tap was on to let the water in, and the other tap was off to ensure it didn't drain away when you were out at work. We eventually got it right!

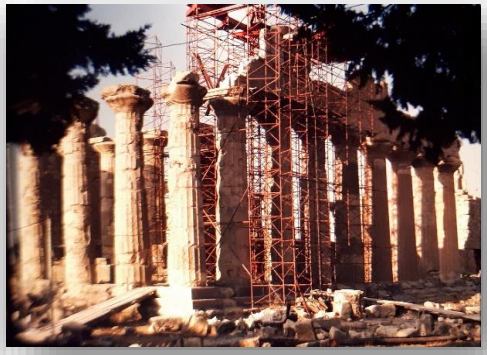
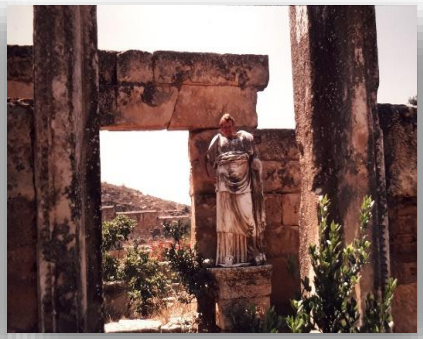
Levelling

On the way back from work in the field, the teams would try their luck at the roadside vegetable and fruit stalls, where we bought many ingredients for our meals. We / I got the hang of some basic Arabic – long since forgotten – "yes, no, please, thank you, counting to ten and maybe a little more, etc." The town had a "shopping precinct" with little in it. – a "supermarket" which didn't sell much, and when it did, it was vast amounts of the one item - enormous chest fridges filled with single-serve butter cartons and, the next day, single jam portions, hundreds and hundreds of them. Flour and sugar could be purchased but only in large quantities, so "our" kitchen had a 50kg sack of flour and the same sugar. My "signature" dish was apple crumble and omelette. The chef of the day cooked for everyone. In the shopping area, there was a butcher. It fully qualified for the title because the meat was butchered any old way, and there was no such thing as cuts of meat. The meat was tough and horrible, but we cottoned on to the existence of a pressure cooker somewhere in the market, and that reduced the meat cooking time from two or three hours to something more manageable.

And so that was the daily routine for week after week. Friday was the day off when we "tidied" and washed and boiled our socks. Occasionally, we went to the only local hotel and had a meal there for some variety. We drove east 100 km to Al Bayda, where an Atkins engineer supervised a road construction project. He was the one who kept the money and gave us our money allowances to buy food! He lived in a nice-ish house/office on his own but with a fierce dog who attempted to take lumps out of your leg when you went into the garden. A few miles beyond Al Bayda is the ancient site of Cyrene –

An ancient Greek and later Roman city, it was the oldest and most important of the five Greek cities in the region. It gave eastern Libya the classical name it has retained to modern times. Located nearby is the ancient Necropolis of Cyrene.

We visited and wandered about the ruins but regret not spending much time there. There was probably no time and, of course, no information, visitor centre, or anything. Some of my photos and some Google ones are also below.

Images of Cyrene

These two courtesies of Google

Difficult Surveying conditions and one man (far right) has only one leg!

We needed another vehicle from Tripoli during the work, so I got a lift down to Benghazi airport and flew to Tripoli. The check-in procedures at Tripoli and Benghazi airports – were a bit like a rugby scrum, with no queue of any sort, with people descending from all directions at the desk - arms outstretched, thrusting hands at the poor airline checker in person. From left and right and above, they came at you as each scrambled to get that all-important boarding card – and then when the gate was called the same scramble, race, and rugby scrum – dreadful it was. Anyway, I got to Tripoli, picked up the car, and drove all the 700 miles back. I am sure I would do it on my own as well. We had hoped that it would be a four-wheel drive vehicle. Still, it was only a normal

two-wheel one – which was just about ok because the rough terrain didn't have much soil depth or sand to get stuck in, although there were some exciting moments when the vehicles slewed and slid all over the tracks in the mud.

Interesting times, culture, and way of life – driving along and sometimes getting stopped at a police roadblock and learning to offer a passport. If that didn't work, the next level above would be a letter from the client authorising travel, and if that didn't work, some other document and eventually, you would be allowed to continue. Or the time after a US / Libyan incident when the US Airforce shot down two Libyan fighters over the Bay of Sirte, there was a heightened level of alert and security. We were driving along when, in the distance, we saw and heard a Libyan tank fire off a shell – or at least make a loud bang, thankfully not in our direction. Or the attempt (successful) to bring in the ingredients to make homemade beer through customs at the airport.

And so ended my six-month stint in Libya – two lots of three months. But not before Col Gaddafi, in exasperation with all things of the West, decided to ban all Western goods with rumours that the first to go would be toilet paper! I got out in the nick of time and before the s - - t hit the fan.

Where there are significant cultural differences, it can be easy to be judgemental, but the key is adaptation and tolerance. The "Western" way is not always right - lessons can be learned, taken back home and hopefully inculcated into one's view of life. In that regard, there have been other more recent experiences in different parts of Africa which I remember well, for example:

In Algeria, the car drive to the steelworks site for our survey work every morning was always fun, with various landmarks along the way at different locations. Because we didn't know the names of streets and the landmarks (if they had any), we, the Atkins staff, gave them our names so we had, for example, the "smelly bridge" and the "fat policeman" roundabout. The road crossed a railway line, or rather the railway line crossed the road – no barriers and only long goods trains. So the traffic all stopped, and as there is always a tendency not to observe any standard road rules on an approximately four-lane highway (2 x 2) – no road markings, kerbs, or the road edge, quickly there would appear about four lanes of cars or more on your side waiting for the train to pass, which it duly did . . . . to reveal four lanes of traffic facing you wanting to come the other way. On another occasion, there was beside the road an unfortunate deceased cow (healthy looking - apart from being dead, of course, and plump) – hit by a car, no doubt. The next day, the cow was still there minus what was presumably a succulent complete left flank that had been butchered off and was probably destined for someone's dinner table!

But there are many interesting things about Africa and its culture—the people have an enthusiastic sense of humour, and it is easy to "play up to that;" they often have no awareness of time, which is viewed as a Western concept.

The Europeans and the Africans have an entirely different concept of time. In the European worldview, time exists outside man, exists objectively, and has measurable and linear characteristics - - - The European feels himself to be time's slave, dependent on it, subject to it. Africans apprehend time differently. For them, it is a much looser, more open, elastic, and subjective concept. Man influences time, its shape, course, and rhythm."

"The Shadow of the Sun" by Ryszard Kapuscinski"

For example, in a project in Accra, we held training sessions and workshops and wondered why no one arrived for the start time of 9.30 a.m. We learnt that participants would leave home at that time!

And they are lovely in traffic. They pay little heed to the laws or sensibilities of the “rules of the road” – road markings become irrelevant, “U-turns and cutting into queues, overtaking is all accepted without a murmur, driving off-road and across the grass, verges, central reservations, etc. are all common. But it works; nobody gets stressed, hoots the horn, gets upset, or shouts and jumps out of their car to remonstrate or worse, which would happen in so-called civilised countries.

A Route Survey in El Marj, Libya - Technical Survey Report

Introduction

In the 1980s, W. S. Atkins was awarded several road supervision and road design contracts in Libya by the Secretariat of Communications. The roads were in the Sirte area and distinct locations east of Benghazi. Because of the company’s involvement in Libya over several years, an office had already been established in Tripoli, which administered and generally 'looked after' all personnel working in Libya. The contract I was responsible for was the El Marj Agri-cultural Feeder Roads Project, which involved a route survey for the road design of up to 200km of road. This report discusses the project concerning one of the roads and analyses how it was conducted.

Location, Terrain, Climate

El Marj is situated 100km east of Benghazi along the main road to Tobruk in an area which is one of the most fertile in Libya. Much of the land is rich agricultural land cleared from the large expanse of bush, which persists in many areas. To the south, as the incidence of rainfall declines, the farm and bush give way to scrub. The topography consists principally of a steep escarpment parallel to the coast rising from a coastal plain to between 300 and 400 metres with rolling hills and plateaux behind rising to 600 metres. Rainfall averages 15 to 25 inches annually, with most falling during winter.

The survey project was divided into two parts:

Stage 1: The roads were eight in number, with a total length of 92 km, varying between 1 km and 30 km.

Stage 2: The roads were eleven in number, with a total length of 81 km varying between 1 km and 14 km.

The roads that formed the base were scattered throughout the El Marj region.

	ROAD NAME	ROUTE CATEGORY	ESTIMATED DISTANCE (Km)	ESTIMATED TEAMDAYS (4 MAN TEAM)
	STAGE 1			
1)	HAUST MARGHANI	B	8	6
2)	SIDI ISMAIL TILMITAH	A	10	10
3)	ABU SHARRAI	B	6	4
4)	MILTANIYAH-BUSHWAITAH HAJ MOHAMMAD R.56	A	23	23
5)	TAKNIS JARDIS	B	32	22
6)	JAHISHIYAH	C	12	6
7)	TANGOUMA-MAROUGA	C	4	2
8)	ZAWIYAT ANAYLO	C	1	1
	STAGE 2			
9)	ROAD 58 TO ROAD 62	C	1	1
10)	SIDI IBRAHIM BU RASS -SOUTH OF AL HIMADAH	A	5½	6
11)	EAST AND WEST OF ROAD 26	C	3½	4
12)	SIDI MAYOUS TO BANIYAH	C	10	5
13)	BANIYAH TO FARWAN	C	8	4
14)	SAS MUTAYMIS	C	10	5
15)	SIDI SALIM TO ZAWIYAT AL QUSUR	C	10	5
16)	ZAWIYAT AL QUSUR TO LESTATA	A	12	12
17)	BAYADDAH TO NADURSAITUN	A	14	14
			170	130 (or 22 Team weeks)

A = DIFFICULT
B = MODERATE
C = EASY

A 64·5
B 46
C 59·5

Schedule of planned road alignments to be surveyed

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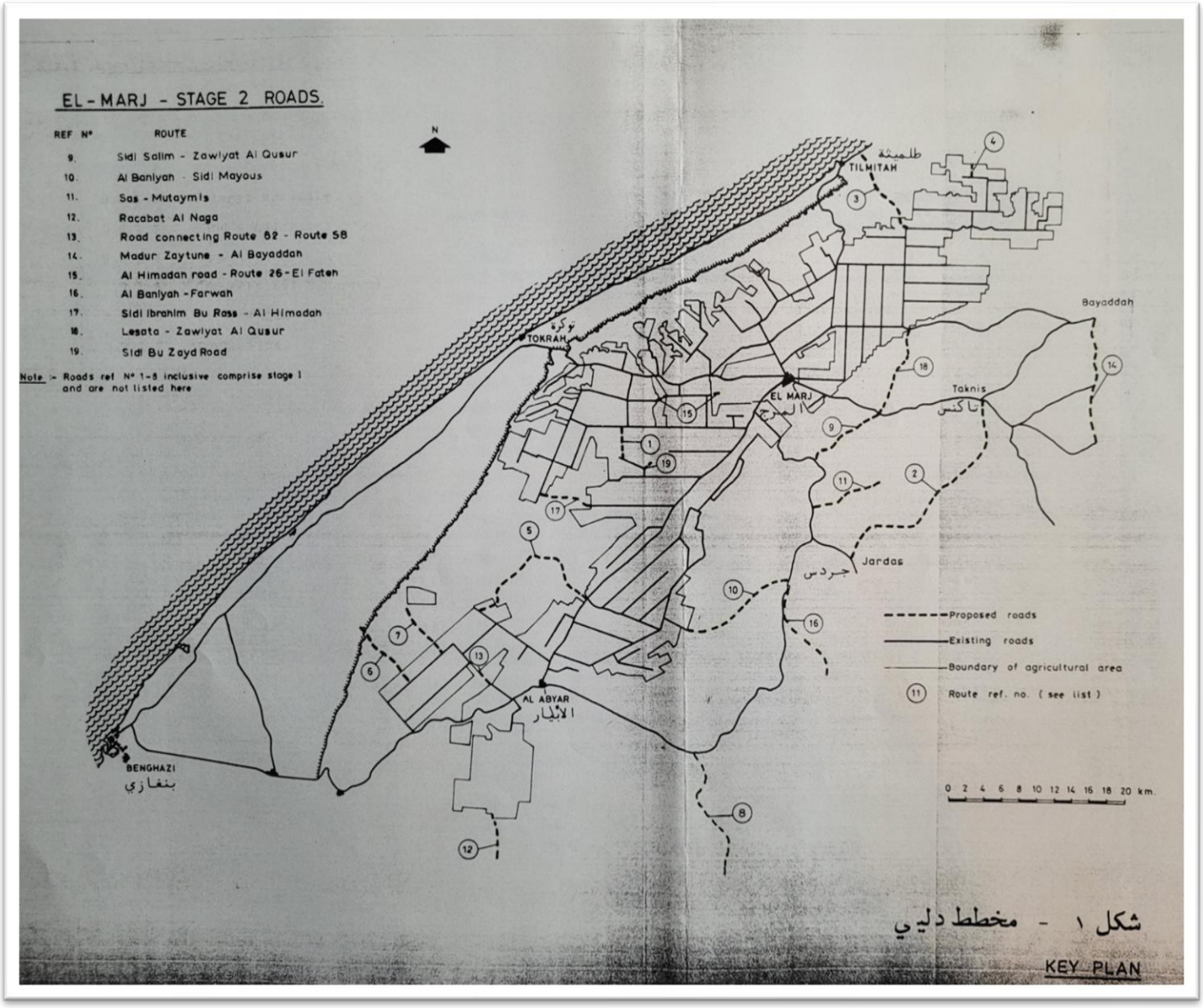


Contract and scope of works

The contract was flexible, initially requiring the design of 150 km of agricultural feeder roads, the routes to be decided by the Secretariat of Communications. Some examples of the routes (40 - 50 km worth) were shown to WSA engineers. On that basis, two prices per kilometre were established, one for most roads and a slightly higher one for those requiring substantial structures. Within the price was the survey costs sufficient to cover the costs of four surveyors on site for three months. As the project progressed, other routes were added, increasing the contract size to 200 km, which allowed a corresponding increase of four months for the survey time on site. The survey department estimate was divided into three categories depending on the difficulty of the routes to be surveyed. Nevertheless, it was assumed that the 40 - 50 km of easy survey was representative of the whole. However, as the routes were being selected, it became

apparent that many were much more difficult than at first envisaged either by the client or by WSA, and this upset the estimates such that the eventual survey time on site was seven months.

The survey requirement was as follows:

Survey the route and provide sufficient detail for plotting and design at 1/2000 with a contour interval of 1 metre.

The provision of centre line and right of way markers to a very rigid schedule.

I. Along the centre line at a maximum distance apart of 500 metres.
II. 20 metres offset from the centre line markers.
III. At all intersection points (IPs)
IV. At all tangent points along the centre line and 20m offset.

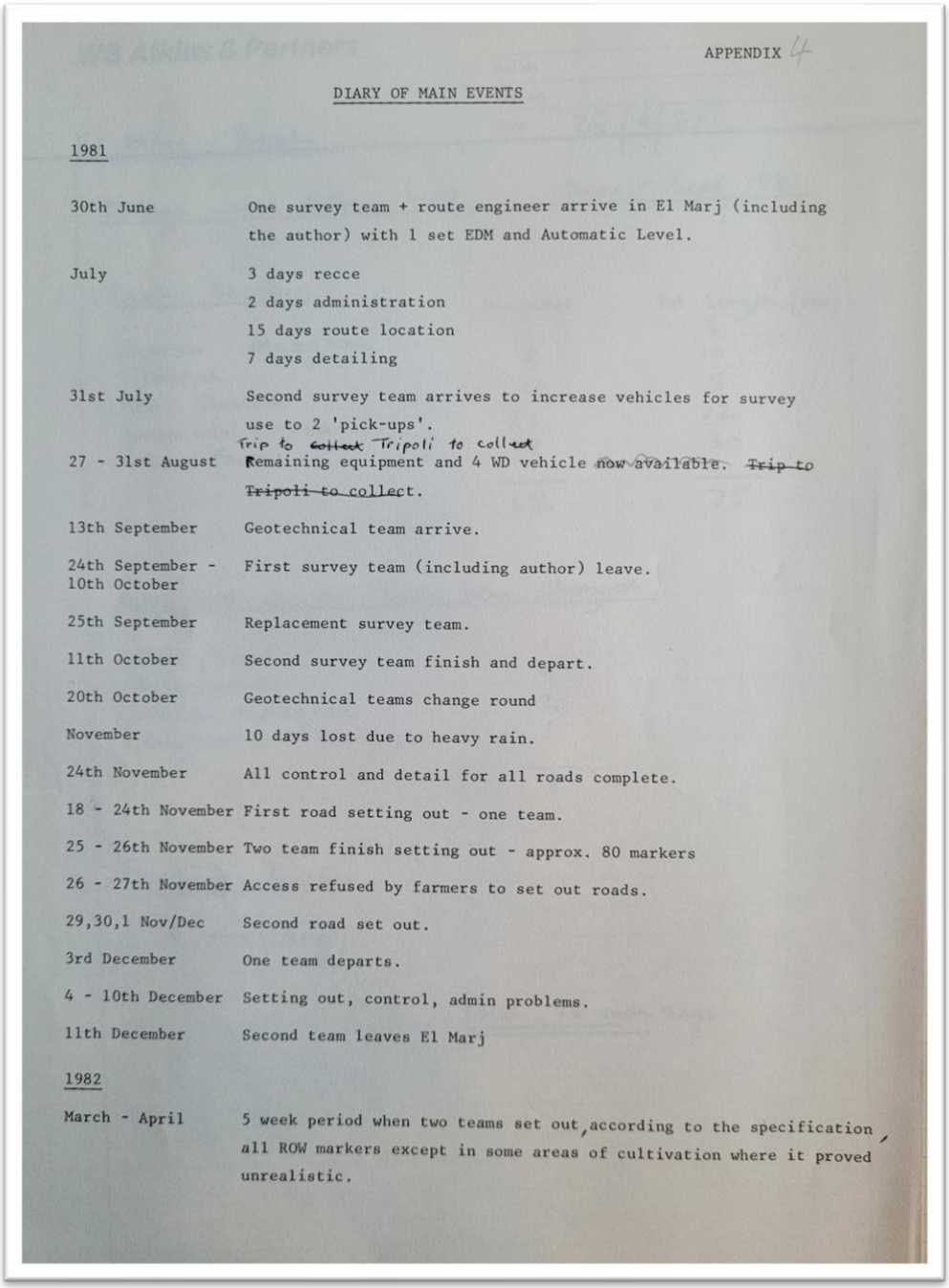
It was estimated that this would require more than 1700 markers. It was required so that the road would eventually be set out from the markers without using arbitrarily positioned control points.

General Organisation

During a large project in a country where communications were poor and general conditions difficult, it was inevitable that the problems thrown up by these circumstances demanded as much attention as the survey work itself. This section is intended to briefly describe the general organisation of the project and the problems it presents.

Personnel

Two teams of two surveyors undertook the survey work for six months. I was responsible for the general local administration of the project, whose personnel also included one routing engineer and two geotechnical engineers, and for all survey work. Of the two survey teams (of which I was one member), two surveyors were experienced, and two were inexperienced—a staggered leave arrangement allowed for two weeks of leave after three months.



APPENDIX 4

DIARY OF MAIN EVENTS

1981

30th June	One survey team + route engineer arrive in El Marj (including the author) with 1 set EDM and Automatic Level.
July	3 days recce 2 days administration 15 days route location 7 days detailing
31st July	Second survey team arrives to increase vehicles for survey use to 2 'pick-ups'.
27 - 31st August	Trip to ~~collect~~ Tripoli to collect Remaining equipment and 4 WD vehicle ~~now available~~. ~~Trip to Tripoli to collect~~.
13th September	Geotechnical team arrive.
24th September - 10th October	First survey team (including author) leave.
25th September	Replacement survey team.
11th October	Second survey team finish and depart.
20th October	Geotechnical teams change round
November	10 days lost due to heavy rain.
24th November	All control and detail for all roads complete.
18 - 24th November	First road setting out - one team.
25 - 26th November	Two team finish setting out - approx. 80 markers
26 - 27th November	Access refused by farmers to set out roads.
29,30,1 Nov/Dec	Second road set out.
3rd December	One team departs.
4 - 10th December	Setting out, control, admin problems.
11th December	Second team leaves El Marj

1982

March - April	5 week period when two teams set out, according to the specification, all ROW markers except in some areas of cultivation where it proved unrealistic.

Equipment and Materials

Early initial problems in mobilisation related to obtaining the equipment and the requisite number of vehicles. Once these problems were overcome, the survey teams were eventually able to make use of the following: -

1. AGA 14 EDM with KERN DKM 2A
2. KERN DKM 500
3.Sokki sha BIC Automatic Level
4. Various accessories, including AGA Geodat Data Recorder.
5. Mitsubishi t Pick-Upt Truck
6. WD Nissan Patrol

The AGA Geodat was used for the first time in WSA's first direct involvement in computer plotting and computer road design using the MOSS suite of programmes. Significant problems were also encountered in obtaining materials for the control station building. We were fortunate to be involved in a road supervision project some 75 km away, and some help came from this quarter. For all other materials, e.g. aggregate. (experiments using the sand/ soil adjacent to stations being built proved unsuccessful), hammers, axes, etc. and many day-to-day requirements and major shopping expeditions were organised to Benghazi.

Communications with Head Office

Telephone contact was maintained with the head office in the U.K. and the Tripoli office when it was possible to discuss major problems or progress. As batches of survey work were completed, WSA personnel going on leave, either from the El Marj project or from projects further east, carried the work back.

Analysis

Many days were spent coping with the administrative, organisational, and client liaison problems. Whilst allowances for this are built into any job estimate, it is impossible to cater for every eventuality and take account of changing local conditions. Inevitably, therefore, there is an element of risk involved in accepting any contract, and, in this instance, what would have turned out to be realistic pricing would not have secured the contract.

Survey Organisation

The process by which route selection and survey took place was as follows; -

In general, the client gave the approximate positions of the proposed road starts to the route engineer in conjunction with the local peoples' committee. In some cases, only start and end points were given, together with a direction and a road length.

The route engineer then decided on the alignment of the proposed road, which was plotted on a 1/50000 scale map. The committee approved this alignment, either directly from the map or, more usually, by driving along the route. In several cases, changes to the approved alignments were necessary because of objections by local farmers. This resulted in extra work for the route engineer, delays in getting new routes approved, and, in some cases, additional survey work as the original route had already been surveyed.

The locations and proposed road alignments were then shown to the survey teams after the early problems had been sorted out. The two types of roads could be distinguished.

Roads across rugged terrain where it was impossible to fix a precise alignment without a control traverse linking intersection points (I P s) being observed.

Roads where the proposed alignment could be fixed, and the right-of-way limits could be precisely defined.

Each team (comprising one inexperienced surveyor, who generally acted as an instrument man and an experienced surveyor) assumed responsibility for various roads and surveyed them from start to finish, as and when initial approval was obtained from the client and other untrusted parties.

There were three distinct survey operations.

1. A control survey.
2. Detailed survey of the right-of-way, theoretically 40m wide.
3. Establishment of the right-of-way markers.

Although, in theory, it would have been possible to combine these three operations in some different permutations, in practice, it was undertaken as follows: -

A control survey was carried out separately. The rugged terrain made it impossible to fix a precise alignment without a control traverse.

In general. The control and detail were conducted as a combined exercise by one team.

The ROW markers were established by two teams working together as a separate exercise, with one team setting out and the other concreting. This was done after all other work had been completed, in March and April 1982. Hiring labour to avoid alignment change problems to do the concreting was considered more trouble than it was worth.

Survey Control and Existing Information

There was no existing survey control information, and the 1/50000 mapping available was old and out-of-date, although still of limited value. Therefore, it was decided to observe open-ended control traverses for all routes, a method used with no problems in similar circumstances in many other road design projects conducted by WSA in Libya. The only alternative of observing closed-loop traverses was rejected based on the extra time involved. Checks on the work were as follows.

Vertical and horizontal datum values were established for the start position for each road from the detail on the 1/50000 map. The coordinates and height of the endpoint were then plotted and compared with the map's detail. This worked well in most cases, given the map's scale and lack of detail.

The initial bearings for all traverses were obtained using a prismatic compass, which was usually checked using sun observation for azimuth.

In a minority of cases, identifiable features on the map, such as buildings and ancient ruins, could be observed.

The three above were checks against gross errors. Other checks attempted to reduce the possibility of smaller errors. Stations were occupied at least twice for the control and detail survey and once for the setting out exercise. Where control and detail were observed separately, stations were occupied three times. This, therefore, provided a chance to conduct distance and angle checks.

A comparison of the heights of stations by levelling and trig heighting checked the distance measured, as a significant error in a distance would produce a station height different from the accepted level value (if there was a considerable height difference to start with).

No gaps or overlapping details occurred on the plotted mapping.

Heighting was executed by trig heighting checked by single levelling. Comparisons made between the two sets of data indicated a close similarity.

It is considered that the combination of checks above was sufficient to eliminate the possibility of any gross or significant errors, and indeed, errors were revealed, which were then corrected,

Surveying Conditions and Problems Encountered

Early in the project, it became clear that original estimates would be exceeded. As more routes were submitted for a survey, obtaining a picture of future progress became possible. Work schedules were therefore drawn up to reflect this, which included the difficulty of each road, estimated times or survey work and, where appropriate, actual times. This information was passed on to the Head Office.

The degree of difficulty for each road reflected the topography and, more particularly, vegetation cover. Some indication of this is shown in the photographs below. Comments related to this, and general problems are as follows: -

Mountainous terrain and deep valleys caused road problems crossing the escarpment to the coast. For example, in a 2km stretch of the Sidi Ismail Tilmitah road, 18 control stations were necessary to adequately survey all details (Plates 1-3).

50 km (29%) of the total route length was heavily wooded, e.g. on the 23 km Miltaniyah - Route 56, over 100 control stations were co-ordinated (Plate 4). To overcome the sight line problem, constructing small portable towers from which to observe was considered. This was rejected because of: -

1. Lack of materials
2. Access difficulties on many roads

The combination of deep winding valleys and convex slopes required many stations.

One attempt to use three tripods as a base for a fourth observing tripod had some limited success, but the usual solution was to use pogo sticks at heights over 4 metres to see over the trees for detail points.

Access to parts of some roads was impossible, even for a four-wheel drive vehicle. (Plate 5)

Unusually heavy rainfall resulted in the (Plate 6) loss of 10 working days.

Where a road alignment had been fixed, it was often impossible to be sure of its location on the ground and difficult to set out. Therefore, a bandwidth greater than 40m wide (i.e., between the ROW limits) was required to ensure adequate detail cover. This was also necessary when the alignment could only be chosen after a road corridor of 100 - - 200 metres had been surveyed.

Mention has already been made of delays and extra work caused by alignment changes and farmers refusing access to land. Where there was opposition to a road, the local inhabitants sometimes destroyed control stations despite attempts to make them as inconspicuous as possible.

57 km (33%) of the total route length was arable land and presented no problems to survey other than above. The setting out of the ROW markers was similarly easy, although, on occasions, it appeared futile as many of those established early on were found later to have been ploughed up on return to the project site. The client was advised of this and problems setting out markers in the middle of dense woodland. (Plate 7)

PLATES 1-3

Sidi Ismail - Tilmitah.
Large numbers of control stations were required to survey deep winding valleys although sometimes a good vantage point could be found. Extra detail was observed to assist in alignment design where the terrain was particularily difficult.

PLATE 1

PLATE 2

PLATE 3

PLATE 4

Detail in heavily wooded areas can only be observed by using an extension to the 'pogo', usually 4m high.

PLATE 7

Easy routes along cultivated land with no terrain or bush problems were detailed surveyed at the rate of 3-5km per day.

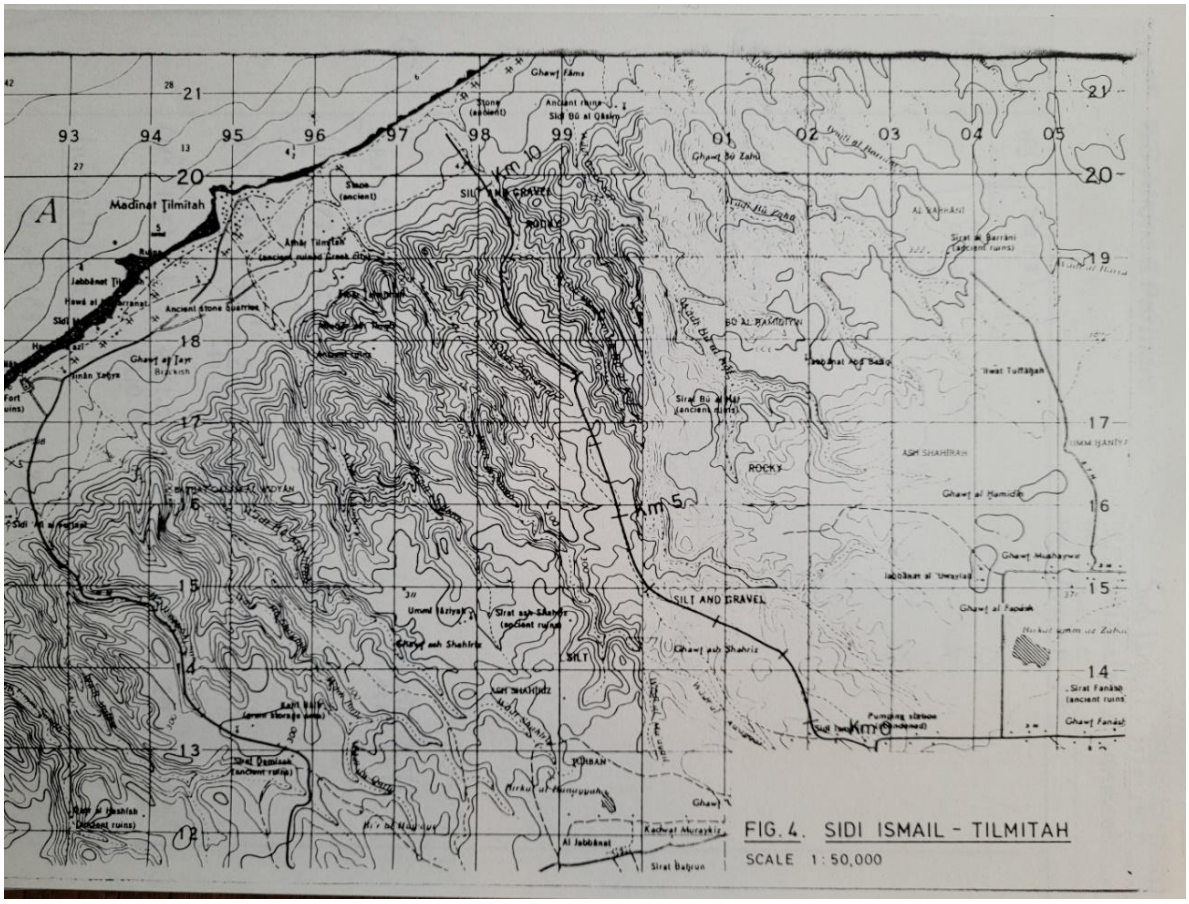
PLATE 8

A moderate section of a difficult road.

ROUTE NO. 3 SIDI ISMAIL - TILMITAH

Introduction

This 10 km road was one of the first routes submitted by the client for design and is a good illustration of all the difficulties described earlier. It links Sidi Ismail (on an existing agricultural road) to the northeast of El Marj to Tilmitah on the coast and, in so doing, descends from a height of 400m on the undulating plateau to 40m on the coastal plain latterly by way of a steep-sided wooded rocky valley. There are several existing tracks along the proposed route, one of which follows the steep valley to the coast. However, as access is only possible with four- In a four-wheel drive vehicle, the tracks are rarely used.



Sidi Ismail- Tilmitah

Execution of survey

The route engineer established an approximate alignment, and the survey was then carried out in different stages.

Survey of Valley and Rocky Gorge Section

This was required early on as it was recognised that this section would be one of the most difficult to design and construct. Therefore, a preliminary control and detail survey was done on an

arbitrary grid. Eighteen stations were required to survey a wide enough corridor to allow a variety of design alternatives. It was executed in July when only one team of valley surveyors was on site, and there was no access to a four-wheel drive vehicle, both of which did not arrive until August.

The surveying practice was to observe control and detail separately with three rounds of horizontal angles, one round of vertical angles for trig heighting and slope reduction, and four distance measurements from one direction only. In addition, the stations were heighted by spirit levelling. This exact specification was adhered to because the actual observation time was such a small proportion of the day's activities that the extra was worthwhile. However, three rounds of HAs were soon reduced to two if the spread was reasonable (within 10"), which was considered adequate. The AGA14 EDM was often used to produce wide-ranging measurements; four measures for control were regarded as necessary. This was maintained throughout the project for all traverse control.

The data collection for detailed purposes is examined in a separate section. It is sufficient to say here that it was manually booked on preprinted forms for automatic posting by MOSS.

Control Survey of the Remainder of the Route

This was intended as a location survey carried out to aid the route engineer in establishing a more precise alignment for the road. A traverse was observed along the route, linking the already-fixed gorge control. Stations were established at sufficient intervals to survey the detail of the proposed route, and the proposed intersection points were coordinated either as part of the traverse where appropriate or, more usually, by a single polar ray. This information was sufficient for the route engineer to compute an exact alignment, which was handed to the survey team.

Detail Survey

Knowledge of the route and location of control relative to the alignment enabled the survey team to estimate the right of way accurately. Details were surveyed according to a bandwidth of 40m - 60m. The bandwidth was increased when the terrain was difficult or dense woodland obscuring visibility, as on long sections of this route. In one or two cases on other roads, the detail surveyed 'missed' the proposed alignment, which was changed to match.

The route was like the others in that the main details surveyed were the form, levels, tops and bottoms of slopes, fences, tracks, and edges of cultivation/ woodland. Due to a misunderstanding of the MOSS system and the detail shown on the final drawings, too much attention was paid to the labelling and naming of features, as the ground profile was of prime importance.

Setting Out of the Right-of-Way Markers

Most of the work on this part of the project, for this route and all but two of the others, was delayed until later when the author was not present. However, the work was carried out similarly to the two roads completed earlier. This stage of the survey was delayed until the end for the following reasons: -

I. To allow maximum time to resolve alignment changes and access problems.
II. To allow time for the calculation of the alignment data.
III. This is so the client can be shown all routes finished simultaneously.

(iv) To allow time to assess the position concerning markers in cultivated fields where previously they had been ploughed' up

As stated, setting out was a two-team operation in which one team set out the required markers according to the contract, and the other team followed behind, concreting the pins already established in the ground. The centre line markers were set out to within 50 mm. The offset pins were set out as near as possible, but they were also coordinated.

Completion of Survey

From the survey department's point of view, the job was complete when all the data (control, detail, and the ROW markers) was handed over to the Transport Engineering Department of Atkins, which was responsible for the design of all the roads. This data was then processed into a valuable form for that department. The finished product presented to the client was not a recognisable survey plot but a narrow road plan and profile backed up by a schedule of coordinates.

Survey Project Analysis

The problems and difficulties that contributed to the excess time spent on the project have been discussed under the contract headings, organisation, terrain and vegetation, local conditions, and survey methods. Any analysis should explore alternative approaches and strategies that could have been tried to achieve a more successful outcome from the lessons of hindsight and experience.

From the survey's point of view, the contract was not a particularly good one. Insufficient information about local terrain and vegetation had been gathered to make a realistic quote. However, it must be said that everyone involved acted in good faith in assessing the project as not being too difficult. For example, similar work had presented no such problems in other areas of Libya. When undertaking or quoting for survey work overseas, it is always difficult to be precisely sure what the ground conditions over a large project area will be like.

Conditions regarding the organisation of vehicles and equipment could have been improved. For example, if an alternative EDM, such as a semi-automatic AGA 120 EDM, had been used to transfer the data to the Geodat data recorder, some time would have been saved in the field and a good deal in the office. A four-wheel drive vehicle earlier in the project may also have marginally speeded up the work. However, in both cases, the lack of these was one of the penalties for working overseas.

Several ways, together, could have achieved reasonable savings in terms of time and costs on the project.

The survey teams were inadequately briefed and inexperienced in using the MOSS road design system. Initial survey methods adopted were soon found to be unworkable and were abandoned. The lack of meaningful detail on the final drawings indicates that too much time was spent deciding, for example, how to survey the top of a slight slope or wadi course. The general profile of the land was more important than its insignificant detail.

The MOSS system was entirely new to the company, and no one had any experience with its use. It became available during the survey project, so it seemed sensible to use. Today, with more experience in its use, the same mistakes would not be made in data processing and field surveys.

Initially, there were not enough consultations with the route engineer to assess routes and decide alignments. Due to a misunderstanding, the selected route was believed to be the final route for two roads. Since IPs were marked and intervisible, they were established and constructed as

control points. The final alignment bypassed several stations, many of which were not in good locations for detailing purposes. A clear understanding of the situation by both parties would have saved a little time.

Survey methods could have been changed in two ways. They were, firstly, easing the standard set for observing horizontal angles. Two acceptable rounds would have been satisfactory instead of three. (Indeed, the change was made after one month) Secondly, the spirit levelling and trig heighting were not necessary. A careful comparison was made for all roads between heights by levelling and trig heighting, and the difference was rarely more significant than 50 mm. Anything greater than 100 mm was viewed with suspicion. According to the contract, the standards by which the roads were being designed and would later be constructed were not high. Trig heighting with checks made at the ROW setting out stage would have been adequate. If that had been applied to Stage I roads, i.e., half the job, 20 team days could have been saved.

Completely diverse ways of undertaking the surveys are briefly considered

Air photography would have been quicker in producing a ground profile, although the 29% woodland may have been a problem. However, the ROW setting out was still required in any case, and permission to fly would have been difficult.

Some other projects in Libya employ the observation of cross-sections using a level. This method would not have worked in this case because sometimes the alignment was only decided after important detailed information had been produced. More importantly, the terrain and vegetation would have prevented the setting out of any regular cross-sections.

Conclusion

From a pure survey point of view, the project was quite simple—to produce sufficient level data over an area 40 m wide and 176 km long for road design. This, however, masks the immense problems unrelated to the survey. A good deal of experience was gained in overcoming them.

Jim Walke

Jim Walke making a cup of tea in the classroom with Hassan looking on

Jim Walke was the civilian instructor when I was on the Army Survey Course No.55 from 1975 to 1976. He was a polymath with wide-ranging interests, and he was a man with only one eye who drove his Alfa Romeo at great speed around the country roads from his house to the camp. But more importantly, he was a likeable man who instilled a love of survey and much beyond into his charges. He was always "up" for anything to lighten the subject of survey and see amusing aspects of everything he encountered. He was extremely well-read and could remember and recite by rote, for example, reams of poetry in the most unusual environments. Sometimes, it must be said to put you off what you were doing, in the most pleasant of ways, of course. I have two vivid memories of him. One, whilst standing at a trig pillar in the morning mist on top of the Ridgeway and waiting for it to clear to conduct the observations while he recited verses of poetry from Browning or Coleridge. Secondly, I kept in touch with him and his family after I left SMS. I went to see him as he had lung cancer, and he was sitting up in bed at home. I had brought some flowers to the house, and he said I was too early for the flowers and that they would be more appropriate in a few days. He then proceeded to discuss some of the political questions of the day, his mind and brain still as clear and sharp as always. He died about ten days later.

Bob Owen

The 31e et 32e Compagnies Géographiques

Samuel PATRIS

Biography:
Reserve officer in the French army having served in a geographical unit for some twenty years and now serving in the artillery.
Worked in West and Central Africa on military and civilian missions.
Master's degree in GIS.
In civilian life, works in the field of land registry, town planning, networks, map production, geographical data production.
Lectured GIS at university.
Passionate about US and French army units during the Italy campaign and liberation of France, especially artillery and geographic units.

Genesis of Compagnies Géographiques

During the armistice of 1940, the Service Géographique de l'Armée (SGA), whose primary mission was to draw up maps of France, French North Africa and the Levant States, was transformed into a civil corps, the Institut Géographique National (IGN), on 27 June 1940, by decree-law, under the impetus of General Hurault[2], to remove personnel, cartographic funds, archives and materials from the German occupier.

Following Operation Torch in AFN, the "Service Géographique Militaire en Afrique » (SGMA)[3] was created on 1 January 1943. The IGN personnel in AFN were then remilitarised to form this service, and Colonel Charvet took command of it.

Recruitment then took place in AFN, particularly in Algeria, and men working in the civilian sector of printing, cartography and topography joined the SGMA.

SGMA identifies, recruits, trains, and distributes specialist personnel to the major units. It is also responsible for printing cartographic documents, manuals, and books.

The Sections Géographiques Légères (SGL) were then created and sent from Algeria to Tunisia, Corsica, and Italy.

The SGL of the CEF, under the command of Major Mélia, distinguished itself throughout the Italian campaign, despite insufficient means, by providing topographical support to the artillery and producing maps for the CEF's ME with draftsmen inserted within the 2nd office. This section worked with the reinforcement of a US topographic platoon in collaboration with the South African 46th Survey Company (SAEC) and the US 1st Field Artillery Observation Battalion.

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2 Chief of the SGA since 1937, then director of the IGN from 1940.
3 Order of 19 December 1942 from the French High Commission in Africa.

At the end of 1943, a " Groupe Géographique d'Armée[4] » had to be created to lighten the divisional headquarters, but the new organisation of the French army and the use of American equipment ordered as a unit led to the replacement of this Groupe Géographique d'Armée by Compagnies Géographiques.

CGs will be assigned the following tasks: rapid establishment of the main elements of an artillery fire plan, updating of maps and plans, drafting or reproduction and printing of geographical documents essential to operations; if necessary, the complete and rapid establishment of a master plan (1:25,000) or a map (1:50,000) over a small area.

The functioning of CGs will be done with advanced elements, grouped in brigades, in charge of all the works on the ground and with a heavy echelon gathering the section of command, the means of photographic exploitation, drawing, reproduction, and storage, whose movements are linked to those of the General Staff.

The Creation of the Compagnies Géographiques and their Equipment with American Materials

Initially, two companies intended for the Armée B were formed. The 31e CG, a light company "type 1" [5], with a total strength of 121 men, initially planned for Armée A, was formed in Algiers on 1 May 1944.

Major Rivière in 1944. He commanded the 32e CG from its inception

Major Brechet, an infantry officer who had previously served in North Africa for the SGA and in Algerian rifle regiments, temporarily took command of this company on 1 July. Major Bouxin led

4 Creation provided for by instruction n° 3690 EMGG 1 October 11, 1943.

5 T.E.G n°2972 E.M.G.G/1 of March 23, 1944.

the cartography section, and Captain LALLEMANT commanded the Geodesy-Topography section, which was partly formed by elements still engaged in the CEF in Italy.

The 32e CG was created at Ouled Fayet on 1 June 1944, from the SGL of the 1e Corps d'Armée stationed in Corsica, the SGL of the 2e Corps stationed in Tunisia and the 2e SGL renforcée. This heavy company, " type 2", with a total strength of 162 men, including seven officers, included a more extensive Geodesy-Topography section and large-format printing potential.
Major Rivière, who took command, is an artillery officer and a graduate of the Ecole Polytechnique of the X1924 class. He has made his career in artillery regiments, fire control groups, and the SGA. His deputy is Lieutenant Chevalier.

32e CG in Algeria in the summer of 1944, with Major Rivière, head of the 32e CG, on the left and Lieutenant Chevalier, his deputy, on the right. On the far left is a GMC 'Map Layout section truck' bearing the company's MF 44002A code, with the old Engineer Corps markings visible under a thin layer of paint. On the right, the rear of a truck with its extension extended.

Major Cazenove is head of the Cartography section and has as deputy Lieutenant Amiot and then Lieutenant Bertrand. At the head of the Geodesy-Topography section, we find Captain Lagrula, with Second Lieutenant Cornevin as deputy. Lieutenant Bocognano is, as for him, the head of the Drawing-Restitution section.

When they were created, the two companies took over the SGL's equipment, i.e. American vehicles, materials and equipment, as well as French materials from the SGMA, such as

reproduction equipment like a Dorel[6] workshop, photographic equipment (30x40 camera) and topography and drawing equipment.

At the end of June 1944, special US "Map reproduction trucks" were delivered, and training on these materials, given by American officers, began a few days later.

The trucks are GMC CCKW-353, Diamond T with technical shelters (drawing, retouching-editing, photo restitution, grain mill, offset copy, press), Autocar U-8144T, and Mack NJU-1 with semi-trailers carrying presses, photo labs, or cameras for large-format shots. The offset presses provided are Harris 20'' x 22 ½'' and Webendorfer "big chief" 22'' x 29 '''.

The optical equipment of SGMA or US origin mainly consists of theodolites T2, T3, and tacheometers of Wild manufacture and Kern levels. Companies are equipped with American Frieden calculating machines.

Operation Dragoon and Advance Towards Franche-Comté

The companies landed in a staggered manner, with the Geodesy-Topography sections as precursors.

Elements of the 31e CG on the boat before landing in the Bay of St Tropez, August 29th 1944. On the far left is Chief Warrant Officer Herbin, and in the centre is Major Brechet, temporarily in command of the 31e CG.

6 Gelatine printing workshop in 56cmx88cm format to print a maximum of 200 copies.

The Geodesy-Topography detachment of the SGL of the CEF, commanded by Captain LALLEMANT, embarked on 3 August 1944 at Brindisi in Italy, while reinforcements embarked at Oran on August 8. They formed the Geodesy-Topography section of the 31e CG (35 to 40 men) and landed on August 17 in the bay of St Tropez. The section then joined the HQ of the Armée B in Aix and stayed there until 03/09 before going to Macon via Grenoble.

On September 15, the section arrived in Besançon, then moved to Moimay towards Villersexel around 20 September and operated in the sector of the 2e Corps d'Armée in the Lure-Gouhenans-Athesans area.

The bulk of the 31e CG embarked on 25 August at Oran under Major Brechet's orders and landed at St Tropez from 29 to 30 August. The company settled in Ecole near Besançon in mid-September.

On 23 October, Major Mélia, who had landed in August with the forward HQ of Armée B, took command of the 31e CG. He was an infantry officer, a St Cyrien from the "Rif class", who had started his career mainly in North Africa with the 8e Régiment de Tirailleurs Tunisiens and the SGA.

Concerning the 32e CG, on August 8th, the Geodesy-Topography section of Captain Lagrula, composed of 2 officers and 34 sub-officers and soldiers, embarked at Oran on board the SS Tristram Dalton (Combat Command n°2). From the 19 to the 23, the section landed at Ste Maxime and suffered one wounded, sergeant Lacrampe. The company continued in the direction of Palette, near Aix, from where it left on 4 September to join via Grenoble, Vinzelles, south of Mâcon. During the trip, it did some road reconnaissance. On the 20, it left for Besançon, then for Villersexel on the 28. The topographical work of the section, which did not start until 29/09, was done as for the 31e CG for the benefit of the 2e Corps d'Armée.

On 16 September, the rest of the 32e CG left Oran with the bulk of the troops on board the USS Charles Carroll APA-28 and the vehicles and drivers on board the George Patten.

On 19 September, at dawn, the Carroll arrived in sight of Marseille, and the landing took place on the beach of Estaque under heavy rain.

On 22 September, the company's automobile detachment embarked with Lieutenant Bertrand on the George Patten, arrived in the harbour of Marseille and disembarked from 23 to 28 September.

From 29 September to 6 October, the company elements moved toward Beure near Besançon, while Major Boulard remained.[7] and Lieutenant Chevalier left on a liaison mission to Paris to contact the IGN.

On October 9, the company, installed in Beure (Gouille district), began its first work.

[7] Liaison officer between the two CGs.

Some changes with the 1e Armée

When the Armée B became the 1e Armée, a geographic service of the 1e Armée was created on the initiative of General Hurault. The CGs were then placed under a single direction by creating a command section headed by Colonel Recordon.[8] This section was attached to the Army's map depot, supplied by the advanced depot in Dijon. The maps of the 1e Armée, initially provided by the Allies, were supplied by the IGN from October 1944.

It was also decided to create two SGLs, whose manpower was taken from the CGs.

The SGL of the 2e Corps d'Armée[9] was created on 12 October and made available on 25 October under the orders of Major Bréchet, who had just left the 31e CG. Its personnel, 2 officers, 3 NCOs, and 13 Soldiers, were taken from the 31e CG.

On 22 November, the 32e CG provided men from the former light section of Corsica to form the SGL of the 1e Corps d'Armée, which would be under the orders of Major Boudou.

From the Fighting in the Vosges to the Fighting in Alsace

The Topography-Geodesy section of the 31e CG followed the movement of the 2e Corps d'Armée in liaison with the artillery to operate in the sector of Melisey, Faucogney, Ronchamp, Servance, Gehan forest and Longegoutte forest. From 1 October to 20 November, the section was based in Amage. At the beginning of November, this section and its counterpart of the 32e CG were sometimes in the lead with the infantry, during battles, like those of Haut du Tôt, alongside the 3e DIA (Division d'Infanterie Algérienne) and the 1e Division Blindée.

On 18/11, the section received the order to move to the sector of the 1e Corps d'Armée and established itself at Courcelles-les-Montbéliard. Under the fire of the guns, it took part in the operations of the Fort du Mont-Vaudois and in front of the Héricourt-Montbéliard line before the capture of Belfort. At the end of November, the section moved to Mulhouse.

When the 1e Corps d'Armée's headquarters were withdrawn from Altkirch around December 20, it moved to Hirsingue and continued its operations despite bad weather conditions. It then worked in the artillery and observers' deployment zone between Mulhouse and the Swiss border near Basel.

Bad weather interrupted the work around the 15 January 1945, and the section joined the rest of the company in Héricourt.

The heavy echelon of the 31e CG moved to Héricourt on 5 December 1944 and, after the fighting in the Colmar pocket ended, left on 25 February 1945 for Schweighouse near Buhl (Haut-Rhin), close to the Headquarters, and then for Illkirch-Graffenstaden on 10 April .

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8 From the IGN of Paris.

9 Also known as 2e Section Géographique.

The Topography-Geodesy section of the 32e CG moved to Corveraine on 06/10 and carried out triangulation work in the Hautes-Vosges for artillery purposes. From 16/10, the section moved to Remiremont[10]. On 21/10, at the place called "Tête du Gehan", the master sergeant Bordère, who was leading a geodesic brigade, was the victim of a mine explosion and was seriously wounded. From 20/11, the section's activity was reduced due to the advance of friendly troops. On 09/12, the section left Remiremont and moved to Obernai. From 13/12 onwards, the brigades carried out reconnaissance in the last foothills of the Vosges to identify intersections on the right bank of the Rhine. Still, the work was not very productive due to the weather conditions.

Concerning the rest of the 32e CG; on 24 November, Major Rivière, driving a jeep on his way back from a liaison mission in Paris, was seriously wounded in an accident and had to be trepanned. On 27 November, Major Cazenove, head of the Cartography section, took over the interim command of the 32e CG.

In December, the Company left Beure for Héricourt, a new stationing point. On 09/01/1945, the Topography-Geodesy section joined the company headquarters in Héricourt.

Major Rivière took over the command of the 32e CG on 1 February. Major Cazenove, who was acting as interim commander, was transferred to the Centre d'Organisation du Service Géographique Militaire in Vincennes; he then commanded the 33e CG, which was created on March 1st[11]. Lieutenant Bertrand then took over the Cartography section.

A Reorganisation of Companies

On 27/02, a reorganization of the functioning of the CG intervenes at the initiative of colonel Charvet and the similar means of the two CG are then regrouped. The remains of the Geodesy-Topography section of the 31e CG were put into subsistence to the 32e CG and the Geodesy-Topography sections of both companies were placed under the direction of Major Batteux. Lieutenant Bocognano, head of the Drawing-Restitution section of the 32e CG, took command of the Drawing-Restitution section of the 31e CG at the same time. Major Bouxin, head of the Cartography section of the 31e CG, took over the technical direction of the Cartography sections of both companies.

On 12 April, the bulk of the 32e CG moved to Wasselonne. An important change occurred in the unit's structure: the two Geodesy-Topography sections and the two Drawing-Restitution sections were attached to the 32e CG, and the 2 Cartography sections were reunited with the 31e CG stationed at Illkirch-Graffenstaden.

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10 At the St Romaric school.

11 Part of the “3e Corps d'Armée”, based at Jallais when it was disbanded in June 1945.

The Arrival in Germany and the End of the War

The Geodesy-Topography section of Captain Lagrula, stationed on 1 April 1945 at Niederrœdern (Bas-Rhin), moved to Herxeim (Palatinate), on 3 April 1945 and then on 8 April to Neureut near Karlsruhe (Baden) before settling on 19/04 at Klosterreichenbach (Black Forest). During this period, it took eight prisoners and was in the outposts during its progression.

On 08/05, Lieutenant Bocognano set up a detachment of the 32e CG in Niederwangen towards Lake Constance. On 17 May, the bulk of the 32e CG left Wasselonne for Balingen and was joined by the detachment of Niederwangen.

On 20 May, the command section and Drawing-Restitution sections of the two companies are stationed in Balingen, the Geodesy-Topography sections of the two companies are in Frommern and the Cartography section of the 32e CG is stationed with the 31e CG around Rotweill.

The 31e CG will then go from Rotweill to Langenargen, then on 25 June to Wangen im Allgau and finally to Rotenfeld in July.

Captain LAGRULA, chief of the Topography-Geodesy section of the 32e CG, at the wheel of his jeep in Remiremont in the autumn of 1944.

Epilogue

The 31e and 32e CGs were officially dissolved on 31 August 1945, and some of their equipment was urgently repatriated to France to equip the "1e Compagnie Géographique Coloniale" [12], which was leaving for the French Indo-China,
In the immediate post-war period, the " Service Géographique des TOA », a " Groupe Géographique Autonome » and " Batteries Géographiques Autonomes » were created.

Today, the last descendant of these units is the 28e Groupe Géographique.

[12] The official name of this company, created on September 1st 1945, at Fort Neuf of Vincennes, is "1e Compagnie Topographique Autonome du Corps Expéditionnaire Français en Extrême Orient".

SURVEYING CELESTIAL BODIES

Space has been officially declared part of the UK's critical national infrastructure and is included in the National and Defence doctrine.

Caroline Sloan BA(Hons) MA

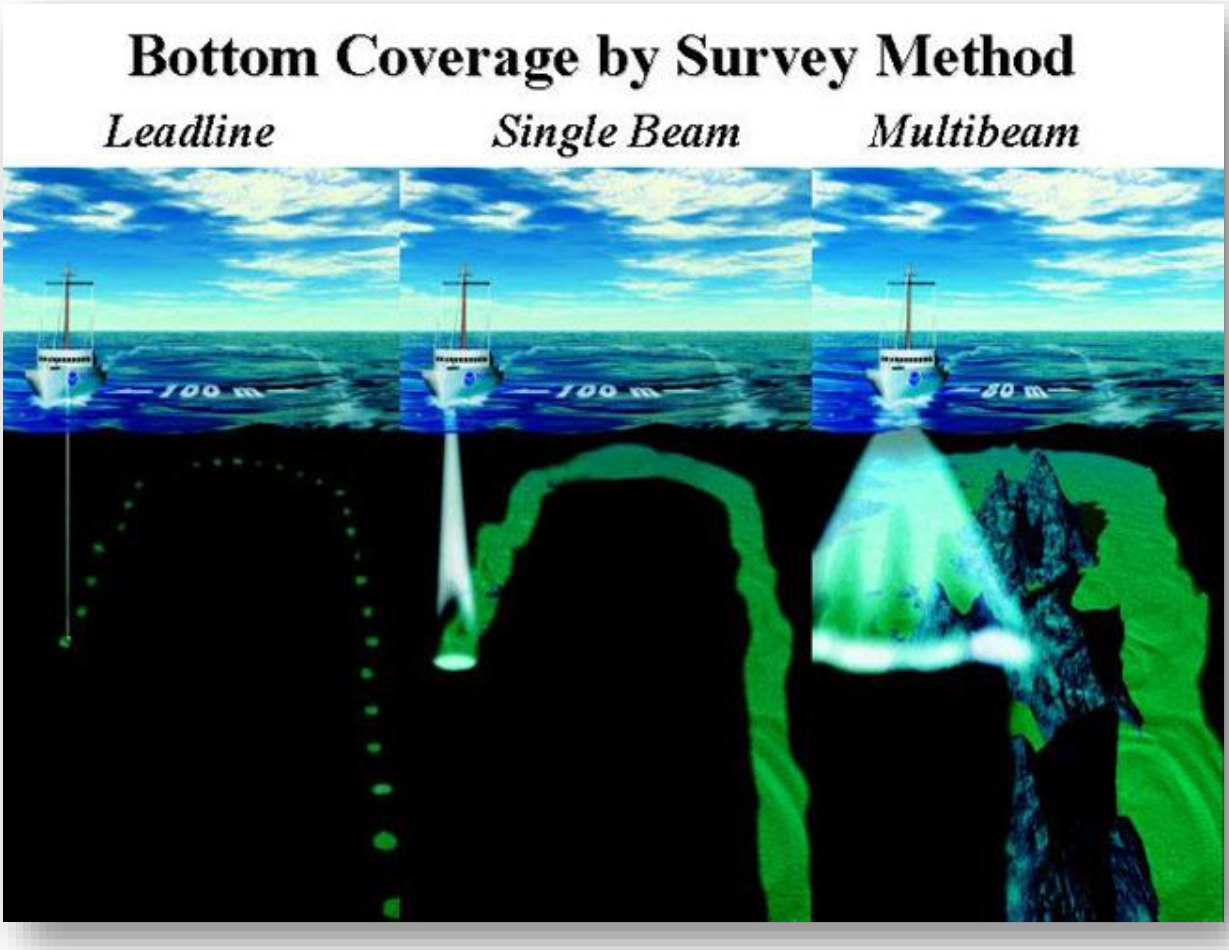
Caroline served in the Royal Navy Hydrographic Branch before working for the MOD and National Oceanography Centre, supporting oceanographic uncrewed underwater vehicles. Recently, Caroline was the Space Policy Coordinator at UK Strategic Command and set up the Satellite Filing Management Team in UK Space Command, a team responsible for managing and coordinating the filing of satellite data for various space missions. She is now Head of Government Relations for Stellar Solutions Aerospace Limited.

> *"Two and a half million years ago, when our distant relative homo habilis was foraging for food across the Tanzanian savannah, a beam of light left the Andromeda galaxy and began its journey across the universe. As that light beam raced across space at the speed of light, generations of pre-humans and humans lived and died; whole species evolved and became extinct until one member of that unbroken lineage happened to gaze up into the sky below the constellation, we call Cassiopeia and focus that beam of light onto their retina. A two-and-a-half-billion-year journey ends by creating an electrical impulse in a nerve fibre, triggering a cascade of wonder in a complex organ called the human brain that didn't exist anywhere in the universe when the journey began."* Professor Brian Cox.

As an archaeologist, you are taught that the "past is the key to the future", and oftentimes, it helps to look to the past to understand how to unravel a tricky problem. When General Augustus Pitt Rivers (1827-1900) began archaeological excavations on his Cranborne Chase estate, he used methodical recording techniques he had learned during his Army career. He employed agricultural labourers for the fieldwork because they understood the land and how to differentiate between soil layers, and he hired a team of skilled assistants to help with the surveys, which included colouring in plans of the estate and making models from wood or wire and plaster to represent landscape contours and features. Present archaeological techniques for digging test pits and assessing sites are based on the meticulous methods developed by Pitt Rivers and his antiquarian peers. Even now, you may find a field archaeologist "testing" soil by tasting it to ascertain mineral content and compare colours to the Munsell soil chart.

Military surveyors were often the first people on the ground. This includes hydrographers in the Royal Navy and surveyors in the Royal Engineers with their theodolites and levels. The hydrographer might have used a lead line or sounding pole to measure water depths. However, with new technology, this process has become less hands-on. Now, they usually watch a

computer screen as sonar creates a 3D image of the seabed while you move at a slow speed of 4 to 8 knots across the ocean.



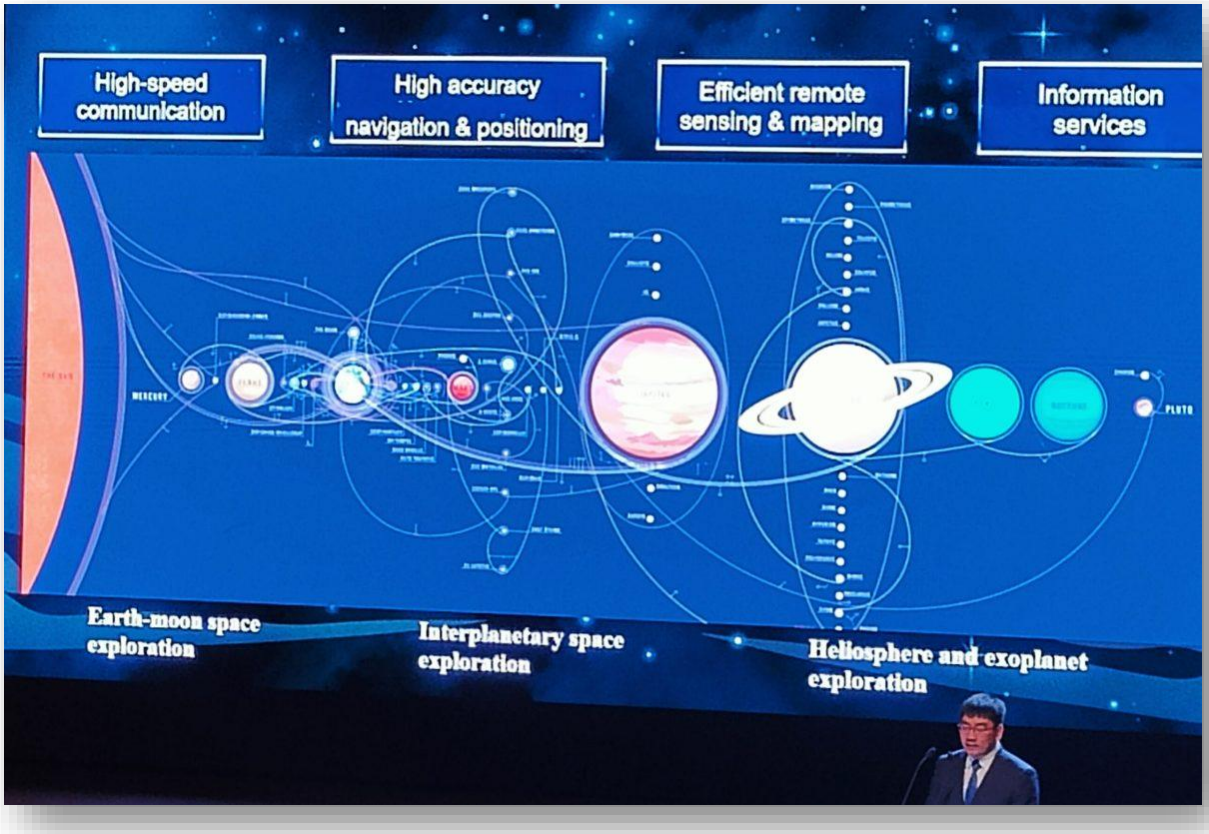
.© NOAA

But what happens when you take a survey of another planet?

Celestial Surveying

Since the Apollo 11 Moon landing in 1969, the world has been captivated by the awe-inspiring journey of space exploration and the dream of putting humans on neighbouring planets. But most of what we understand about our solar system and universe is through uncrewed systems relaying data, travelling at 186,000 miles per second (speed of light) across the vast vacuum of space. The reconnaissance spacecraft undertakes the essentials of surveying distant objects, allowing scientists and engineers to model suitable landing sites for probes. This would be inconceivable for Pitt Rivers as he supervised the surveys on his estate in 1880 – the concept of mapping another planet, let alone space exploration, would have been astonishing.

The speed of technological advancements allows us to achieve incredible feats. When you consider what has been achieved in human space exploration over the last 55 years – Apollo 11's "one small step for a man, one giant leap for mankind", a mission that saw the first humans land on the Moon and return safely to Earth; the development of NASA's Space Transport System (STS) with the successful launch of Space Shuttle Columbia in 1981; the first humans to live in space when Cosmonauts Kizim and Solovyov entered the Mir Space Station in 1986; followed by the international missions to the International Space Station from 2000; the continued interest in China's Tiangong space station and lunar communications satellites Queqiao; and looking forward to 2026 with the anticipated NASA Artemis III crewed mission to return "boots on the Moon". [13]



Xi Xiangyu of DSEL presents the Queqiao constellation concept in Baku, Azerbaijan, on Oct. 2, 2023. Credit: Andrew Jones/SpaceNews

One thing is certain about operating in space: it is not easy. It was summed up by former US Space Force Chief of Space Operations, General John Raymond when he stated that "space is hard" – and satirically mirrored by General Naird in Netflix's Space Force series that demonstrates just how many hurdles there are when it comes to achieving anything in space. The complexity

[13] China is leading a project known as the International Lunar Research Station (ILRS) which aims to establish a base near the lunar south pole in the 2030s. The plan includes establishing a Queqiao ("Magpie Bridge") relay system in lunar orbit to facilitate communications between the Earth and moon.

and magnitude of the challenges in space operations are genuinely staggering, making every achievement in space exploration a testament to human ingenuity and perseverance.

Space is hard. Orbital mechanics and astrodynamics are incredibly complex. Understanding the extreme vastness of space adds to the complexity of calculations. Proxima Centauri is our closest star, and she is 4.24 light-years away (approximately 25 trillion miles). If you look at Proxima through a telescope, you see her as she was, not as she is, because of the time it takes light to travel that distance. The dynamic environment in space creates issues, but with advanced technologies and the ingenuity of clever individuals, spacecraft have been sent on missions to every corner of our solar system, overcoming the seemingly insurmountable challenges of space exploration.

Proxima Centauri

Spacecraft or space probes are designed for different purposes. For example, an interplanetary probe will fly past celestial bodies to collect sample data sets. An orbiter, whose purpose is to remain in orbit around a celestial body, can be positioned to act as a relay transmitter and examine and analyse particular aspects of an object. For example, the Magellan probe mapped the entire surface of Venus to a resolution of 120-300 metres, utilising Synthetic Aperture Radar (SAR) and returned 1200 gigabits of data. In 1991, all of NASA's planetary missions had only collected 900 gigabits of data, so Magellan's achievement was notable. Due to the nature of orbital dynamics and the limited power available to Orbiters, they are usually instructed to de-orbit into the atmosphere of the object they are examining upon completing their mission.

Landers or robotic explorers are probes designed to land on the surface of celestial bodies to undertake physical inspections. In 2004, Spirit and Opportunity landed on Mars, and in 2012, Curiosity joined them to study geo-environmental conditions that support microbial life.

To communicate with the rovers, there are Martian orbiters to relay transmissions from the surface of Mars to Earth, with an 8-minute window for the rover to communicate with the orbiter and onward transfer to the Deep Space Network (DSN) antennas on Earth taking about 14 minutes to travel the ~250 million miles. Perseverance landed in 2021 and is fitted with L3Harris ultra-high frequency transceivers, allowing data relay between the rover and orbiter at two megabits per second compared to Curiosity's ability to download and upload data at 256 kilobits per second.

Perseverance's Selfie at Cheyava Falls on Mars © NASA/JPL-Caltech/MSSS

Like any satellite or spacecraft, probes need a Command Data Handling (C&DH) system for the Telemetry downlink (i.e. status of the platform, orbital position, payload/science data) and Telecommand uplink (i.e. commands given to the platform) paths. Also known as Telemetry, Tracking, and Command (TT&C), this includes any inter-satellite links to share data and workloads. Payload Data Transmission (PDT) is vital for scientists and engineers as it returns data from the mission. This data transfer relies entirely on electromagnetic energy through radio waves.

NASA is developing software-defined radio (SDR) telemetry transceiver technology to convert radio frequency signals to digital format. This will allow high-speed data transmissions and multi-band frequency operations and reduce payload weight and power consumption. This means spacecraft will have lighter payloads, allowing for more room onboard for fuel or solar panels, increasing mission lengths. It also allows for larger quantities of data and images to be captured and, in turn, transmitted faster so that scientists have more resilient information to assist with the characterisation of objects for the prelanding mission phase.

Characterising celestial bodies, whether a comet or one of the 288 planetary moons in our solar system, involves understanding many parameters for the secure landing of a probe. Shape, orientation, rotation rate, surface topography, surface temperature, internal temperature, gravity

field, velocity (consider speeds averaging 30 miles per second for comets and 0.6 miles per second for our Moon), orbital period, and that's not even considering the vast distances probes will cover to get to their target site. Every aspect of space exploration is reliant on data.

The European Space Agency (ESA) Rosetta-Philae mission is an excellent example of the efforts required to land on a comet. Launched in 2004, Rosetta (the orbiter) spent ten years travelling to comet 67P/Churyumov-Gerasimenko before spending two years studying the comet.

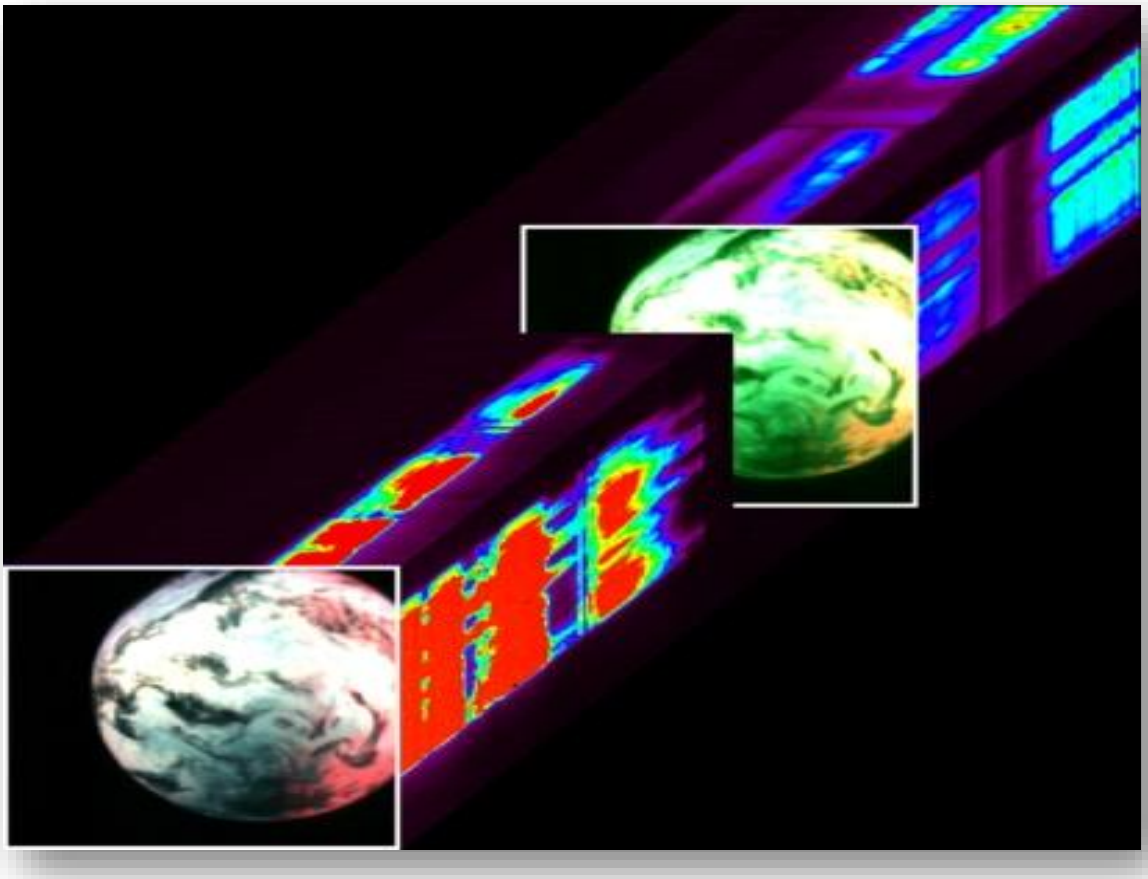
Comet 67P/Churyumov–Gerasimenko in true colour, as seen by ESA's Rosetta Spacecraft in December 2014. The comet consists of two lobes connected by a narrower neck, with the larger lobe measuring about 4.1 km × 3.3 km × 1.8 km (2.5 mi × 2.1 mi × 1.1 mi) and the smaller one about 2.6 km × 2.3 km × 1.8 km (1.6 mi × 1.4 mi × 1.1 mi). With each orbit the comet loses matter, as gas and dust are evaporated away by the Sun. It is estimated that a layer with an average thickness of about 1 ± 0.5 m (3.3 ± 1.6 ft) is lost per orbit as of 2015. The comet has a mass of approximately 10 billion tonnes.

Philae was a robotic lander developed by the European Space Agency that travelled alongside the Rosetta spacecraft. After ten years and eight months from Earth, it separated from Rosetta to land on comet 67P/Churyumov–Gerasimenko. On November 12, 2014, Philae made its historic landing on the comet. However, it experienced a bounce due to the failure of its anchoring harpoons and a thruster that was supposed to secure it to the surface. Despite bouncing off the surface twice, Philae successfully completed the first-ever soft landing on a comet nucleus. Unfortunately, its final uncontrolled landing left it in a less-than-ideal position and orientation.

Over four months, it had to undertake four surveys of the comet using its Visible and InfraRed Thermal Imaging Spectrometer-Mapping (VIRTIS-M). It was limited in altitude due to the need for its solar arrays to be oriented towards the Sun. Corrections to the data included surface temperatures and thermal emissions, which were entered into the photometric mapping model together with the geometric parameters (such as latitude, longitude, and incidence angle). Of the ten landing sites chosen, Rosetta used its Optical, Spectroscopic, and Infrared Remote Imaging System (OSIRIS) Narrow Angle Camera to refine the target landing site. Every aspect of space exploration is reliant on data.

The landing sites tend to be ellipses several hundred metres across based on the trajectory of the probe's approach. The target coordinates will be tweaked in the days leading up to the deployment of Philae (the lander) until the final separation and landing sequence are transmitted to Rosetta, at which point the landing is completed automatically. It took roughly 40 minutes ± 20 minutes for data transmission to occur, so no last-minute adjustments were available.

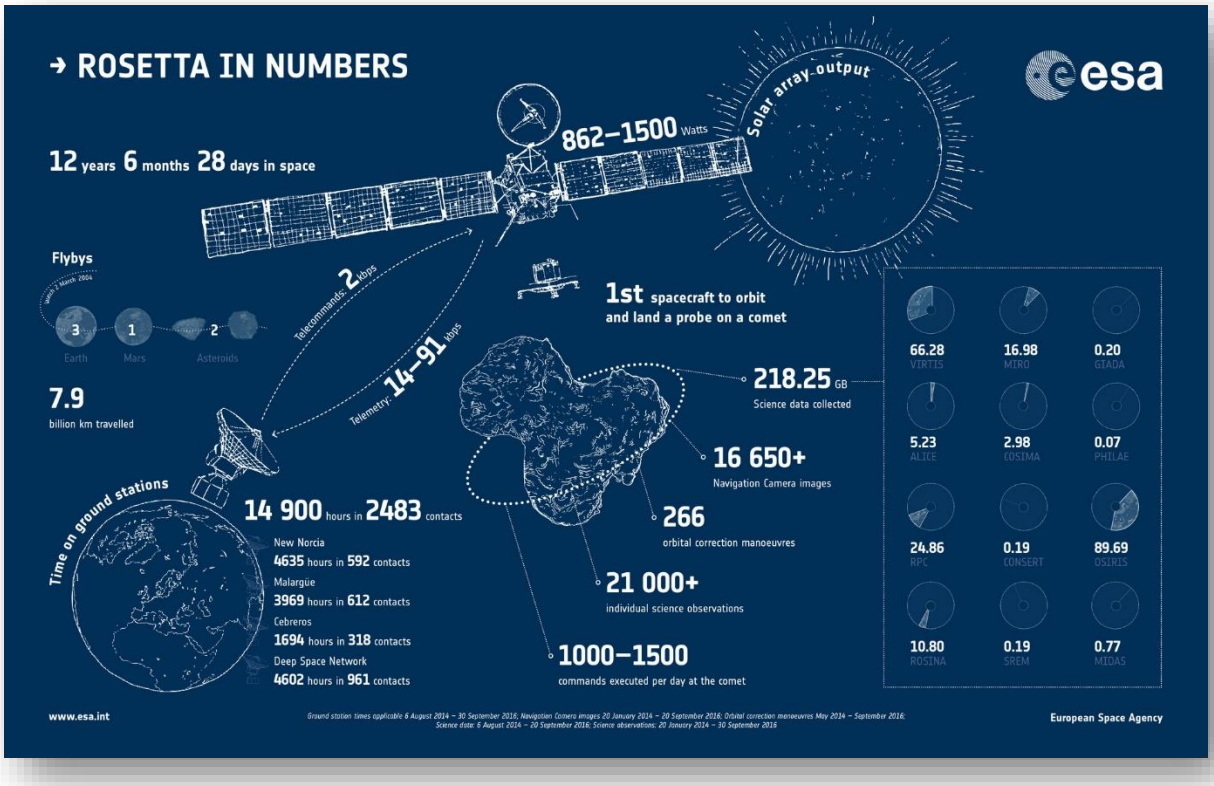
Philae landed successfully on the surface of comet 67P on 12 November 2014. The OSIRIS cameras provided 100,000 images during the mission with a resolution of ~2cm per pixel. In September 2016, Rosetta was placed into a controlled descent to the comet's surface. It was



The Earth image has been obtained in 432 bands in the visible (between 0.25 and 1 micrometres) and 432 bands in the infrared (between 1.0 and 5 micrometres). The spectrum at high resolution of VIRTIS-H is associated with the cube obtained by VIRTIS-M. © ESA 2019

able to capture final high-resolution images and scientific measurements (gas, dust, plasma) before its mission ended.

Space has been officially declared part of the UK's critical national infrastructure and is included in the National and Defence doctrine. Therefore, with space becoming an increasingly complex, contested, congested and connected domain and interest increasing in cislunar space with the notion of mining the Moon an ever more likely scenario, surveying celestial bodies for landing sites and data gathering will become a far more regular occurrence. Although it is a scientific activity, the race to get "boots on the Moon" – NASA's Artemis III vs China's Chang-e Project – will inevitably draw military interest.



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"Mankind is drawn to the heavens for the same reason we were once drawn into unknown lands and across the open sea."

George W Bush, 43rd President of the USA.

Sea Breezes and Some Surveying

My name is John Banfield. Few in DSA know me, yet somehow, I am a member of the DSA Council, which I enjoy being part of. I have done some survey work, although not much of it has been Military Survey, so I thought you might appreciate knowing about different kinds of Surveys.

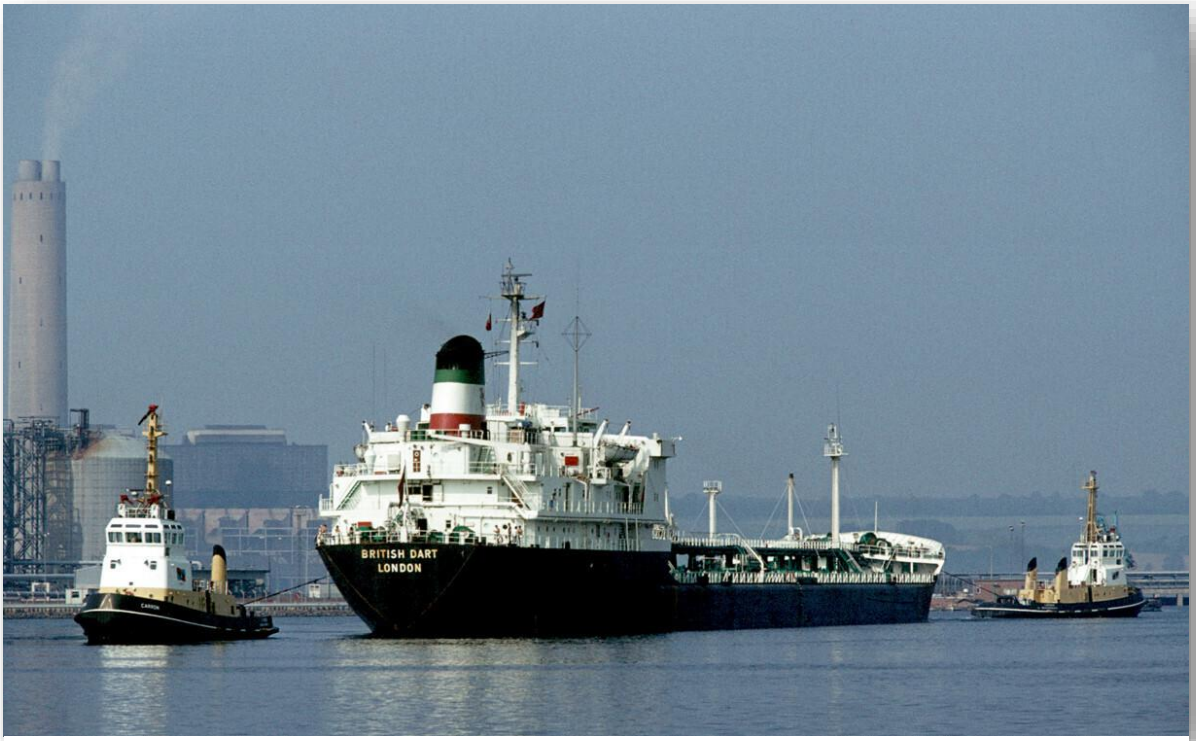
The first surveys I was involved with occurred on my first ship; a 68,000-deadweight super tanker called S.S. British Confidence. 68,000 refers to the cargo-carrying capacity. She was 815 feet long, and my starting salary in 1974 was £815.00, so it is easy to remember.

SS British Confidence

The ship was on a dry dock in Breast and was undergoing a Fire Fighting Appliance (FFA) Survey and Life Saving Appliance (LSA) Survey. Part of the FFA involved changing the foam solution for the fixed smothering system for either the Engine Room or the pump room. In those days, the foam compound was ox-blood-based, which smelled interesting! One of the other first-trip cadets and I were tasked with pumping the old compound out with a Pencil Pump. That is a small diameter pump that could be inserted

into the large opening in a 45-gallon drum and was powered by compressed air. The two tanks needed a washout before a new compound was added. In operation, the tank was pressurised by CO2, which persuaded the foam compound to join with salt water in an educator unit to make the foam mixture, aerated by nozzles in the pump room or engine room. We also changed the old N&S hose couplings to instantaneous by applying an adaptor with a copious amount of two-part epoxy glue. We also re-made the hose end fittings, so the hoses were all instantaneous. The banding device was quite clever.

On the LSA front, we had to display all the lifeboat equipment and rations, including Barley sugar, Biscuits, and Water, so that the Surveyor could see everything was in good order. It may have been that we changed to the new, then None Thirst Provoking ration as we had many jars of Barley Sugar tucked away in our cabin. You can go off things if you have too many, you know!

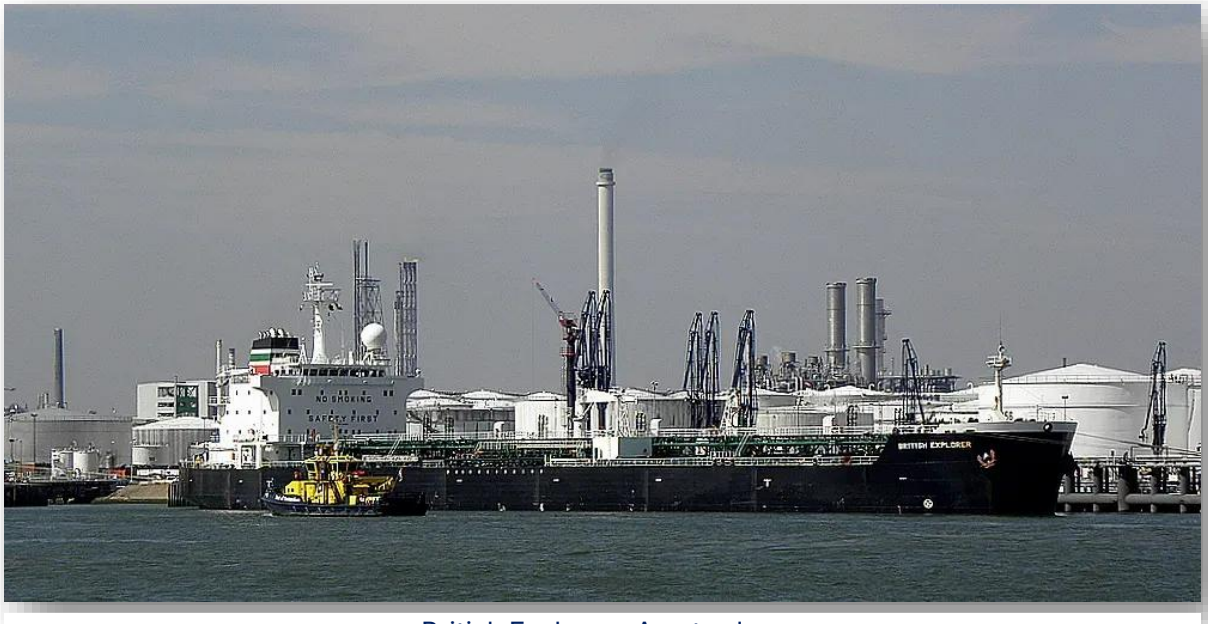


British Dart

The following survey, British Dart, two ships later, was another LSA in Japan. I do not know how it was set up, but we had a pre-survey the visit before the survey visit. We were running between the Persian Gulf and Japan, regularly carrying Naphtha. It is used in plastics production. So, on one discharge in Japan, an independent contractor came on board, and we four cadets learnt how to lay out the LSA for the Japanese Surveyor. Then, everything was re-stowed, ready to be laid out again on the next visit for the actual survey. We must have done the FFA, and I remember testing the levels in the CO2 bottles for the smothering system for the pump room or the engine room. An X-ray device was used to

check the levels in each bottle. The contractor came on board with six Green Parachute Flares, as they were a Japanese requirement. You must comply with the regulations in the country conducting the survey. Whilst on this trip, I was trusted to relieve the Mate on the Bridge so he could talk with the Bosun/CPO about the day's work for the deck crew. So, I appeared on the bridge about quarter past seven, and the Mate went off to see the Bosun. The Third Mate relieved me at about ten to eight and took over at eight. I may have also done Tea relief, but I do not remember; that was from 17:00 until 17:25ish.

One cargo of Naphtha was used to “Spike” the crude oil cargo onboard the SS British Explorer. It was to enable more lighter elements to be distilled from the crude. While we



British Explorer - Amsterdam

were waiting to go alongside her somewhere in the middle of the Gulf, there was an eight-meter swell running, which is why we were waiting. One ship later, I joined British Explorer. We had to pressure test the fire hoses regularly, and we two cadets had the job one day to test the emergency fire pump. This was a small “hydraulic-driven” pump at the bottom of the pump room. So, we collected all the accommodation fire hoses, connected them all to gather, connected them to the fire main, and requested that the emergency fire pump be started. I was on the end of the hose with a branch pipe. The pressure came on, and I abruptly found myself six feet in the air! Fortunately, it did not wave me about; it lifted me off the deck. The other cadet shut the pump off quickly, for which I was grateful.

We went to discharge in Genoa, and the Senior Cadet was being relieved there, so there would only be the two of us Cadets for a while. I was on the bridge leaving with the Captain, Second Mate, and two Ratings. Cadets tended to keep the movement book where passing buoys and landmarks were noted. We used to record engine movements,

but with advances, we had engine movement, order loggers. We also tended to see the Pilot board/depart, escort him to/from the Bridge and make him a hot drink. So, the pilot left, and when I returned to the Bridge, the ratings had gone about their duties. I checked that the Second Mate had anything he wished me to do and went out on the Bridge Wing to see what was around, but not a great deal. I looked at the chart and went to the front of the bridge, and there was nobody there; I walked around the wheelhouse, both bridge wings and back in the bridge, and I was alone! What to do, I think. I think the captain had joined in Genoa, and I had not spoken to him, so I decided to phone the Chief Mate, who we Cadets usually worked for/with. When I explained that I was on the Bridge alone, he asked if no one had explained that I was taking over from the Senior Cadet, who had left, and I was keeping the 8 to 12 Bridge Watch! So, the rest of the trip was interesting! I only needed to call the captain once.

The Chief Engineer was doing a boiler survey, which involved us. I only joined in in the afternoon as I was on Bridge Watch and had done my engine room time on a previous vessel, but the chance to see inside a boiler was to be missed. Firing up a boiler is a noisy experience that happened one morning. Steam was raised in the boiler to the extent the safety valve operates. It tends to be a high lift valve, so the more it opens, the more area the steam can act on until the valve is fully open. We kept 15 knots on one boiler as the steam plant aimed to run four cargo and one ballast pump, which took more steam than the high-pressure turbine propelling us. The Second Engineer talked me through high lift safeties and Hydrogen Fires in the superheater tubes if things go a bit wrong.

British Respect

The following survey was on SS British Respect in drydock in Lisbon. I was to accompany the Lloyds Surveyor conducting the Load Line Survey. This is about the watertight

openings/closing and air vent sealing mechanisms and the condition of the hull. I'll learn something, I thought. Being in dry dock, most of the tanks were empty bar some ballast. The dockyard Chemist checked the tank atmosphere every morning, and the reading was recorded on the tank hatches so we could enter tanks knowing the air was breathable. The sluice valves were open on the centre tanks and the empty wing tanks. They were about four-foot by three-foot doors separating bulkheads in the bottom of the tank. The sluice valves enabled bulk cargo discharge from the aftmost centre tank. All the cargo pumps could take suction from 6 centre, and with the sluice valves open, the oil ran aft from the other tanks. So, we go down to six centre and have a bit of a look about and through a sluice valve into five centre; now I am just about keeping up without running!

An interesting voyage was to near Suez. A pipeline had been built to run from the Red Sea to the Mediterranean Sea, and our 270,000 tonnes were to be the cargo that caused the first oil to arrive at the Mediterranean end of the pipeline. Thinking about it now, I would love to know how the pipeline worked. Did it have non-return valves every so often? Did the oil pool in low sections? Did they put a few thousand tonnes in and then insert a pig (a pipe cleaning device, think 007 and Octopussy) and then a bit more oil?

The smaller product tankers did not have sluice valves in the bulkheads. Initially, they had a ring main with crossovers to reach the centre tanks, then a double ring central with double crossovers and connections between the crossovers called Cruciform Valves, two of them so with master valves on the Green, Yellow, Blue, and Red lines two valve separation could be maintained between different cargoes. With the crossover valves, masters, and double cruciform valves, we could carry eight grades of freight. Each tank has its suction point very near the aft bulkhead.

There was a bit of turmoil in the tanker world, and BP divested themselves of sixty or so ships and quite a lot of staff, and I found myself on MV Gardline Tracker in Plymouth. She was undertaking an inshore hydrographic survey in Lyme Bay. There was an undertaking to update a certain amount of data, and as the Inshore Survey Squadron had gone to the Falklands to update charts around there, commercial companies were being used to do the UK-based work.

We spent most of the time steaming line running an echo sounder for the depth, a side scan sonar for the seabed quality and wreck positions. The echo sounder opening was a pair of large gate valves fitted to the bottom of the ship. If the lower valve was shut, the upper valve could be opened, and the echo sounder transduce could be put in place. Then the upper valve was shut, and the lower valve could be opened, and sounding was possible.

We also did Wire Wreck Sweeping to ascertain the height above the seabed of wrecks. Some three-sixteenth steel wire rope had been prepared with markers every ten centimetres. There were two of these, one for the bow and one for the stern. A fifty-six-pound weight was hung from each wire. The check for obstructions, piano wire was fed from a small winch down to the bow weight, back to the stern weight and back up to the deck. The wires were lowered to the last known depth for the wreck, and the winch paid out piano wire. We would aim to have no head or stern way on and allow the wind and tide to push us over to wreck. If the piano wire cleared, it would be lower ten cm; if it fouled, it would be raised ten cm, and we would drift over again. We had a Tide Watcher in Torquay who gave us tide readings every ten minutes so we would have our depths as accurate as possible.

MV Gardline Tracker

We did find a shallow wreck; it was within about eight feet of the surface. The Party Chief, a former RN CPO with the hydrographic section, called up Taunton, and the Wreck Commander visited us the next day. Some fishermen had tied a gallon plastic bottle to the wreck, so the bottle floated at a depth where it could be seen so they could easily find it.

While in Lyme Bay, we were sometimes in the Portland Exercise Area, so we had to inform Portland of our position and plan at Midday and Midnight. That seemed to go okay mostly, although someone was chucking bricks in our general direction one day.

Moving on a few years, I found myself as a Z Service Contract Office in the Sultan of Oman's Navy in the rank of Naqueeb Bahry, which I understood to be Captain of the Sea. That is three Pip Captain not four Ring, so in RN terms a Lieutenant. My role was as one of the four Landing Craft Mechanised Commanding Officers. We were primarily involved in supply runs to Goat Island in the Straits of Hormuz, with occasional runs to Masiera Island for the services. My first run on what was my usual command was to collect a D8 Bulldozer. The Americans had recently built a pre-positioning facility on Masiera with a ramp, which we could use for loading. As we did not want the bulldozer to mark the new concert, our Squadron Raiid (Lt Cdr) and the Logistics Raiid were there with some old

Landing Craft Mechanised - Oman

tyres for the bulldozer to walk on.

The first attempt at loading went well, except with the weight of the D8, we are firmly aground. Move the D8 as far aft, and we are still aground. So, D8 drives off. I back off to some hastily imagined reasonable distance, make sure the bow door wires are slack, and we try again. I ended up at three-quarters power on both engines to stop the D8, pushing us backwards. We had the D8 on board right aft, floating free, pulled back a little and moved the D8 more to the middle of the tank deck, and we were fine; thirty-six hours later, we were in the new Naval Base at Wudam.

We had some extra runs to Goat Island for a while, and somehow, my boat, SNV Al Doghas C-9, collected all of them. I think C-8 was in re-fit, and C-10 had a propeller shaft sorted out. It had broken within the stern tube, so the only result was a lack of drive from that engine. I thought she had picked up a fishing net and filled the Kort Nozzle with a net, so there was no water flow. It was an excellent idea, but seeing the propeller sticking out behind the boat was a huge giveaway that the shaft had snapped. So, we went to Goat Island on a Sunday for six or seven weeks, having loaded on Saturday. Arrive early morning Monday. Unload either at Goat Island or Khassab, stay the night at Goat Island, leave mid-day and return to Wudam, arriving Wednesday at 6 am, except I worked out if we left Tuesday at 6 am, we arrived back at Wudam at midnight, and the crew who were very family orientated could go home and report back the start of play Saturday. I did not realise how tiring that was until one day, I sat at the end of my bed to change my shoes before lunch in the wardroom and woke up at about midnight to undress and get into bed properly. I slept for about eighteen hours. The boys appreciated the time at home, however. I received a bit of a ticking off, but I had no idea I was that tired.

This is possibly my boat taking road repair plant after a heavy rainstorm.

We moved 130mm guns, a £27,000,000.00 Air Search Radar System, and the two weekly supply runs. We took a small bulldozer and a 'JCB' type tractor for the Engineers. On the first approach to the beach, we ran out of wire for the kedge anchor short of the dryish sand, so we backed off to reel in the kedge, moved forward a little and re-drop the kedge and approach successfully this time, keeping more than three turns on the winch drum. The bulldozer came in very handy, enabling us to unload the JCB.

The angle of the bow door on the beach meant that the outriggers on the JCB would foul and halt the offload. So, my Coxswain asked the bulldozer operator to push up a pile of sand so we could put the bow door on top of the sand and the JCB could drive off successfully. We were lucky to have level spooling devices on the kedge winches, which did help tremendously with not having riding turns of wire and the associated crush damage. The downside is that if the wire diameter is changed as the initial wire size is unavailable, one of the drive gears for the level winding must also be replaced.

After moving the 130mm guns about I bumped into one of their Training Officers at The Seeb Intercontinental Hotel Happy Hour one day. He was going on leave but gave me his number so I could call him after his leave. This resulted in my attending their Training camp later. First adventure was meeting an Omani Army Major who was not sure if he saluted me, or me him. Fortunately, the British Major 2IC turned up and we set of to the training area.

The idea was that 4 guns fired, the Sound Ranging Battery picked up the sound from the fall of shot and fed that position to 4 other gun who fired at the arrival area of the first four guns fall of shot. Then, the second 4 guns packed up and moved as their role was counter-battery fire. The 2IC checked the position the guns were moving to, which was quite interesting. He had a V8 109 Land-Rover so as a L-R nut I managed to take over driving. I had a Pocket Altimeter which came in handy deciding which small hill was the correct one we should be beside. This was pre Navstar of course. The hydrographic bods had a Magnavox Receiver for Transit that they could put somewhere for 24 hours and it recorded the received signals onto a cassette tape. The tape could be sent to the US Navy who would re-work the position calculations from where the satellite had really been not where they thought it would be. A satellite appeared about every two hours and the calculation of the position took maybe thirty minutes, so Navstar was such a big improvement to positioning.

I had my camera with me in a white, cool bag with no ice. Even in the white bag, the camera was nearly too hot to handle! I fired one of the guns and was given the case, which is in our hallway holding the rolls of Christmas wrapping paper.

At some point, word filtered through that The Sultan wished to visit Jazirat Al Hallaniyyah, and the chart was old. When I first went to see one of the charts for that neighbourhood, I saw a drawing of part of the coastline near the margin with ‘Here be Dragons’ on it! In the fullness of time, my vessel was the one detailed for the Hydrographic Investigation. We were to take the Hydrographic Section, their two inflatables, two ten-foot containers, one with a refrigeration unit and their Pinzgauer 6 x 6 vehicle. One container is for dry rations and stores, and the other is for frozen food. We were going to work on getting there and some survey work for two weeks and pop into Salalah for Thursday and Friday, back

to Al Hallaniyyah for a couple of weeks, a weekend in Salalah, a two-week survey and then back to Wudam. Ra'id (Lt Comd) Peter Banyard was the boss of the Hydrographic Section with G T Jones, a Wakil 'awal (WO 1).

Once we arrived at Al Hallaniyyah, we put the Pinzgauer ashore with some kit needed ashore and then anchored while we set things up. Peter had borrowed a microwave distance measuring set from the Oman version of OS, and there was a distance measuring system like Syledis (I think) (DMU); it had wave guides like 3cm radar waveguides. The echo sounder was hung from the lowered bow door, which was an easy fix and gave undisturbed water. Amongst other things, GT cut a level in a stone jetty on the island's southern end. They must have been doing land survey during the first period, as I do not remember much of what happened.

We stayed with the Frontier Force the first weekend in Salalah, which was interesting. I got ticked off for not wearing long sleeves in the evening. The Royal Yacht Support Ship Fulk Al Salamah was in Salalah, too, and I knew the navigator via an RFA friend, so I took myself off to see him and managed to arrange three cabins for our next visit. We also managed to have some laundry done a little nicer. A chicken curry was served for Sunday lunch as the captain was a P & O man.

On the way past Mirbat, we noticed a harbour arm, so we stopped off to look on our way back. That quickly produced the local Governor, who wished to know what we were doing in his fishing harbour. While that was playing out, I wandered off and found an exciting rock to examine! Peter instead thought that he might have been told harbours were being built so that they could be added to the relevant charts, all a little above my pay grade, hence the interesting rock.

During the next work period, a strong Northerly Wind blew up one night, and we weighed anchor and headed for the mainland. The thinking being that the cliffs there would give us a rest from the waves. LCM being flat fronted and flat bottomed are not the best in largish waves. We could not have been more wrong on the wind and wavefront, so we returned to the island and found a bay to anchor in to wait out the wind. As the Hydro boys were sleeping ashore, we were lucky the islanders fed them for the days the wind blew, so next time back to Salalah, we topped up their outboard motor tanks and gave them some of our rations. Whenever we went off somewhere, we drew rations for the days of the trip and two days spare. Remember, we had worked for six or seven weeks, and each week, we were given two days of extra rations. Hence, we had dry rations to donate to the island folk.

For the next work spell, we got down to survey lines. Peter was watching the readout from the DMU, and I was steering. So, we are steaming away from the island one line, and a

little ahead, I see a kind of upwelling of water with something solid looking in the middle of it. So, I decided we had better go around it, to which Peter said, ' Where are you going, my good fellow?' I replied, pointing out the bridge window, 'Around That!!!' It was awash, so that was a good spot. As we did our lines, we found a few more, some not awash, which was not good. So, some afternoons, I found myself standing upon various rocks in The Indian Ocean with a cluster of those Prism devices that Real Surveyors use on a pole so Peter and GT could plot where these awkward rocks were. We also did some Coastline, walking about with the prism pole in about six inches of water, or it may have been a measuring stick.

The Sultan's Special Force Training Officer invited us to dinner in the mountains behind Salalah one weekend. It was an interesting drive, with roads carved out of the mountains. When we arrived and were let in, we had a magnetic triangular pillar with a number to put on the car roof. I noticed that the tower guards kept their GPMGs trained on us as we moved to the Mess Car Park. It was steak pie that night.

We went to the Airworks part of Salalah airfield/port to phone home, where they had a Tuck Shop and sold phone cards. As we entered, the Guards were a little cross about something that took a moment or two to work out. Car number plates were either white background with black letters and numbers in English and Arabic, or Service cars had a Black number plate with white numbers only in the newish Arabic Numbers. Army had a Red square, the Air Force a Light Blue square, and the Navy a Dark Blue square with an anchor in white. The guards were talking about Ben's Car. The previous Southern Naval Area Commander was Ben Trelaw, but he had been gone a few months. So, we worked out that the boys had come to the airfield in the Pinzgauer, Ben's Car, and some did not have their ID cards. Would we please tell them off?

We may have gone back to Salalah at the end so the Hydrographic boys could fly back up North and not have to put up with sleeping where they could find deck space. On the passage back to Wudam, Peter and GT started producing the beginnings of a chart. That looks easy, but it is not very far from it, so I stuck to boat driving.

About every two hours, a pod of Dolphins visited us. This is appropriate as I believe Al Doghas means Dolphin, although an RN language guy told me in Arabic there was a 'Q', not a 'G', so it might be pronounced Doqhas. When one of the pods visited, I put the bow door down and stood on the front edge of the door, looking back along the bow wave. I got a nice picture of a Dolphin a few feet in the air.

After I had passed my Master Mariner's Certificate exams, I secured a job with Western Geophysical, where I worked on their seismic survey vessels. When I submitted the paperwork for my Master's sea time, the Board of Trade (BOT) might have been the

Department for Transport by then, but we tended to refer to it as Board of Trade; there are only so many name changes you can keep track of, decided my sea time with a Foreign Navy did not count! How very dare they! So, after a phone call during which I explained that this Foreign Navy was Commanded by a Royal Navy Loan Service Rear Admiral, 'Ah, that might make a difference'. So, during my 'Leaving Interview' with the Admiral, I asked if he could speak with the BOT to explain the situation further. He also gave me a lovely letter after his phone call. The man at the BOT did seem somewhat chuffed to have been phoned up by The Commander of the Sultan of Oman's Navy, and he and I agreed that I had not been at sea all the time I was in Oman but if I would make up the time, I needed on the paperwork it would go through. These days, Second Mates needed 24 months of sea time, then 18 more for First Mates, and another 18 months before you could sit for Master; I needed 11 months, which worked out in the end.

R.V. Western Ocean

So, the seismic survey on R.V. Wester Ocean is a converted North Sea supply boat. We towed to hydrophone cables, polythene tubes about four inches in diameter, in sections about 60m long, with hydrophones in them and with oil added to adjust the buoyancy. We towed one-mile-long cables. To make the noise the cable listens for, we towed several compressed air 'guns'. If you like, these stainless-steel flasks were filled with compressed air at something like 3,500 psi. We had four compressors, so some were running, some were on standby, and maybe one was under maintenance. As we

surveyed, the computer system ‘let the air out’ of the guns in sequence, so it appeared to be one big gun producing the sound; I suppose it was at about 40-second intervals. The cables were held off to the side about 150m by paravanes, garage door-sized. Then, the computer recorded the response of the hydrophones picked up, and the guns fired again.

The cables did not follow precisely behind us, 170 deg or 190 deg, so the new Automatic Radar Plotting Aids were helpful. We could lock the Radar to some small platforms, which gave us a stabilised radar picture, which was particularly useful. When passing an obstruction, we could shift one of the Variable Range and Bearing Markers (VRBM) from the centre of the screen (the ship) and drop it on the obstruction. If we set it to the reciprocal of the tail buoy bearing when we dropped the VRBM, the cable would pass clear of the obstruction if the tail buoy echo did not touch or cross the bearing line. The tail buoy

We were working off Ravena, where there were a few platforms of various types. One was a Gas Oil Separation Platform, GOSP for short. Where these platforms were produced so many holes in the recorded data, we did some ‘undershooting’ with another Western boat to fill in these holes. They towed the guns, and we towed two hydrophone cables. Now, both vessels could pass either side of an obstruction, say about 200m. The computers had a radio link, and we could pick up the return for the required bit of Earth’s Crust.

On the ship was a system of sonars, one towed either side forward, on the head of the gun strings and the head of the cables. This system allowed surveyors to determine the geometry of cables and guns.

To help with cable depth, each cable section had a Bird attached. These birds had a set of wings, so the cable could be commanded to dive deeper or surface.

After heading to the Persian Gulf, we surveyed near Kharg Island when the USS Ranger helped with the No-Fly Zone over Iraq. It is entirely something to see planes taking off with a re-heat full blast shortly after Midnight, then others land, not so impressive, then the lights go out, and she slowed down until the following change of planes. When we turned corners with the cable out, it did tend to go where we had and not cut the corner, so quite often, Ranger would send a hello to check on our tail buoy and have a few radio conversations about that tail buoy.

There is much rigging happening here to keep the cable spacing even. However, it is managed, and the paravanes are working hard.

It reminds me of a time in Gavle, Sweden, when I was still with BP. Our cargo had been a supply of low-temperature diesel fuel. They were delighted to receive this, and the Local Council picked up the taxi fare of anyone who went into town. On our way back, we had this perfect echo on the radar, and we could not see anything. I thought it was a wooden rowing boat, and then we saw this drainpipe sticking out of the water with a slight bow wave and wash. Considering that we were in The Baltic, we thought it was most likely Russian. Hence, the Deck Cadet on watch with me dug out the Aldis Lamp and flashed the code group from The International Code of Signals, for Please Report me to Mineflot Moscow, like “Please Report me to Lloyds of London”. Imagine our surprise when one of His Swedish Majesty’s Submarines called on the VHF, asking what we wanted!
On Western Patriot, we towed four cables two miles long, more gun strings and had a work boat that could go out to part of the cable, lift a section joint aboard, break the joint, tow the rest of the cable and move ahead to the next joint, and swap out a cable section. This saved having to haul in all four cables to change one section. We backed down the

cable rather than pulling it towards us to pick up the cable. The storage drums would pull the cable quicker than they liked, so backing down was gentler.

Western Spirit – similar to Western Patriot

Now, we have an International Maritime Organisation logbook for so many things. Each Fire Extinguisher had its page that needed signing regularly. It was a fine idea, but filling in the logbook took longer than walking around to check the extinguishers! Then I found that the guy I shared the job with needed to be doing the chart or publication corrections. He was writing that he had done them, but getting the chart out and putting it away, why not just do the correction? So, I decided there could be something to do on dry land!

A friend and I had considered buying a business called Allchorn Pleasure Boats, which ran trips from Eastbourne Beach to Beachy Head Lighthouse and back. Brian Allchorn loaned us the books, but with the help of my friend's brother, a Banker, we could not see that the business made sense. Another interested person did the business, and I went to work with him.

One of the boats, Motor Launch Southern Queen, had a lute stern.[14] That was to float the boat as she was launched from the beach; the lute shape had much buoyancy to contribute. The other one, Motor Launch William Allchorn, was modelled very much on the silhouette of a 1950s three-island cargo vessel. ML SQ was clinker-built, and ML WA was double diagonal carvel construction. Both had a shallow draft forward to help get close enough to the beach to enable passengers to get on and off.

[14] a transom stern used on small boats, having an open after extension for breaking up seas coming from astern.

I discovered one morning that SQ went quickly with fewer engine revolutions. I had a Garmin GPS, which I was putting the various routes into. James, the new owner's son, remonstrated that I needed to move on as we needed to get on the beach and fuel up. So, I speeded up the engines from 1200 RPM to 1800, and we duly slowed down! The water churned up by the propellers piled up and stuck to the lute stern, so we were pulling 5 or 6 tonnes of water along with us. Having discovered this, we could pull away from WA, much to her crew's disgust and produce a small fuel saving.
We also saved on oil consumption. We tended to put a quart of oil in the starboard engine daily and only a pint in the port. Both engines had a Jabsco pump that drew sea water through a heat exchanger to cool the engine water and lube oil. The port engine also drove a bugger Jabsco as a bilge pump. It had a small feed from the cooling water pump to stop it from running dry if the bilges were empty. So, it occurred to me that this small feed, think copper brake pipe, was drawing more water through the heat exchanger and the port engine ran cooler and used less oil as a result. So now, when we were at the beach exchanging passengers, I started to leave the engines running; this gave them a chance to cool down. We used to turn both off for peace and quiet, but I noticed the water temperature was high when we set off again. So, keeping the starboard engine a little cooler reduced the oil consumption, not down to the port engine's pint but better than the quart it had been.

So, quite a bit of situation observation could be regarded as surveying conditions, but there was no Military Land Survey. I hope you have found my rambling recollections interesting.

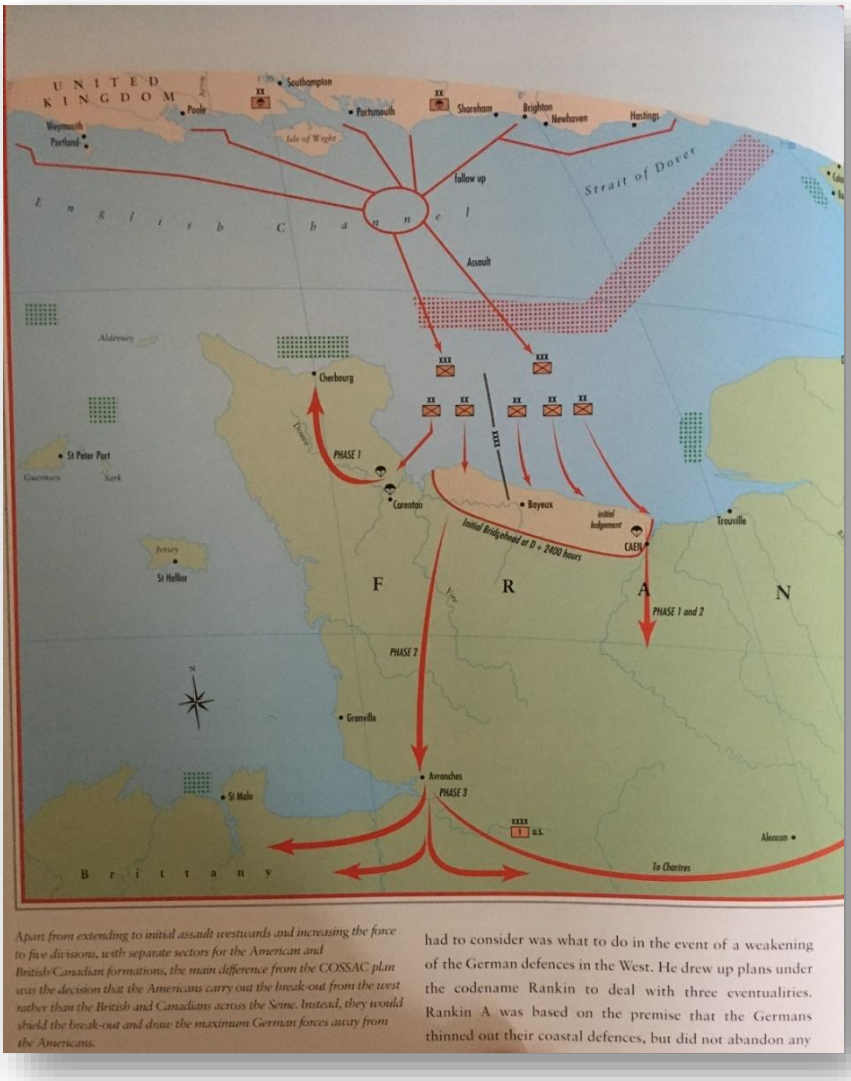
Alchorn Southern Queen - Clinker Built and Lute Stern

DSA SEMINAR
D-DAY 80th ANNIVERSARY

Chris Barrington-Brown

Montgomery's plan

5 assault divisions on five beaches
3 airborne divisions (still limited)
Needs US ships and LCVPs
Assumes British shield Americans
Assumes Americans breakout



Fifty members of DSA and associated interested parties gathered at the D-Day Story in Southsea on Thursday, September 19th, for a series of D-Day-themed talks.

Steve Bird set the stage, covering the strategic planning from the Quebec Conference in March 1941 to D-Day on June 6, 1944. While necessarily high-level, Steve ensured that the presentation contained many 'human interest' details to keep the audience engaged.

Mike Nolan then took the floor to talk about the mapping necessary for the invasion, detailing its creation and the individuals involved. True to form, Mike placed the efforts of Military Survey within a historical framework, beginning with the Crimean War, swiftly moving through the advent

of aerial survey methods, and culminating in the extensive undertaking of Project Benson. Alongside numerous map images displayed on the screen, he generously brought a diverse array of printed maps from his collection for everyone to explore throughout the day

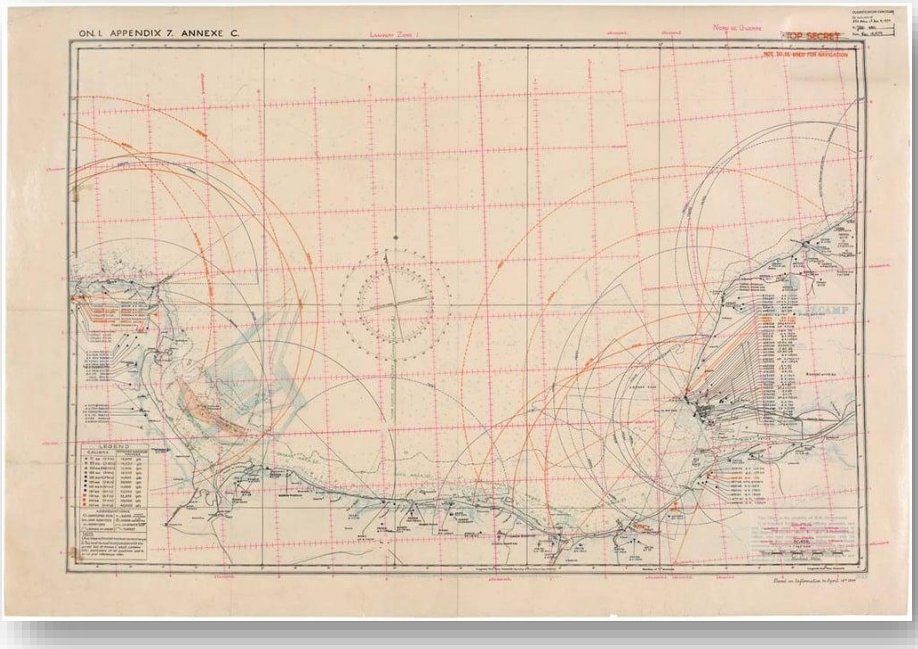
The sectors Peter, Queen, and Roger were part of Sword Beach, one of the five landing beaches during the D-Day invasion of Normandy on June 6, 1944.

A substantial buffet lunch allowed everyone to mix, meet friends and other members of the audience, and examine the maps laid out by Mike Nolan.

The seminar resumed with Christopher Nash discussing the vital role of the Merchant Navy in the operation. Frequently regarded as a 'Cinderella' service, the invasion would not have been possible or maintained without the Merchant Marine. Christopher guided us through the Merchant Navy's preparations for war, the prolonged struggle in the North Atlantic, and the planning and execution of Operation Neptune on June 6, 1944.

The Merchant Navy delivered the troops and materials and continued to provide the resupply and evacuation

Adrian Webb presented how the Hydrographer prepared for D-Day. His newly released book, Churchill's Secret Map Makers, was the foundation for his talk. Packed with engaging stories about the individuals who created the charts and other essential documents, Adrian highlighted a topic that DSA, despite its title, occasionally overlooks. There is a separate article on the book in the Ranger.



Finally, the curator of the D-Day Story, Andrew Whitmarsh, covered the story of the life, sinking, recovery, repair, and display of the only Landing Craft Tank remaining from WW2. Now on display outside the museum, LCT 7074 is a striking reminder of the sort of craft many soldiers took across the Channel to Normandy 80 years ago. Attendees then had an opportunity to visit it and the rest of the museum as the day closed.

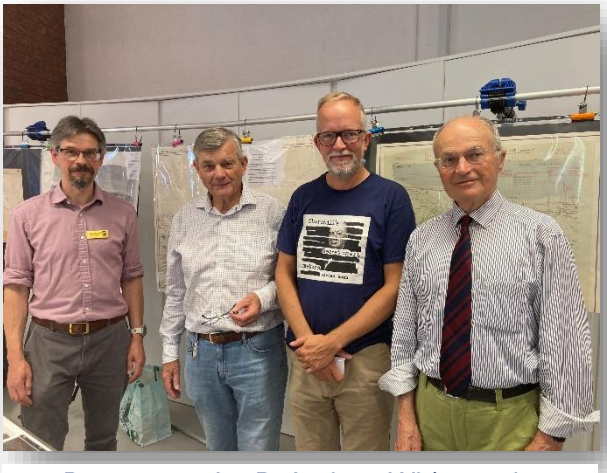
LCT 7074 at the museum

Chris Barrington-Brown, seen leaning on the lectern, arranged and organised the event. We thank Chris for an excellent event.

The feedback from attendees was positive, and we look forward to another series of lectures and visits next year. Various ideas are being discussed, but if you want to influence location or content, please contact a Council member.

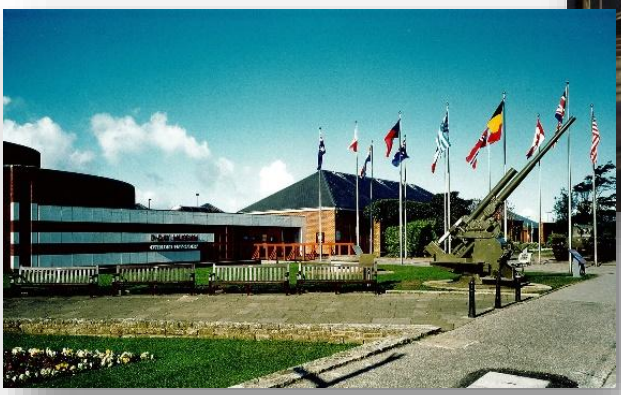
A section of the audience

Steve Bird opened the seminar



Presenters: LtoR. Andrew Whitmarsh, Mike Nolan, Adrian Webb, Christopher Nash

The D-Day Museum-Portsmouth



Exercise *OWL REFLECT* – Battlefield Tour

Lt Charlie Honeywood

Between 1 and 5 June 24, 135 Geographic Squadron Royal Engineers embarked on Exercise OWL REFLECT, a five-day battlefield study aimed at studying Operations NEPTUNE and OVERLORD while also commemorating the 80th anniversary of the Normandy Campaign. Attended by 29 members of 135 Squadron and the wider regiment, the study chronologically followed the planning, preparation and execution of the D-Day landings and subsequent actions from both sides of the channel.

Commencing with a trip to the Royal Engineers Museum in Chatham, attendees split down into syndicates to deliver briefs on key elements preceding D-Day, starting with a talk on Operation JUBILEE and the failure of the Dieppe raid. This identified key lessons learned and incorporated into the planning of Operation OVERLORD. Focus was placed on the need for more accurate intelligence, deception and surprise, greater and better-integrated air and naval support for the landing forces, armoured vehicles more suited to amphibious assault, and abandoning the aim to capture a well-defended port with a frontal attack from the sea.

Royal Engineer Museum - Chatham

SSgt Evans gave a particularly animated "Hobart's Funnies" brief (spot the Armoured Engineer) using the vehicles outside the RE Museum. These vehicles were a series of specialist armoured vehicles tailored to the needs of OVERLORD, incorporating the lessons learned from the Dieppe

raid. The final talk was on Operation BODYGUARD, the Allies' deception strategy in the run-up to D-Day. This was particularly interesting as delegates were challenged to imagine how effective the methods deployed then would be today and how we could achieve similar effects in modern, full-spectrum warfare.

That evening, the squadron reconvened at Mercator House, Ewell, to hear from two guest speakers, Merryn Walters and Lt Col (Retd.) Mike Nolan. The guest speakers spoke in-depth about how mapping was critical to the success of the planning, preparation, and execution of OVERLORD. Focus was given to the need for accurate, definitive mapping to inform the planning of D-Day, especially given the intelligence failures that contributed to the defeat at Dieppe and how mapping played a key role in controlling the build-up of invasion forces in southern England in the weeks leading up to D-Day. The group was particularly interested in the organisation of map production and distribution and the need for secrecy in the immediate run-up to D-Day. This was especially relevant to the squadron's modern role of geospatial information dissemination. The speakers also emphasised the need for those involved in map production and distribution to be two steps ahead of the action, ensuring that the right maps were in the right hands not just for the current fight but for the next actions and beyond at tactical, operational and strategic levels.

Day 2 focussed on the significant logistical challenges of Operation OVERLORD, with visits to Lepe Beach in Hampshire, Mayflower Park in Portsmouth and the D-Day Story in Portsmouth. Lepe Beach tangibly connected the study to constructing the Mulberry artificial floating harbours and the PipeLine Under The Ocean (PLUTO), vital elements of the sustainment effort. With many remnants of its wartime past still extant, visiting Lepe Beach brought to life the scale of the logistical challenges faced by the Allies in executing D-Day, many of which still exist today and were recently highlighted by the US deployment of a floating harbour off the coast of Gaza and the limited success achieved.

Mayflower Park and the D-Day Story stands discussed the assemblage of the landing craft and the supreme organisation of the embarkation to effect the amphibious assault. Discussions roamed across amphibious capability today, the challenges of Anti-Access Area Denial doctrines employed by our peer opponents, and a review of how the Squadron would deploy today through the Marchwood Military Port. The final discussion before the Ferry centred on the critical decisions around the weather, leading to the delay of Op NEPTUNE by 24 hours.

The following day (3 June 24), having arrived from an overnight crossing, the squadron convened at SWORD beach to analyse the beach landings themselves. Applying what was learned at the RE Museum, the role of specialist armour in clearing the beach was examined and contrasted with American operations on OMAHA and UTAH beaches. The role of the Royal Engineers in subsequent beach operations was also discussed, particularly the management of traffic on the beaches once obstacles had been cleared. The chaotic environment the engineers would have faced was compared with the likely conditions that their modern successors will face on operations, namely the 5C's descriptors of the future character of conflict: congested, contested, cluttered, connected and constrained.

Moving inland to the Hillman Bunker, the group was briefed on the purpose of the position and its impact on Allied ambitions to capture Caen on D-Day. The site was appraised as a defensive

location, and the terrain was analysed from the perspectives of both the attacking allies and the defending Axis forces. Delegates were impressed by the quality of the construction, the complex and interlinked arcs of fire and the commanding position of the bunker, agreeing that it was a formidable objective that faced the men of the Suffolk Regiment on 6th June. The study then moved to another piece of key terrain, Pegasus Bridge, to discuss terrain factors and tactical surprise. Conversation soon turned to how such an action would be achieved today with modern capabilities - some suggesting a similar airborne assault (by helicopter as opposed to glider), others proposing a stealthier water-borne approach to ensure surprise, and some questioning the need for a ground assault by troops at all given the effectiveness of modern air-launched precision-guided munitions.

Pegasus Bridge

The final stop of Day 3 was the Merville Battery, believed by the invasion planners to be comprised of 150mm guns and a massive threat to the landings on Sword Beach. Walking the site, the study group heard how the destruction of the battery, tasked to the 9th Parachute Battalion, unfolded. It was an expensive operation in human costs. The discussion turned to how the engagement lessons could be applied to modern warfare and whether fortified artillery positions such as Merville are still viable considering modern ISTAR and counter-battery strike capabilities.

On 4 June 24, the visit to Longues Sur Mer Battery allowed the group to study how the Allies chose to neutralise this battery compared to Merville. Longues Sur Mer, a coastal artillery battery between Gold and Omaha beaches, presented a significant threat to the invasion force and was subject to intense aerial and naval bombardment until the surviving German troops capitulated to British ground forces on 7th June. The squadron then travelled the short distance to Arromanches-les-Bains to see the remains of the Mulberry Harbour. Major Locke and Major

(Retd) Peter Richardson delivered a briefing on the role of RE Survey in Operation OVERLORD and how this role has evolved up to the present day. Thought was given to the present-day littoral logistics and sustainment capabilities within the RE, RLC, RN, RFA and broader defence.

Moving to Bayeux, the focus of the battlefield study moved from the beaches to the subsequent engagements inland. Visiting the D-Day Museum allowed the group to get up close with armoured vehicles used by both sides in the Normandy Campaign and compare their relative strengths, weaknesses and design philosophies. As Royal Engineers, we could not depart without discussing the impact of the Bayeux ring road, built in a matter of days by the Engineers in 1944. A visit to Bayeux War Cemetery brought home the human cost of D-Day, and an Act of Remembrance was held along with a talk by Maj Richardson on the incredible work of the Commonwealth War Graves Commission.

Bayeux Commonwealth War Graves

The final day (5 June 24) saw the study in Villers-Bocage discussing the fate of the British 22nd Armoured Brigade when caught un-prepared by SS-Obersturmführer Michael Wittmann and his SS Heavy Panzer Battalion. The Battle of Villers-Bocage also highlighted the character of the Bocage terrain of Normandy, small agricultural parcels bordered by dense hedgerows and crossed by narrow undulating roads. The impact of Bocage country on operations was primarily not appreciated by the invasion planners, leading to slower progress than anticipated. This failure to appreciate the geography of the area of operations emphasises the importance of Geospatial Intelligence (GEOINT) in the planning and execution of combat operations.

Continuing the GEOINT theme, the study moved to Gué de Moissy, a ford across the River Dives, across which the Germans attempted to withdraw during the Battle of the Falaise Pocket. This ‘pocket’ saw the remains of the German force in Normandy surrounded by an ever-narrowing escape route. The ford at Moissy became the site of heavy German losses at the hands of the Allies, as retreating forces were channelled through this chokepoint. Overlooking Gué de Moissy,

the Coudehard-Montormel Memorial was the final stop on the battlefield study. Its commanding position on Hill 262 overlooking the Falaise Pocket was the site of stubborn Polish resistance to fearsome German attacks in the concluding phase of the battle. By holding out just long enough to be reinforced, the Polish forces ensured the closure of the Falaise pocket and the collapse of the German position in Normandy. The memorial at Coudehard-Montormel was, therefore, the perfect setting to conclude our battlefield study and remember the sacrifices of those who fought and made the ultimate sacrifice to liberate France and eventually end the war in Europe.

With state-on-state warfare in Europe again, there has never been a more relevant time to study the Normandy Campaign in detail. Operation OVERLORD arguably saw the birth of modern combined-arms warfare and multi-corps operations, which are still recognisable today in how NATO expects to fight our adversaries.

The Squadron would like to thank the DSA for its generous financial contribution towards the cost of the guest speakers, who made an invaluable contribution to this battlefield study.

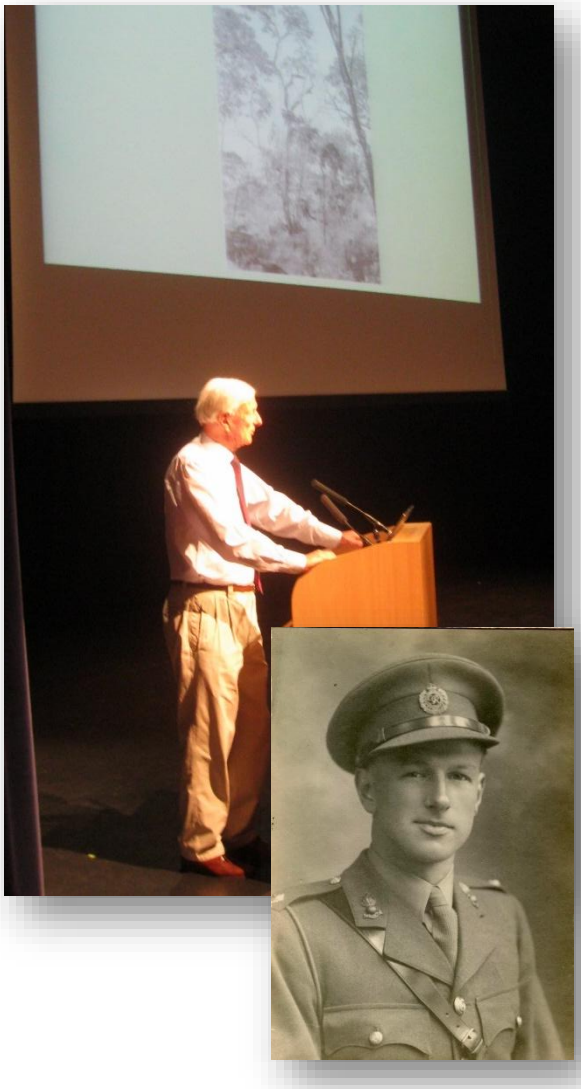
135 Geographic Squadron (Reserves) is a sub-unit of 42 Engineer Regiment (Geographic) based in Ewell (Surrey), with Troop detachments in Reading and at RAF Wyton (Cambridgeshire). Formed in 1949, the Squadron celebrated its 75 Anniversary in July 2024 with a Freedom of Epsom and Ewell parade. Since 1991, the Squadron has provided 51 individual augmentees to various operations in the Middle East, Afghanistan, South Sudan, the Balkans and the UK. The Squadron is stood by to support UK Defence and the UK's NATO Allies and Partners during major warfighting operations providing an in-theatre map distribution network and in-theatre short notice and bulk map production. The Squadron has recently established a small number of Specialist Reserve Officer posts to recruit individuals with geospatial and geospatial related skills to provide Defence with geospatial consultancy and advice to projects and programmes in Defence.

Alan Marles Celebrated his 100th Birthday

On the 16 October 2024, Alan Marles celebrated his 100th birthday.

Those who attended the DSA Seminar 2017 at the Arlington Arts Centre will remember Alan's clear, detailed and fascinating presentation concerning his life and careers in the military and the Ordnance Survey.

Many friends and Royal Engineer units sent congratulations and best wishes to Alan on his birthday.

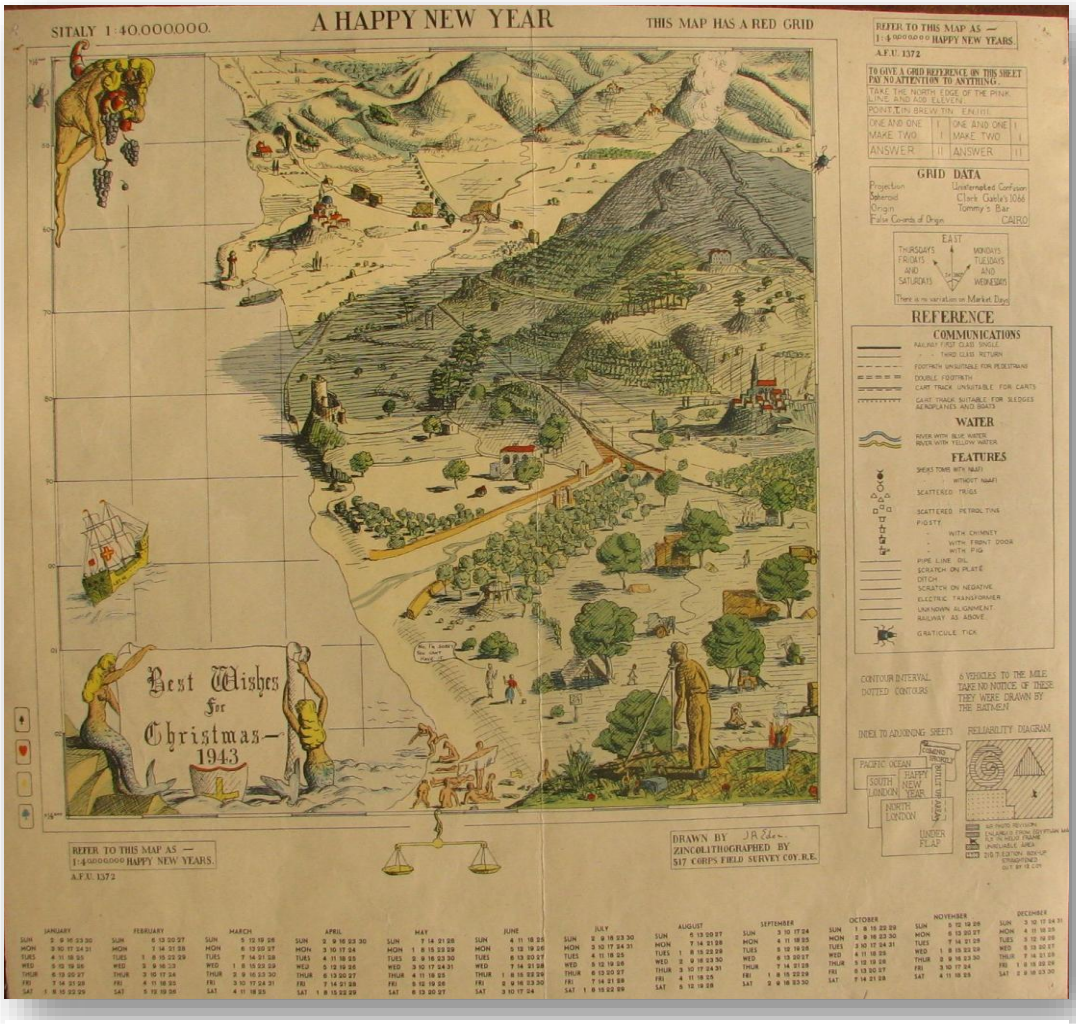


The Defence Surveyors' Association sent the following message.

Your friends and colleagues in the Defence Surveyors Association are so pleased you have celebrated your 100th birthday! We send you our warmest congratulations and best wishes on this remarkable milestone.

Link to Alan's notes outlining his career
https://ubiquevir.wordpress.com/2024/10/16/sapper-family/

The Council of the Defence Surveyors' Association extends their good wishes to all members, present and past, for 2025 and onwards.



Italy 1943

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