The Military Survey (Geographic) Branch

Royal Engineers Association

Winter Newsletter 2022 – issue 86

Military Survey (Geographic) Branch
Royal Engineers Association

WARNING ORDER - MILITARY SURVEY (GEO) BRANCH REA REUNION

The Committee with the kind permission of Commanding Officer, the RSM, the President of the WOs' & Sgts' Mess, extend an invitation to members to attend the annual reunion in the **WOs' and Sgts' Mess, Hermitage Station** on:

Saturday 1st April 2023 (12:30hrs for 13:00hrs)

Enjoy meeting old friends, with lots of benefits:

- **FREE Entry**
- **FREE Lunch (Curry) for ALL Attendees**
- **FREE Branch lapel badge for first time members that attend** (Existing lapel badge holders are encouraged to wear them!)
- **Super Bar @ Mess Prices.**

Please note that we only meet once a year **SO PLEASE PLAN TO COME AND JOIN US**.

We must vote in officers of the Branch and approve the accounts therefore we are compelled to hold an annual general meeting (AGM). Those interested in attending the AGM should note that this will take place on the same day at the same venue but at an earlier time of 11:00hrs. It will not interfere with the opportunity for members attending the reunion to chew the cud, enjoy the food and of course the good beer.

Also note that due to a lack of availability there will be no accommodation available at Hermitage Station.

So please do try to attend with wives/partners and support your Branch.

RETURNS REQUIRED BY 20 March 2023
(Return details contained within)

Branch Annual Award

As readers will be aware the Branch endeavors to make an annual award to an individual who has given outstanding and loyal support to the Regiment; above and beyond what might normally be expected.

For 2022, the award went to LCpl Nicholas Evans. An extract from LCpl Evans' award nomination is given below:

> *LCpl Evans has dedicated a significant amount of his personal time to improving the lived experiences of his peers. Through his management of the Squadron welfare facility, he has delivered multiple events for both the Squadron and Regiment, for soldiers and their families, promoting a feeling of belonging and wellbeing throughout.*
>
> *He has used his initiative to deliver events that people want to attend. He has ensured that personnel are formally welcomed on arrival and introduced to the Squadron in an environment that is inclusive, relaxed, and friendly. In doing so he has instilled a true sense of belonging and Esprit de Corps.*
>
> *LCpl Evans' drive and organisation skills represent the very best qualities of a JNCO and have been an inspiration to others. He has set the bar very high and promoted a feeling of fellowship which has had a positive effect on morale across the Regiment.*

The picture shows LCpl Evans being presented with his prizes: a framed copy of "Hurrah for the CRE"; his award citation; and a cheque for £200, by Branch Chairman, Col (Ret'd) Mark Burrows.

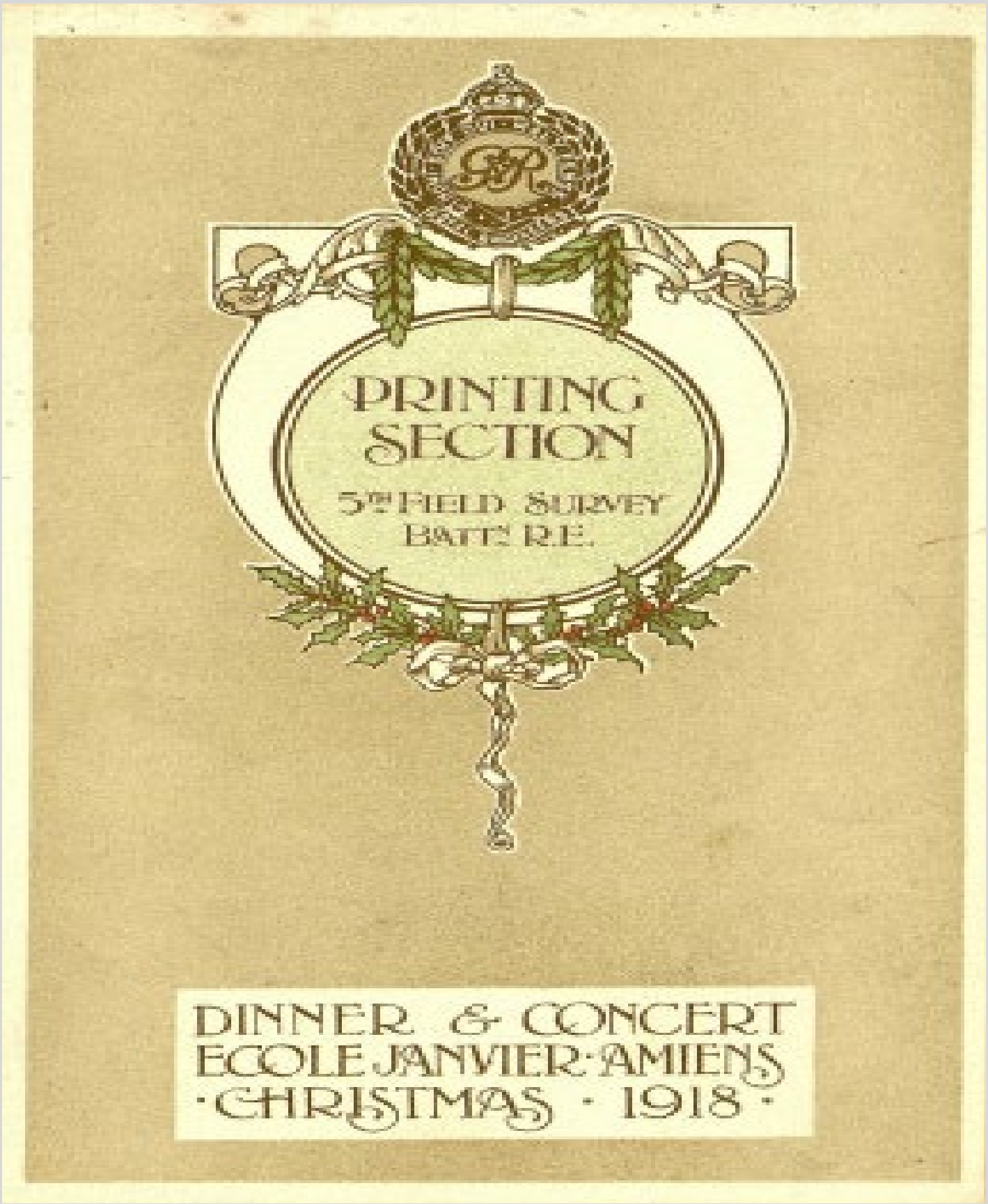
Soldiers' Soldier Award
No 55 Military Engineer Geographic Technician Class 2 Course

Working with RSMS, the Branch recently made its Soldiers' Soldier Award to the student on a Military Engineer Geographic Technician 0-2 Course who best epitomised the REA motto of "Service not Self".

Each student is asked to nominate a peer for the award and nominations from No 55 Course were received for four members. Competition was close but the winner was Sapper Oscar Griffiths who was awarded a copy of Alan Gordon's Book "The Regiment that Mapped the World", an award certificate and a prize of £25.

The presentation was made by Col (Ret'd) Mark Burrows, the Branch Chairman, following the end of course discussion. The 14 successful students have all been posted to 42 Engineer Regiment Geographic.

Sapper Oscar Griffiths receiving his "Soldiers' Soldier" Award
from the Branch Chairman, Col (Ret'd) Mark Burrows.


PRINTING
SECTION
5TH FIELD SURVEY
BATTY R.E.
DINNER & CONCERT
ECOLE JANVIER·AMIENS
·CHRISTMAS · 1918·

War 1914-1918- Christmas 1918

Program of the dinner concert given at the January School, in honour of the 5th Survey Battalion RE

(Details provided by Mike Nolan)

Survey of India 1767 - 1990
Through the Ages

(Abridged from a brochure organised by the RICS and RGS to commemorate the Bicentenary of the Birth of Sir George Everest on 8 November 1990)

Author - Lieutenant General S M Chadha, Surveyor General of India
Printed at the Printing Group of Survey of India

Surveys up to the 18th Century

The art, culture and kingdoms of India could not have spread through centuries and countries without knowledge of its geography. In the Vedic literature of over 5,000 years ago, the knowledge of land was presented in a graphical form which described the extent and shape of territories. The 'Brahmand Purana' of 500 B.C. to 700 A.D. gives evidence of the art of modern map-making. The art of surveying and techniques of mensuration of areas are escribed in 'Sulva Sutra' (science of mensuration) and in the 'Arth Shastra' of described in 'Sulva Sutra' (science of mensuration) and in the 'Arth Shastra' of Chanakya written in the 3rd century B.C. The golden age of Indian Renaissance in the 5th century saw the towering genius Arya Bhat who wrote 'Surya Siddhant' calculated the earth s circumference to be 25,080 miles - less than 200 miles off modern measurements of the equator. Chinese and Arab travellers and many adventurers also contributed to Indian geography. Sher Shah Suri and Todar Mai's revenue maps, based on regular land survey systems were well known in the medieval period and continued to be in practice during the mid-eighteenth century.
India's Topography

The topography of the Indian subcontinent varies from the snow-covered Himalayan peaks of the world's highest mountains to the rich and fertile plains the Ganges, with large undulating areas, thick jungles, deserts, mighty rivers, swamps, and a long coastline. The area of independent India (i.e., 1.28 million sq miles, more than that of western Europe) is largely inhabited by the descendant of migrants from across the Himalaya and today, it consists of a mixture of various races, cultures, languages, and religions.

The major religious communities of the 834 million people of India are Hindus, Muslims, Christians, Sikhs Jains. Buddhists and Parsees speaking 15 officially recognised languages and several hundred dialects. Such is the very rich culture and heritage of the nation that is India.

THE SURVEY OF INDIA TODAY

Survey of India, fondly called the Department by its members, is organised into 10 Regional Circles and 8 specialised Circles/Directorates. Each Regional Circle is responsible for all topographical and developmental surveys of a State or group of small States. The specialised Directorates are the Geodetic and Research Branch. Map Publication Directorate, Directorate of Survey (Air), Survey Training Institute, Research & Development Directorate, Modem Cartographic Centre, Digital Mapping Centre and the Flood Plain Zoning Surveys. The manpower resource consists of over 7,000 technical personnel. The Survey Training Institute runs about 45 courses a year – training about 600 officers. Apart from the basic, refresher and specialised courses, it runs advanced courses in photogrammetry, geodesy, and cartography. This year, we have started a one-year advanced course in Integrated Digital Map Production and Geographical Information Systems. We have about 60 field units, 14 photogrammetric units, 17 drawing offices, 5 printing groups and 23 other special units.

Apart from geodetic topographical and geophysical surveys the Department meets the survey needs of all developmental projects amounting to more than a hundred a year. Scientific projects like the study of seismotectonic of the Himalaya and many others are undertaken independently or in collaboration with other organisations

The Survey of India has covered the whole country by 1:50,000 rigorous metric surveys in about 5,000 sheets. This is a feather in its cap since many large countries are yet to fully cover their areas on this or larger scales. About 30% of India has also been covered by 1:25,000 surveys.

The Department has met the challenges of surveying the indomitable Himalaya, blazing deserts and disease and animal-infested jungles. The Department is continuously striving to keep abreast of modern technology and has successfully entered the era of Digital Mapping and Geographic Information Systems.

1767-1800: THE ROOTS

The Survey of India traces its birth to the appointment of Major James Rennell as Surveyor General of Bengal by Robert Lord Clive and his council, on the first of January 1767. He placed all available surveyors under Major Rennell's orders, amongst them being the Frenchman Claud Martin, who later became famous as the founder of the La Martiniere Schools.
By 1773, Rennell completed surveys of the possessions before relinquishing the post of Surveyor General in 1777. Rennell surveyed Bengal and Bihar, an area of over 1500 sq. miles, producing a continuous and uniform set of maps. The surveys however were far from complete or accurate in detail but were sufficient to meet the needs of the time. Rennell continued his interest in England, and his first "Map of Hindoostan" reached India in l783.

The early history of surveys in India followed the East India Company's expanding areas of influence and conquest.
The next Surveyor General Thomas Call like many others who followed him, undertook the task of compiling an atlas embracing the whole of India. On initiative of John Tringle, who surveyed routes with great enthusiasm, a military 'Corps of Guides' was established. This Corps also contributed largely to the surveys of the Madras Presidency for the next 30 years.

It was in 1787 that Michael Topping a marine officer, broke away from the eternal method of Perambulator Traverse and ran a 300-mile line of triangles along the coast from Madras to Palk Strait. It was he who built a permanent astronomical observatory in Madras in 1793 and founded the first surveying school in 1794.

In 1796 and 1810, the Presidencies of Bombay and Madras got their own Surveyors General with the appointment of Lt Gen Charles Reynolds and Col Colin Mackenzie as the respective Surveyors General. It was on the first of May 1815 that the Directors, finding it wasteful to maintain three separate independent Surveyors General appointed Mackenzie as the Surveyor General of India.

The credit of the first surveys of the Brahmaputra in Assam, in 1794 and that of the Irrawaddy river in Burma go to Thomas Wood. The mission also collected interesting information about people, tribes and general geography of Assam and Burma, about which nothing whatever had been known before.

India was one of the earliest countries to establish a regular Government Survey Organisation and to commence systematic surveys - a few years before even the Ordnance Survey of UK.

1800 - 1843 : SCIENTIFIC APPROACH SOLID FOUNDATIONS

Lambton

It was very fortunate that a man of the genius and resolution of Lambton in the subcontinent to lay the foundation of the 'Great Trigonometrical Survey of India' - a few years before similar projects were undertaken by France and England.

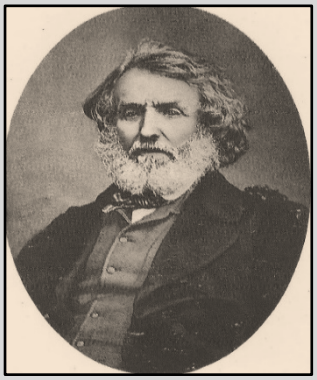
In November 1799 he put forward his proposal for a "Mathematical and Geographical Survey " that should extend right across the Peninsula from sea to sea, controlled by astronomical observations carried out on scientific principles, capable of extension in any direction and to any distance. He started his work from Madras where, in early 1802 he measured the famous base lineal Saint Thomas's Mount as a start for his triangulation, north and south through Carnatic India and across the Peninsula, with his famous 36-inch great theodolite.

He completed a meridional arc from Cuddalore to Madras observing latitude at both ends and obtaining a value for the length of a degree that was I essential for his scientific work. By 1815, he had nearly covered the whole Peninsula south of the river Kistna (Krishna) with a network of triangulations braced by main cross belts. To him goes the distinction of measuring the longest geodetic arc closest to the equator, from Cape Comorin to the 18° parallel.

The 36" Great Theodolite used between 1802 and 1866
Valued at £650, weighing 1011 lbs when packed..... the
great instrument behind the Great Meridional Arc of India

George Everest

In 1806, a subaltern came to India at the tender age of sixteen. He was none other than Lieutenant George Everest, whose birth bicentenary we are celebrating. He joined Lambton in 1818. Lambton died at work on January 20, 1823, at Hingunghat at the age of 70. Gen Walker recognising In is work, wrote in 1870, "of all Col Lambton's contributions to geodesy, the most important are his measurements of meridional arcs the results of which have been employed up to the present time, in combination with those of other parts of the globe, in all investigations of the figure of the earth."



Lambton's mantle fell on the worthy shoulders of George Everest. Everest felt the need for basing the surveys on a rigid reference framework, This raised the problem of finding a suitable reference spheroid fit the shape of the earth's gravity equi-potential surface for India and the adjacent countries. Everest realised that the Indian subcontinent was too large for basing surveys on an osculating sphere, leave alone a tangent or secant plane. Everest therefore started his control work from Kalianpur in Madhya Pradesh, more or less in the centre of India. Here, he made astronomical observations and treated the astronomical latitude, longitude, and the plumbline at that place as error-free. With Kalianpur as the centre, he conceived covering the length and breadth of India by a gridiron of triangular chains, as opposed to the network of triangle1 conceived by Lambton. He brought to surveying greater accuracy and rigorous observational procedures, besides devising, and refining the instruments.

He introduced the observation of astronomical azimuths from pairs of circumpolar stars, ray traces for long lines etc. His redesigned 36-inch great theodolite is famous today. He replaced the chain with Colby's base-line apparatus and l0-foot compensation bars, with which he measured various bases. He completed the great meridional arc from Cape Comorin to Banog in the first Himalaya, near Mussoorie a length of 2,400 km . Everest made the government agree to the revision of Lambton's work, based on more accurate instruments and the procedures as laid down by him. Later, in 1830 he was appointed as the Surveyor General of India but much against the wishes of the then government, he continued to devote much time to the Great Meridional Arc. This was completed by him in 1841 and he utilised the last 2 years of his service in its computations and adjustments. The work and norms laid down by Everest have stood the test of time. The Everest Spheroid evolved by him in the year l830 is not only still being used by India but also by Pakistan, Nepal, Burma, Sri Lanka, Bangladesh Bhutan, and other south-east Asian countries.

We can only grasp the significance of his monumental work if we visualise India of the early nineteenth century - without communications and full of jungles wild animals, robbers, and disease. The average length of a side of the triangulation was about 31 miles, the maximum being about 62 miles. One cannot imagine how such long-distance observations were planned, laid down the ground, line of sight cleared of all trees and sometimes even houses, how big rivers and swamps were crossed. Everest devoted to his work, did all this despite his partial paralysis and bad health. Based on his conceptualization, the gridiron network today covers the entire country and forms a solid foundation for accurate surveys and mapping for defence, development and efficient administration.

Mount Everest 8848 m discovered in 1852 – the highest of them all – still rising?

It was with the help of this gridiron network that the highest peak of world was observed and discovered in 1852 and its height declared as 29,002 ft-i.e., about 8840 metres. After fresh observations and computations, the Survey of India declared its height in 1954 as 8848 metres. In 1975, the Chinese put metallic beacon on Mt. Everest and observed it from 9 stations. They also carried out sufficient astronomical and gravimetrical measurements, the co-efficient of refraction was reliably determined and the final result of determination was declared as 8848.13 + 0.35 metres.

Sir Thomas Holdick concluded in the "Standard" of January 24, 1905, that "it was officers of the Survey of India who placed his name just near the stars, than that of any other lover of eternal glory of the mountains and let it stay in witness to the faithful work not of one man but scores of men." Everest was the first from amongst the eight Surveyors General of India to be knighted.

The Great Instrument Repairer

Mention must be made of Mohsin Husain, the great instrument repairer. In recognising his work Everest writes that without his valuable aid it would have been utterly out of his power to carry out various projects for remodeling the instruments, comparing the chains and standard bars, and removing radical defects in the reverberatory lamps. Hussain's crowning triumph was his successful division of the horizontal circles of two astronomical instruments during 1839 - a task which Barrow the mathematical instrument maker had firmly refused to touch. In spite of the best efforts and recommendations of Everest, however, Mohsin was not promoted but his salary was raised to Rs.250/- per month. Nevertheless, Everest did not give up and got him a promotion and title in September 1843.

Other Survey Efforts up to 1843

Between 1808 and 1810 the scare and threat of Napoleon to invade India led to several political missions and surveyors to Sindh, Lahore, Peshawar, and Persia. The frontiers of Gujarat were also surveyed on priority as a precaution against Napoleon's invasion.

A mention may also be made of the 'Military Institution' founded at the end of 1804 for the education of selected military cadets in mathematics, drawing and military fortifications and also for several months each year, in field survey, triangulation and Plane tabling a fresh area every year. The institution was closed in 1860 by which time it had completed nearly 15,000 sq miles of Arcot and Chitoor. Another expedient, the monthly survey allowance granted to inexperienced regimental officers, produced only a mass of problematic route surveys. In 1807 due to paucity of funds, Surveyor General Colebrooke took to the field himself and surveyed Rohilkhand.

Survey work on strict scientific lines reduced productivity. Therefore, in 1833 increase in annual output was ordered by cutting professional work to the minimum. The work did get speeded up but resulted in little of long-term value for settlement or effective mapping of the country. The work had to be revised in later years.

During this period, 1800 to 1843, compilation of topographical surveys based on route surveys were gradually discarded and surveys based on geodetic control commenced. Solid foundations were laid by Lambton and Everest – both great geniuses in surveying.

1843 – 1904: YEARS OF EXPLORATION CONSOLIDATION

Maj Gen Sir Andrew Scott Waugh holds the record of occupying the post of Surveyor General of India for the longest duration in history-from 1843 to 1861. It fell on him to extend the grid of triangles started by his illustrious predecessor Sir George Everest, over Bengal Bihar and Orissa with extensions towards the North-East Frontier and down the east coast. Later, the main triangulation was carried westward to the Indus and northwards through the mountain region Kashmir. To link up the Bombay triangulation was continued west and north .

These surveys were not without problems and difficulties. The passage of the desert, 150 miles of sand hills, raised serious problems of supplies – including scanty wells that were too often over 300 ft. deep, brackish water, lack of building materials for towers, mirage arid other vagaries of refraction. A surveyor commented "a miserable country only interesting for its physical deficiencies."

Montgomerie started the Kashmir triangulation in 1855 from Jammu and extended it across the Pir Panjal to the Great Himalayan range, fixing the peaks of Nanga Parbat and K.2. Many triangulation stations were established at heights of over 19,000 feet.

Mention may be made of Capt Godwin Austen who by temperament and physique, was the ideal man for topographical surveys under the roughest conditions. His plane table survey of the glaciers of K2 and other peaks were notable pieces of work. Phillimore writes, “His work in the high Karakoram attracted particular attention and led to the unfortunate suggestion that name be given to the peak that Montgomerie had discovered and had designate as K2, for which no Vocal name had been found.”

Radhanalh Sickdhar

Born in Oct 1813, he joined the Surveyor General’s Office in December 1831 and rose to the rank of Chief Computer. He authored many technical publications and contributed to several others. He assisted Thuillier and Smith in the preparation of the “Manual of Surveying for India” for which he was duly acknowledged in the preface to the first and second editions. However, this acknowledgement was omitted in the third edition of September 1875. Strong criticism in the local press was contributed by a retired and a serving officer. The serving officer was sharply reprimanded and reduced in seniority.

Radhanath Sickdhar

Radhanath also published “A set of tables for facilitating the computation of trigonometrical survey and the projection of maps for India”, based on formulae authorised Everest and, in some cases, modified by Radhanath himself, during his spare time, he acquainted himself with the latest in English and French geodesy including Puissant’s work of 1842. Waugh was always afraid of losing him to other departments and had asked for a much higher salary for him, but the government considered Rs 400 per month as sufficient remuneration.

Radhanath was in charge of the computation section in Calcutta and was constantly consulted by Waugh regarding refraction and formulae for vertical angles. There is a controversy as to who first computed and discovered peak No. .15, the highest in the world later named Mount Everest. It is not clear whether the Chief Computer who made the calculations was Radhanath Sickdhar or John Hennessey. However, Phillimore felt that Radhanath had no share in it.

Spirit Levelling

Gen Walker is known as the father of Indian levelling for the care, thought and execution of levelling practices in India. Discrepancies were found in the heights brought out by triangulation from various connections with the sea level. It became clear that except for hilly areas, more accurate values would have to be derived by spirit levelling. This was also felt necessary to control engineering and irrigation projects. A tidal station was established at Karachi and spirit levelling of precision was introduced as a part of the Great Trigonometric Survey in 1858. It was Walker who introduced the system of simultaneous double levelling each line being observed by two levelers working independently.

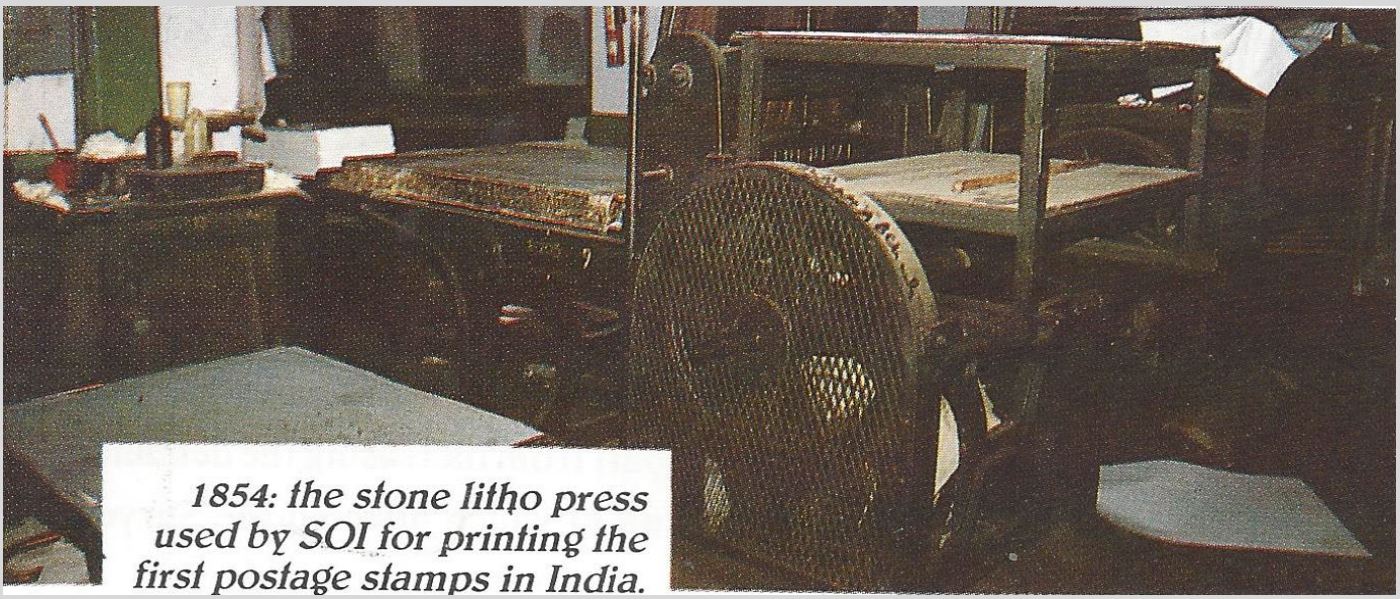
Gravity

George Everest felt the importance of gravity and pendulum operations while studying the effect of local attractions and the deflection due to the Himalaya on the measurement of the Great Arc. The pendulums obtained by him were not used. It was left to Capt Basevi and Capt Hennessey to start the pendulum observations at Dehra Dun in 1865. From 1866, Basevi carried gravity series over the Great Meridional Arc from Dehra Dun to Cape Comorin. He died at work in Ladakh in July 1871. Archdeacon John Henry Prat in Calcutta devoted himself to calculations of the actual amount of attractions of the Himalayan masses and the deflection deviation of the vertical (plumb line). His major contribution was that the deflection calculated from the known distribution of mountain mass, was much greater than that actually observed; from which he deduced the theory of Isostasy. Thus, India, the birthplace of the theory, contributed significantly to geophysical sciences.

Compilation Engraving

Compilation, engraving, and publication were done in London from material regularly sent from India. The work fell into arrears and, as a result of the Surveyor General’s protests the production of maps was transferred to India in 1869. From about 1841 the work of the Government Lithographic Press at Calcutta was far from satisfactory. The machines and staff were effectively transferred to the Surveyor General in 1852. Some machines were constructed locally, and others imported, and map printing came under departmental control.

The Survey of India printed the first postage stamps of India during 1854-55 on the stone litho proving press. In 15 months, over 47 million stamps were struck off; half-anna in blue, one-anna in red and four-anna in red and blue Photolithography started in Calcutta in 1862. Zincography started at Dehra pun in 1866 after a course of training at the Ordnance Survey Southampton.



Magnetism

Magnetic observations were started during Everest's tenure by Capt Boilean in 1840 but kept in abeyance till 1896. The first determination of the various values i.e., dip declination and horizontal forces etc. were made in 1901 with Survey of India pattern instruments. Magnetic observatories were established during 1902-04.

Tides

The importance of the investigations of the laws of the tides of the Indian seas was strongly felt to be available to seamen and scientists. In 1834, the East India Company desired Everest to start tide observations. Though the earliest recorded tidal observations are those of James Kyd at the Hooghly River (1806-27) a breakthrough was made only in 187l-72 by Major B.R Anjill of the Survey of India who introduced a self-registering tide gauge at Tuticorin and reduced the observations by simple harmonic analysis. Today, the Survey of India has tide gauges in 22 ports and publishes the tide tables of 44 ports from Aden to Singapore.

Security of Maps

It is interesting to note that the greatest importance was attached to the security of maps. There was a strict rule that surveyors should treat their work as secret and not pass on copies even to local officers, civil or military, without proper authority- It is presumed that this was, as Hodgson noted, because many public officers carry papers in their charge to England especially maps which are put to sinister uses.

Other Notable Events

During this era the notable events were the start of the railways in 1853, the Geological Survey of India and electric telegraphy in 1851, and the Indian Meteorological Department in 1875. These apart from increasing the demand surveys, also competed for educated staff all of which affected the Survey of India.

Calcutta: Surveyor General's Office 1882 to 1940

1905 – 1946: THE DIFFICULT YEARS

The Committee

Complaints were received from the military authorities that Survey of India maps were not modern, that the topographical surveys were slowly, and revenue surveys were given too much prominence in the Department's programmes. This resulted, in 1905, in the convening of a committee of high civil, military, and departmental officers as well as advisers from the ordnance survey to formulate a policy and programme to meet military as well needs except for revenue surveys which, from that time, became the responsibility of the provinces.

The policy and programme to cover India in 25 years with modern coloured and contoured maps was approved and put into effect by the government. Many maps were published on the new layout as devised by the Committee of 1905-06 with contours and with colours. These specifications more or less continued for over 80 years. But far more weighty events elsewhere in the world changed mandate of the Department.

The First World War

In August 1914 the Survey of India was in recess, completing records of the last field season and planning for the next, when the war broke out. Most of Department's military officers and some civilian reservist officers to military duty. This left the Survey of India very short-handed and survey programmes were slowed down drastically- The necessity for comprehensive survey and mapping work in any major war and during the reconstruction period afterwards had not been recognised. As a consequence, suitable experienced personnel for military surveys could not be found easily-The need became intense when war reached Mesopotamia a virtually unmapped country strong survey service was formed which functioned in Mesopotamia, Persia and Macedonia, surveying altogether nearly 180,000 sq. miles. This work was scientifically executed and based on triangulation. Rapid reconnaissance of about 7000 sq. miles and route surveys of 2200 linear miles were also undertaken in Khurdistan, the Upper Euphrates, the Syrian desert, Persia, and East Africa. Large-scale surveys of cantonments and principal cities were also carried out.

The Department can be justifiably proud of its achievements during the war. Its officers and staff completed many onerous tasks and won well-deserved laurels, at the cost of 57 lives.

It was during this period that the value of aerial photography was realised. It was used for large-scale surveys in Salonika and to deliver position maps base on the latest photographs. It was for the first time that the aerial photographs were used stereoscopically to draw and map contours.

1918 – 1939: The Depression

It was recognised that, even in small wars, strong militarised map-publication potential would be necessary with the fighting forces, and that make-shift arrangements are not the most effective way to lend survey support the military.
The deployment of aircraft and use of aerial photographs for mapping showed the necessity for research. After some experiments, the survey of the Irrawaddy delta was undertaken in 1922-23.

The Survey of India expanded, and fresh recruitments were made. Interesting to note that the Burma Survey party manned by Survey of India personnel continued to be under the technical control of the Surveyor (general of India till the end of the second world war.

Because of the world depression the Survey of India started paid for jobs' for irrigation surveys settlement surveys etc. required by the provinces.

It was clear that there was no chance whatever of completing the modern programmes of India, though 35 years had elapsed. By the end of 1938, rumours of war stirred up mobilisation plans, training etc., in close collaboration with the artillery.

The Second World War

At the outset, the impact of the war was not seriously felt in India. The immediate results, however, were the curtailment of civil programmes, comprehensive and intense military training, improvement of war establishments and equipment tables, and mobilisation schemes coupled with expediting the five new rotary offset machines on order.

Because of increased commitments on the Survey of India the Geographical Section General Staff headed by a Director of the Survey of India was raised in 1942. From there on the Survey of India's responsibility to the Army was through GSGS.

Another milestone was the establishment of a new map factory at Hathibarkala Dehra Dun designed to accommodate 8 to 10 printing machines. Map production was increased more than 25 times and the Survey of India's strength rose from 1,400 to 2,260. In 1943 the Geodetic Branch was spilt by the formation of a War Survey Research Institute. During the war years the main problem of the Survey of India was quantity versus time. During this period, it churned out over 65 million maps.

Towards the end of and after the second world war, the rehabilitation schemes for 2 million men of the Indian Army together with demands for surveys for 'Grow More Food' projects engaged the Survey of India's potential. The post-war sanctioned strength of the Department was seven circles and 24 parties as against four circles and 12 parties in 1939.
The two world wars and a great depression in between were trying and difficult years for the Survey of India-but it emerged tempered and experienced.

1947 – 1965: INDEPENDENCE AND NEW CHALLENGES

After Independence, there was an upsurge of development all over the country which has continued till today. With planning lor economic development, hundreds of schemes required survey data for scientific planning execution. The Survey of India had to divert most of its potential for developmental projects the normal topographical surveys being relegated to a secondary place.

Projects competed for survey potential and a Survey Priorities Committee had to be established in 1961 to prioritise the meagre potential of the Survey of India. Added to this was the fact that only about 60% of the country was covered with rigorous surveys on the one-inch scale - the difficult areas of the high Himalayas, the north-east region and the deserts remained to be covered by accurate surveys. Based on the recommendations of the various committees to assess the total requirement of the surveys for developmental projects utilization of natural resources, the Department was considerably expanded during the period 1961-66.

Threat on India's Northern Borders

During 1962 and thereafter because of the threat on the northern borders new directorate was entrusted with the task of completing the mapping of the high hill areas within the next 3-5 years. The task was immense, formidable, and intricate and it lacked communication. Every detachment was an expedition, and many precious lives were lost.

The task of surveying the Himalaya could not have been completed successfully and Within a reasonable timeframe, had the Department not kept pace with modern developments-especially photogrammetry.

1967 – 1990: IN PURSUIT OF EXCELLENCE

Geodesy

Satellite geodesy was introduced in 1982 and many vectors have since been observed to strengthen the Indian geodetic network. Outlying islands have also been connected to the mainland. The first phase of the primary and secondary triangulation network at a spacing of 4º (250 miles) apart was completed in 1956. About 30% of the work of densification of the control network from the 4º to a 2º spacing, has been completed.

The second level net, consisting of 99 lines about 16,500 miles was completed by 1977 and Bombay port formed the basis of second adjustment. This revealed that the east coast MSL at Madras is higher by 1 foot than the west coast MSL at Mangalore on the same latitude. The maximum permissible error between these two stations 425 miles apart could only be 0.26 foot. The local MSL at Bombay is the lowest.

The levelling lines spacing of 125 miles is planned to be reduced to 60 miles apart and about 64% of the work has been accomplished. Similarly, the gravity network is also being densified.

Sea level Rise

The observations at a few tidal stations on the east and west coasts indicate a general rise in the sea level of the order of 7.8 to 9.0 cm per century. The highest, 4.06 mm / yr. (SE+1,8nim) at Kandla and Madras between 1954 and 1978 showed a negative trend of 1.18 mm/yr. (SE+0.93 mm/yr.). The average trend of the sea level rise of 1.0 mm/yr., agrees with the world findings.

Antarctica

Survey of India joins the tenth expedition to Antarctica this year and will carry out various scientific experiments and observations.

Seismoteclonics

Recent geodetic strain patterns studied in the north-eastern region have revealed an anticlockwise rotation of 0.6 micro radian/yr. and clockwise of 0.2. A displacement of more than 2 metres magnitude has been observed at one of the stations. The results are somewhat in agreement with the seismic data. A little east of this area 8 BMs have revealed a vertical movement at the rate of 2.0 to 5,0 mm per year. The absolute change between 2 epochs observed at one of the BM is of the order of 44 cm.

Training

With the assistance of UNDP, a Survey Training Institute and a pilot production Plant were established at Hyderabad on modern lines during 1967. During 1990, apart from establishing a one-year advanced course in integrated digital map production systems and geographic information systems the course syllabi and structure for all Survey Training Institute's courses are being reviewed and revised to meet the challenges of the new digital environment.

Indian Photo Interpretation Institute

A need was felt for advanced training facilities in the techniques of aerial photo interpretation in applied geology- mineral exploration, soil, soil conservation land use forests and other disciplines. The offer made by the government of the Netherlands in I964 was realised in May 1966 with the Indian Photo Interpretation Institute at Dehra Dun for training interpretation specialists in the fields of geology forestry and soils. However, in 1976 the institute was transferred from the Survey of India to the National Remote Sensing Agency.

Topographic Mapping

With the completion of 1:50,000 surveys covering the whole country, the Department now strives towards the completion of 1:25 000 surveys. However, about 40% of its resources continue to be deployed on developmental surveys.

Digital Cartography

Digital Cartography came to the Survey of India in 1982 with the establishment of the Automated Cartographic Cell under the R&D Directorate.

The Modern Cartographic Centre and the Digital Mapping Centre have been commissioned tested and accepted. The main focus is on the generation of standard operating procedures, and they are expected to be fully operational within the next few months. The Survey of India plans to decentralise capture and verification, through PC and workstation based small systems spread all over the country during the 8th five-year plan. This will help Survey of India to achieve its ambition to digitise its entire 1:250.000 cartographic data in the next 4 to 5 Years together with substantial data of the 1:50,000 scale.

A very large project of India's Ministry of Water Resources for the survey of flood plain zones is also being planned on modern systems.

Popularisation Programmes

To make the people more map conscious and more aware of the Indian states and the country, the publication of four series of maps of high quality, has been launched. These are: the Tourist Map Series, covering all the major cities of the country; the Trekking Map Series; the State Map Series, each map covering one or more States; and the 'Discover India Series' under which themes of interest would be published like Motoring Map, Hill Ranges and Rivers, National Parks, and Sanctuaries.

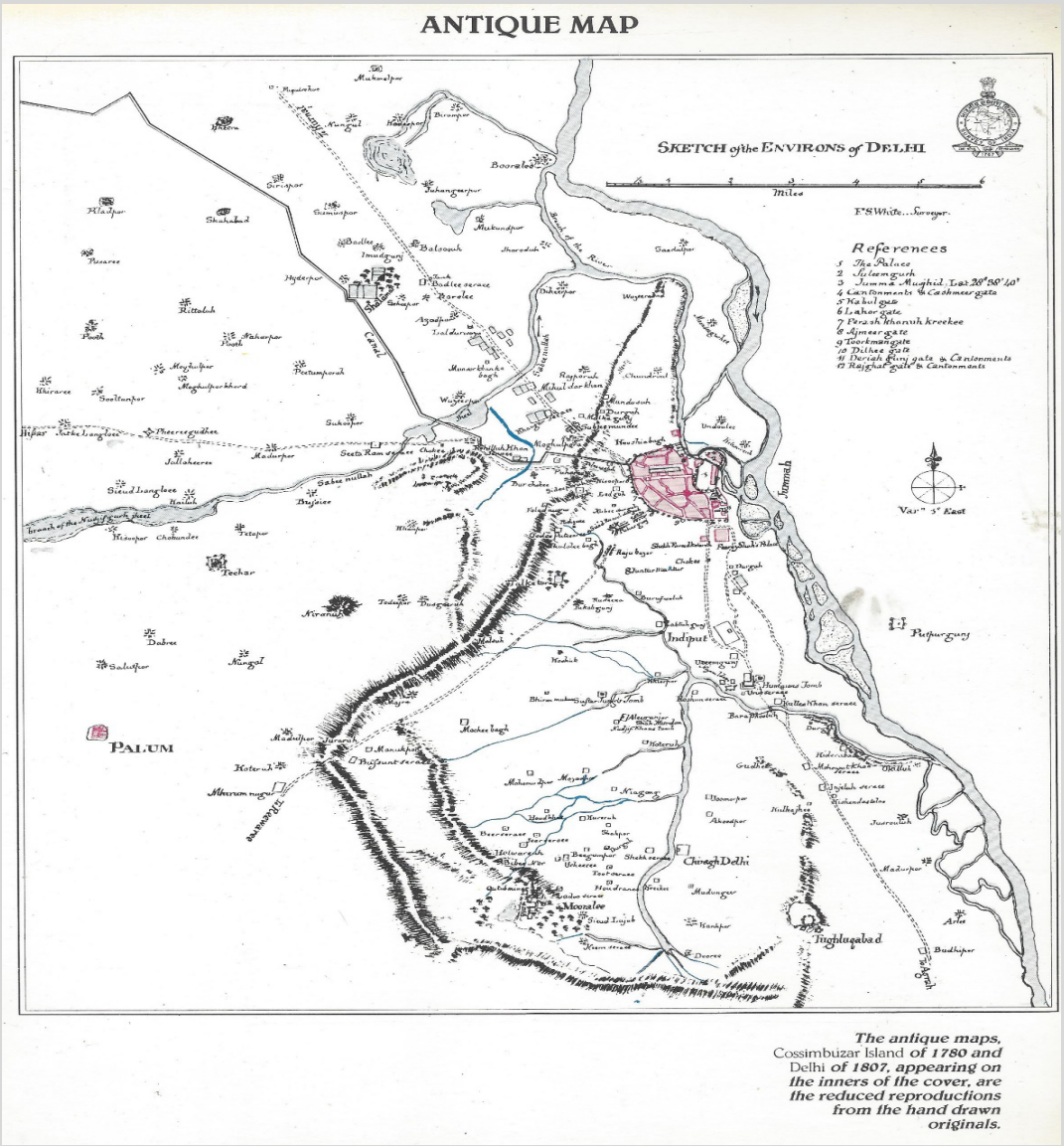
Quite a few maps in these series have published and others are in the pipeline. With a strong distribution system this will give a great boost to map use and awareness in India.

The future

The Department, built on solid foundations, strong traditions and deep roots keeps striving to keep India among the best surveyed countries in the world, adopting the latest technologies to meet new challenges-always living up to its motto:

'A SETU HIMACHALAM'

LT GEN S M CHADHA
SURVEYOR-GENERAL OF INDIA
DEHRADUN



MAJOR JAMES RENNELL

COLONEL COLIN MACKENZIE

COL SIR GEORGE EVEREST

SURVEYORS GENERAL OF BENGAL

1767-1777 MAJ JAMES RENNELL
1777-1786 LT COL THOMAS CALL
1786-1788 CAPT MARK WOOD
1788-1794 CAPT ALEXANDER KYD
1794-1808 LT ROBERT HYDE COLEBROOKE
1808-1813 MAI GEN JOHN GARSTIN
1813-1815 COL CHARLES CRAWFORD

SURVEYORS GENERAL OF BOMBAY

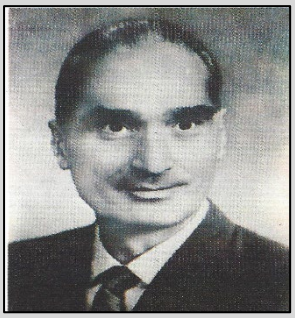
1796-1807 LT GEN CHARLES REYNOLDS
1807 1817 CAPT MONIER WILLIAMS

SURVEYOR GENERAL OF MADRAS

1810-1815 COL COLIN MACKENZIE

SURVEYORS GENERAL OF INDIA

1815-1821 COL COLIN MACKENZIE
1821-1823 MAJ GEN]OHN ANTHONY HODGSON
1823-1826 COL VALENTINE BLACKER
1826-1829 MAI GEN]OHN ANTHONY HODGSON
1829-1830 MAJ HENRY WALPOLE
1830-1843 COL SIR GEORGE EVEREST
1843-1861 MAJ GEN SIR ANDREW SCOTT WAUGH
1861-1877 GEN SIR HENRY LANDOR THUILLIEP
1878-1884 GEN 1AMES THOMAS WALKER
1884-1887 COL GEORGE CHARLES DEPREE
1887-1895 COL SIR HENRY RAVENSHAW THUILLIER
1895-1899 MAJ GEN CHARLES STRAHAN
1899-1904 COL ST. GEORGE CORBET GORE
1904-1911 COL FRANCIS BACON LONGE
1911-1919 COL SIR SIDNEY GERALD BURRARD
1919-1924 COL CHARLES HENRY DUDLEY RYDER
1924-1928 EDWARD ALDBOROUGH TANDY
1928-1933 BRIG ROBERT HENRY THOM



Gambhir Singh the first Indian Surveyor General

Surinder Mohan Chadha The present Surveyor General

1928-1933 BRIG ROBERT HENRY THOMAS
1933-1937 BRIG SIR HAROLD IOHN COUCHMAN
1937-1941 BRIG SIR CLINTON GRESHAM LEWIS
1941-1946 BRIG SIR EDWARD OLIVER WHEELER
1946-1951 BRIG GEORGE FREDERICK HEANEY
1951-1956 BRIG IAN HENRY RICHARD WILSON
1956-1961 BRIG GAMBHIR SINGH
1961 COL RAIINDER SINGH KALHA
1961-1962 EUSTACE RANDOLF WILSON
1962-1966 BRIG GAMBHIR SINGH
1966-1969 BRIG JITINDAR SINGH PAINTAL
1969-1971 BRIG JAMSHED ARDESHIR FARDUNJI DALAL
1971-1972 BRIG IITINDAP SINGH PAINTAL
1972-1976 DR HARI NARAIN
1976-1981 LT GEN KISHORI LAL KHOSLA
1981-1988 LT GEN GIRISH CHANDRA AGARWAL
1968-1989 MAI GEN DAYAL MOHAN GUPTA
1989- LT GEN SURINDER MOHAN CHADHA

(Researched, transcribed, and compiled by Noel Grimmett October 2022)

****

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WO1 (SMI) Ollie Teasdale RE

DGC Representative
Colin Wright

AKABA
Photographic Survey by HMS RAVEN II
August 1916
Photographs Taken from Average Height of 2,500 FT
Focal Length – Lens 8 inches (RNAS SERVICE CAMERA)
EAST INDIES & EGYPT STATION
SEAPLANE SQUADRON.

HMS Raven II was a seaplane carrier of the Royal Navy used during the First World War. Converted from the captured German freighter *Rabenfels*, the ship's aircraft conducted aerial reconnaissance, observation and bombing missions in the Eastern Mediterranean and Red Sea during 1915–17 even though the ship was not commissioned into the Royal Navy until mid-1915. She fruitlessly searched the Indian Ocean for the German commerce raider Wolf in mid-1917. *Raven II* was decommissioned in late 1917 and became a Merchant Navy collier for the last year of the war. She was sold off in 1923 and had a succession of owners and names until she was sunk during the Second World War while under Japanese

Description

Raven II was 394 feet 5 inches (120.22 m) long, had a beam of 51 feet 6 inches (15.7 m), and a draught of 27 feet 6 inches (8.38 m). She was rated at 4,706 GRT. The ship had one propeller shaft powered by one quadruple-expansion steam engine that used steam generated by an unknown number of coal-fired boilers. Raven II had a maximum speed of 10 knots (19 km/h; 12 mph).

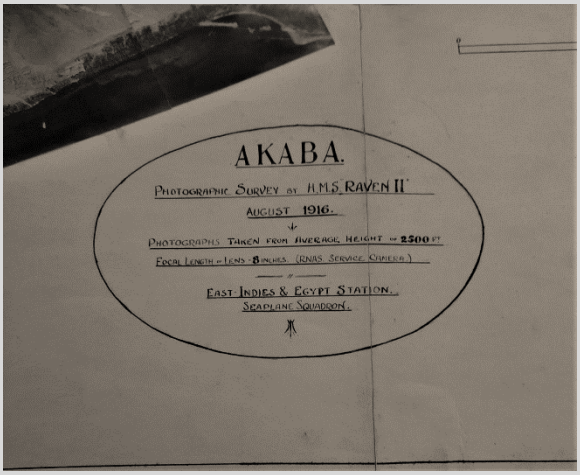
Career

The German freighter SS Rabenfels was built by Swan Hunter & Wigham Richardson and completed in December 1903. On the outbreak of war in August 1914, the British authorities seized her whilst in Port Said, Egypt and was requisitioned for service under the Red Ensign in January 1915 to operate seaplanes. No special modifications were made to the ship; the aircraft were stowed on the aft hatch covers and handled with her cargo booms. Aenne Rickmers operated two French Nieuport VI.H floatplanes that had been off-loaded by the French seaplane carrier *Foudre*; they were flown by French pilots with British observers. Later, the ship operated included British Short Type 184, Sopwith Schneider, Sopwith Baby and Short Admiralty Type 827 floatplanes.

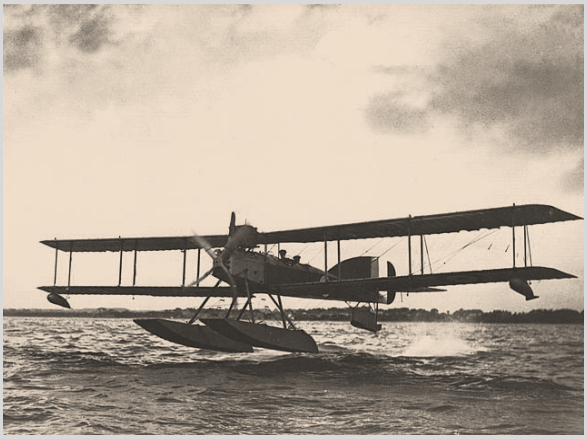
For the first two months of 1915, the ship and her aircraft supported Allied operations in Syria, Palestine, and the Sinai Peninsula. Aside from reconnaissance duties, they delivered and recovered Allied spies as well as observed for ships performing coastal bombardments. Around 20 March, *Rabenfels* arrived in Mudros to load the aircraft and crew of the damaged *Aenne Rickmers* (later HMS *Anne*). The ship was commissioned into the Royal Navy on 12 June 1915 and renamed HMS *Raven II*. On 17 August, both *Anne* and *Raven II* spotted for the French armoured cruiser *Jeanne d'Arc* as she bombarded Tarsus. In January 1916, she was assigned to the East Indies and Egypt Seaplane Squadron together with the carriers *Empress, Ben-my-Chree,* and *Anne*. The squadron was under the command of the General Officer Commanding, Egypt and its primary duty was to watch Turkish positions and movements in southern Palestine and the Sinai in early 1916.

At the end of March, *Raven II* was sent to the Red Sea to attack Turkish troops threatening Aden; she carried one two-seat Short floatplane and five Sopwith Schneiders for this operation. After a preliminary reconnaissance mission, on 2–3 April her aircraft dropped ninety-one 20-pound (9.1 kg) bombs as well as leaflets urging the Arab auxiliaries to desert.

The ship returned to the Syrian coast for patrols and was transferred to Kastellorizo in early July to conduct aerial reconnaissance and bombing missions in that area. ***Raven II* was transferred to the Gulf of Aqaba later that month to take aerial photographs of the head of gulf as well as the east coast of the Red Sea**. Her aircraft observed for the monitor *M21* as she bombarded a Turkish encampment in the Sinai. One aircraft was forced to land, but it was taken in tow by the monitor and delivered back to *Raven II*.



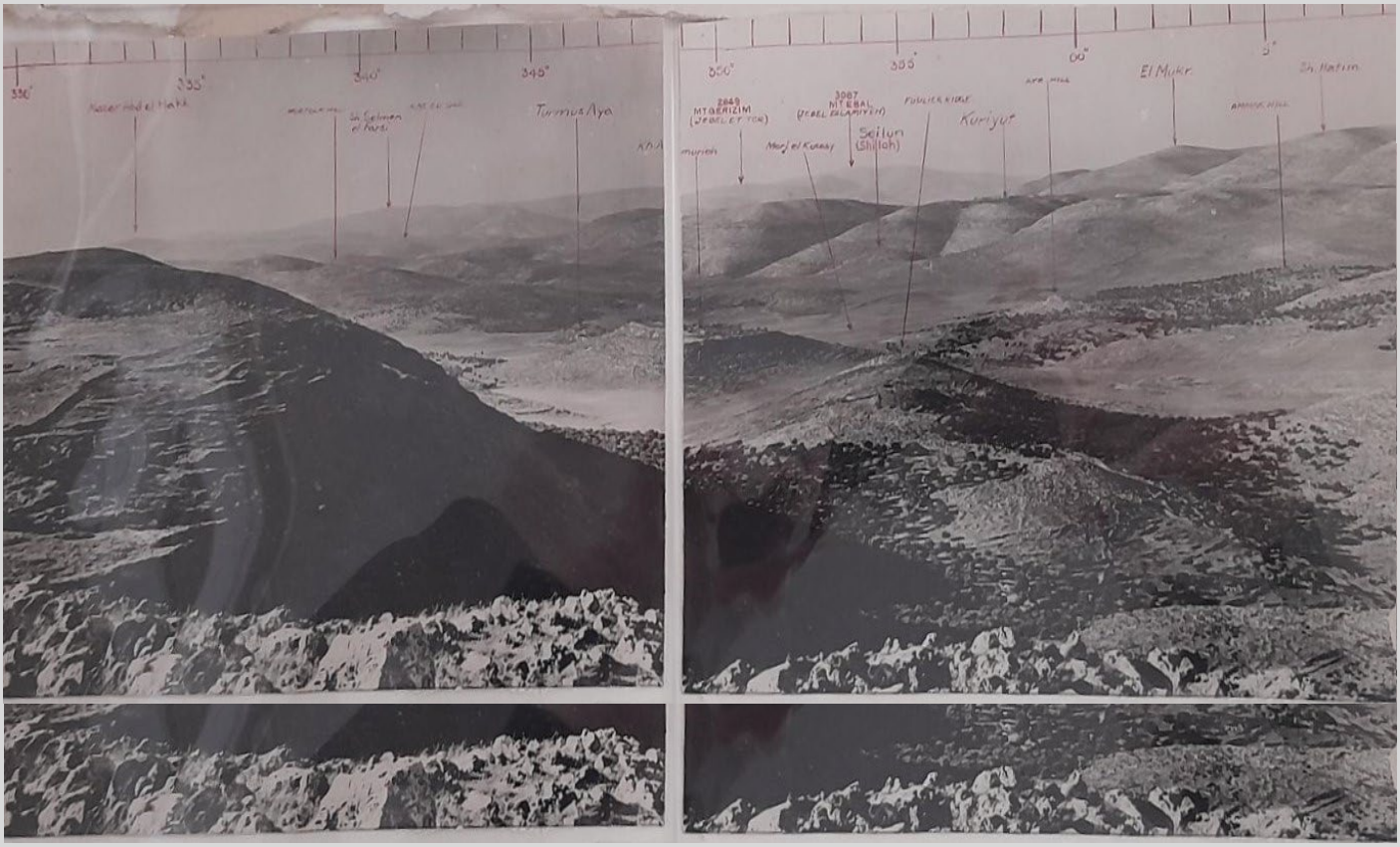
Sopwith Schneider Seaplane 1916



Short 184 floatplane

Monitor HMS M21

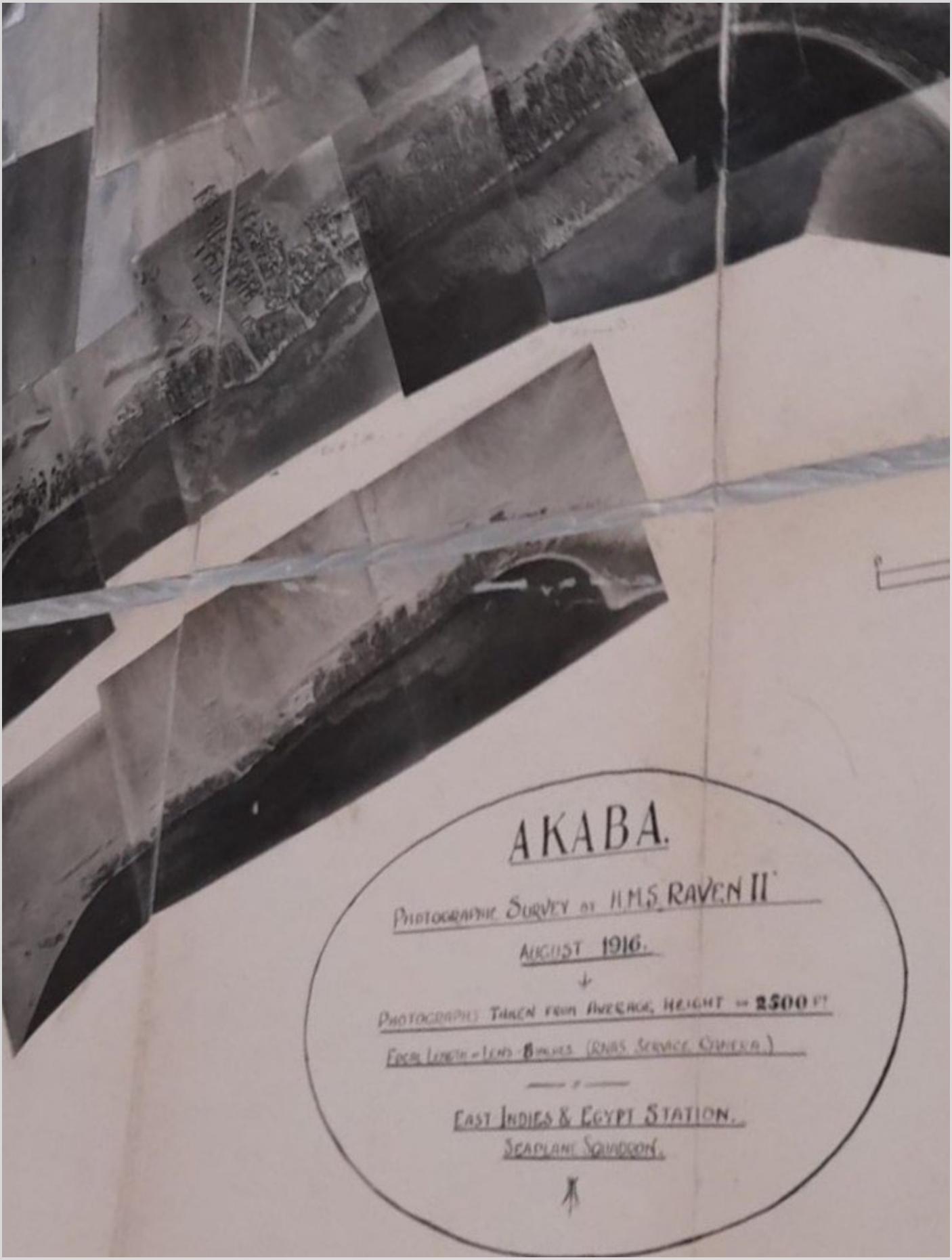
The East Indies and Egypt Squadron reassembled in late August with *Raven II*, *Anne* and *Ben-my-Chree* and the aircraft from the three carriers attacked the Turkish supply dump at El Afule for thirty minutes. The squadron then steamed south along the Palestinian coast where they encountered two Turkish supply dhows. The escorting French destroyer *Arbalète* sank one while the other was captured. The squadron flew off seven aircraft that attacked an encampment at Bureir and a nearby railroad viaduct. *Raven II* was then sent to the Adalia area on the Turkish coast where her aircraft bombed a factory at Fineka and searched for U-boat bases On 1 September, the ship was in Port Said preparing for another sortie into the Red Sea when she was hit by a bomb dropped by a German aircraft (probably the first successful air attack on an aviation vessel). Although *Raven II* was only lightly damaged, *Anne* was sent in her place. *Raven II* relieved *Anne* on 26 October in the Red Sea and her aircraft bombed Turkish forces advancing on Rabigh and Yenbo on 10 December. Shortly afterwards, the ship was transferred back to the Eastern Mediterranean where her aircraft attacked a bridge over the Ceyhan River with one 65-pound (29 kg) bomb and eight 16-pound (7.3 kg) bombs on 27 December

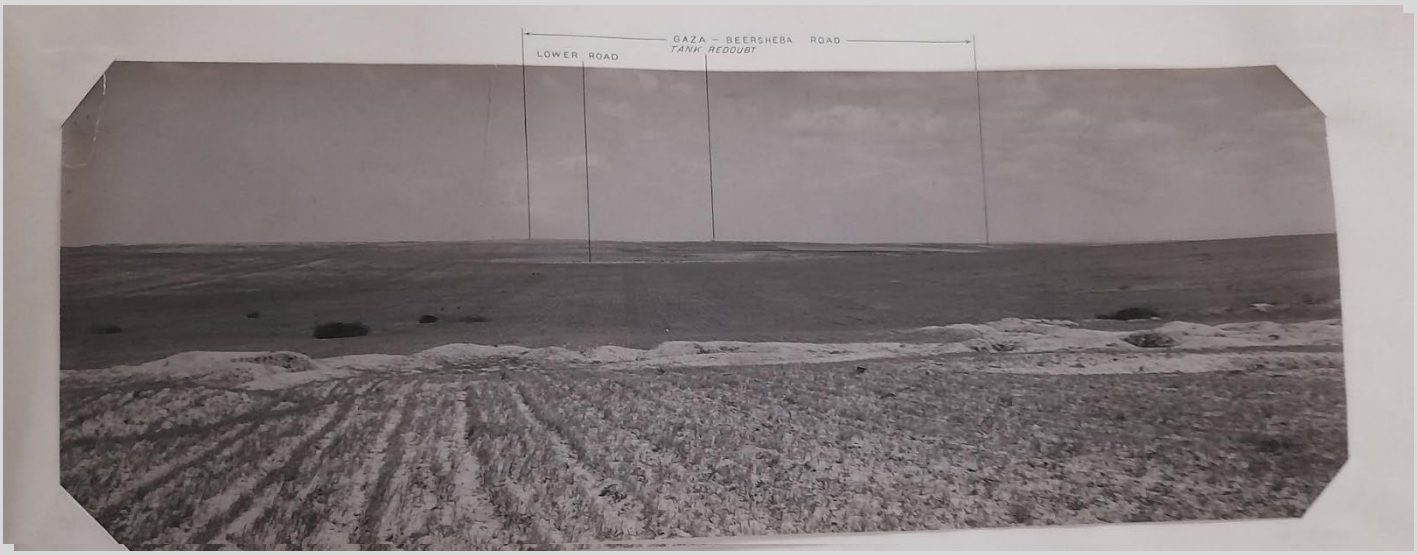


Kuriyut Palestine

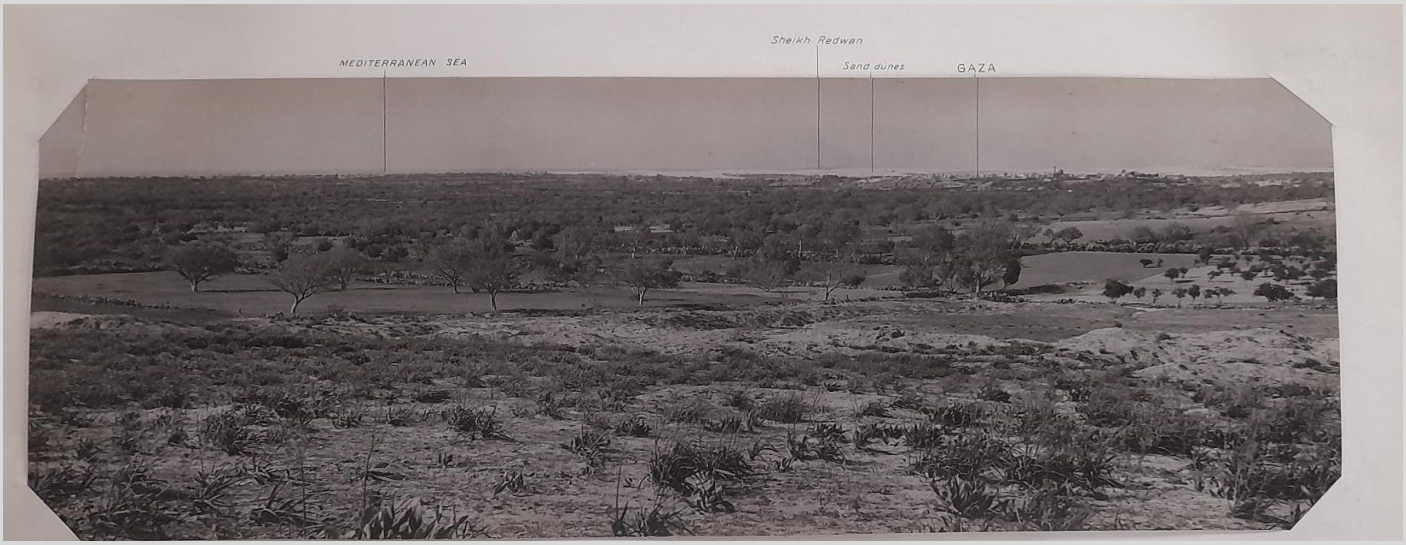
El Mughar Palestine

On 10 March 1917, *Raven II,* and the French armoured cruiser *Pothuau* sailed for the Indian Ocean to hunt for the German Q-ship *Wolf*. For this mission she carried a Short Baby and two Short 184s. The two ships searched the Laccadive Islands en route to Colombo, Ceylon, which they reached on 2 April. They then searched the Chagos Archipelago and the Maldive Islands and returned to Colombo. Engine problems forced a Short 184 to make an emergency landing on 21 April in the Maldives; the crew re-joined the ship on 6 May after a series of adventures that inspired Rudyard Kipling's story "A Flight of Fact". *Raven II* recovered the floatplane and its aircraft continued to fly search missions from Colombo until 21 May. She then joined a convoy bound for Egypt and arrived back in Port Said on 10 June. In early November, the ship's aircraft observed fire for a variety of ships during the Third Battle of Gaza.


AKABA.
PHOTOGRAPHIC SURVEY BY H.M.S. RAVEN II
AUGUST 1916.
PHOTOGRAPHS TAKEN FROM AVERAGE HEIGHT OF 2500 FT
FROM LUMIERE LAND CAMERAS (RNAS SERVICE CAMERA)
EAST INDIES & EGYPT STATION.
SEAPLANE SQUADRON.



Tank Redoubt from Sheikh Addas
(Area of advance of 54th Division & Imperial Camel Brigade in Second battle of GAZA)



Looking north from Lee's Hill over GAZA and Lambeth Wood

GAZA from Ali el Muntar – Mediterranean Sea in the distance

Commercial service

HMS *Raven II* was paid off shortly afterwards and, renamed Ravenrock, served as a collier under the Red Ensign from January 1918 until the end of the war under the management of Grahams & Co. She was sold to British Dominion Steamship Co. in 1923 and resold later that year to Karafuto Kisen Kabushiki Kaisha (KKK), which renamed her *Heiyei Maru No. 7*. In 1935, the ship was sold to Inuri KKK, and she was renamed *Heiei Maru No. 7* in 1938. The ship was sunk during the Second World War, although the circumstances are unknown.

Sources:
TNA File WO 319/1
Wikipedia

(Researched, transcribed, and compiled by Noel Grimmett – November 2022)

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Notices

We have had posted copies of the last Newsletter returned from the following addresses:

Mrs. JAC Read (widow of John Read) Windsor End, Beaconsfield
Mr. H R Wallace (Harvey) of Cowes, Isle of Wight

If any Member knows of a forwarding address, or other contact details we would be grateful for the information. Please notify the Hon Sec on 01635 292407 or "REA-MilSvy-Sec@outlook.com"

(********

Notification of Deaths

John Knight

From Ian Parr – *It is with great sadness that I have learned of the passing of John Knight following a heart attack. John was living in the Philippines with his wife Evelyn. The family have given permission to share this information to military groups. John was a field surveyor by trade, a great guy, and a massive rugby fanatic.*
Rest in Peace John

Andy Turley

ERBIL (Kurdistan 24) – The Erbil Police Directorate announced on Friday that a British citizen died in a traffic accident on Wednesday night at 1:30 am. The accident happened on a 100-meter street, where a Syrian delivery motorcyclist hit Andrew Turley, 59, while trying to cross the road, the Erbil Police Directorate said in a statement. Turley was accompanied by his friend David, who told the Erbil Police that Turley had been drinking on the night of the accident. The motorcyclist has been detained by police under Article 23 of traffic law, the police said. Some social media pages on Thursday claimed the British citizen was killed, although he died in a traffic incident

Graham Caisley

From Simon Carroll:
I have been informed by his family that Graham Caisley had a heart attack in the Philippines & passed away!
RIP Graham

Military Survey (Geographic) Branch
Royal Engineers Association

Mark Kieras - Functions Member
5 School Road, Compton, NEWBURY, Berkshire, RG20 6QU
Phone No: 07974355646 Email: rea-milsvy-functions@outlook.com

MILITARY SURVEY (GEO) BRANCH REA REUNION - RETURN

Saturday 1st April 2023 (12:30hrs till late)

PRECEDED BY AN ANNUAL GENERAL MEETING to be held at 11:00hrs

Timings.	10:30hrs	Tea/Coffee served
	11:00hrs	AGM starts
	12:30hrs	Reunion starts / Bar opens (late close)
	13:00hrs	Lunch (Curry)

Accommodation. Due to the increased manning at Hermitage Station, unfortunately no rooms are available. Hotel facilities are available at junction 13 of the M4 motorway and in Chieveley.

Dress. Smart casual or better if you wish!

Security. Hermitage has become a high security Barracks. ENTRY WILL ONLY BE PERMITTED to those who have returned this entry form with their details. IDENTITY CHECKS WILL BE REQUIRED TO GAIN ACCESS TO THE CAMP.

It is vital to establish firm attendance figures early and so once again we would request that you return this form as soon as you can to Mark Kieras (or email the details requested in the form to rea-milsvy-functions@outlook.com)

If you have any special dietary needs or require disabled access, please detail these below and every attempt will be made to accommodate them. Please note - Military units do not cater for severely disabled conditions (for obvious reasons) and we apologies in advance for any shortcomings that might cause individual inconvenience.

RETURNS MUST BE RECEIVED BY 20th March 2023

From: Forename: …… Surname: ……

I am a member – YES//NO

Dietary / Special requirements: ……

Address: - ……

……

Tel No: - ……

E-mail: - ……

Type & Make of transport:- ……Registration No: - ……

I *shall/*shall not be attending the Reunion on Saturday 1st April 2023.
I *wish to/*will be unable to: - attend the AGM beforehand (10:30hrs for 11:00hrs).
Guests: Wives/partners are welcome. (first guest free for members)

1 …… 2…… 3 ……

DO PLEASE REMEMBER THE GEO SOLDIERS SUPPORT FUND

I enclose a cheque for £..... payable to "Military Survey Branch REA"