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The Society’s recent expedition to Northern Ireland (see page 2) included a visit to Lanyon Plaza, Belfast, the stunning headquarters of Land & Property Services, publishers of OSNI maps. Director of Mapping Services & Chief Survey Officer John Deyermond and his staff were most welcoming and hospitable, showing the group around and explaining the functions and activities of the organisation. The photograph (left) shows CCS chairman Gerry Zierler presenting John Deyermond with Honorary membership of the Society. The photographs below show the visitors and the building.

The 2016 visits and meetings programme is still being finalised, but is expected to include the events listed below, amongst others. To register an interest in attending any of these, please contact Bernard Anderson at the address shown opposite. We would also very much encourage members to organise a meeting or outing in their local area. If you wish to do so, please let Bernard know. Events are publicised by email messages (see page 18) as well as in Sheetlines.

**Proposed visits for 2016 include:** 27 Feb: explore Hounslow Heath base line. Other dates likely to be announced include: Imray, St Ives (Cambs); PLA; Maritime Museum, Greenwich; The Coal Authority, Mansfield.
An Ulster pilgrimage

The urge to walk in the steps of one’s heroes is ever a powerful one. CCS members on the recent Society visit to Northern Ireland had the chance to do just that – follow in the footsteps of Thomas Colby as he first surveyed Ireland in the 1820s. But the group also saw the latest developments in surveying technology, exciting architecture, inspirational artwork, historic maps and wonderful scenery – all in glorious sunshine.

The visit began at Land & Property Services’ two Belfast city-centre offices where the group inspected state-of-the-art GPS receivers and rugged laptops which enable surveyors on the ground to pinpoint new buildings and update the records immediately. However, much of today’s surveying is from above, rather than on, the ground and the process of planning and controlling flights and processing the resulting photographs was explained. Irish weather is notoriously fickle and the aerial survey requires clear skies; a challenge met by a contract which requires the plane to be airborne at nearby City airport within an hour.

The mapping database is updated nightly and is available publicly in an innovative website Spatial NI,1 created under the auspices of EU Inspire directive. An intuitive interface lets users view OSNI mapping and create bespoke maps.

If LPS office at Lanyon Plaza is a spectacular building (see previous page), so too is PRONI,2 situated in the Titanic Quarter, previously industrial dockland. Here the group, after being delighted by the artwork displayed in the atrium, was treated to a specially-assembled exhibition of historic maps, plans and documents from the collection, courtesy of Dr Glynn Kelso.

After a day in the city, the party travelled into the countryside. CCS member Keith Lilley3 organised an expedition to celebrate Colby’s achievements. First stop was the summit of Divis, overlooking the city, where a marker commemorates the 1825 primary triangulation point which first linked Ireland to the British mainland. Then north to Limavady to view the three remaining of the four base stations which comprised the Lough Foyle baseline4 constructed in 1827/8. A memorial stands in the grounds of the Drummond Hotel, Ballykelly, near to the southernmost station.

The outward journey had been over the wild Sperrin mountains; for the return to the city the party travelled the scenic north Antrim coast road via Giant’s Causeway and Dunluce Castle.

Members spent Sunday pursuing their own interests in the many attractions in and around Belfast and the surrounding countryside – and many vowed to return soon to see more.

1 https://www.spatialni.gov.uk/
2 http://www.proni.gov.uk/
3 Keith’s day job is Professor of Historical Geography at Queen’s University Belfast and one of his current mapping projects is on World War One, at: http://www.livinglegacies1914-18.ac.uk/LearningZone/MappingtheWesternFront/
4 For more about the baseline see http://www.charlesclosesociety.org/files/OS_Limavady.pdf
top: Historic stereo-plotter at LPS and its modern equivalent
below: PRONI, some of the artwork in the atrium and the legend from 1754 estate map

left: Gerry Zierler and Keith Liley inspect the plaque on Divis summit above; the party at the south base station of the Lough Foyle baseline at Ballykelly

far left: the Minearny base station
left: the memorial plaque in the garden of Drummond Hotel Ballykelly
Prize quiz

Water every...where? attracted an enthusiastic response. Answers are: Ladybower Reservoir, Loch Katrine, Llyn Trawsfynydd, Loch Earn, Lake of Menteith, Llyn Llydaw, Rutland Water, Pitsford Water, Wast Water. The first ten solvers were Jim Chisholm, David I Walker, David Purchase, Stuart Dennison, John Winterbottom, Andrew Turner, Rodney Leary, Donald Clayton, John Savage and Aidan de la Mare. Congratulations to these and all who solved it.

But that was rather easy as we left in many identifying clues. This time, most – but not all – have been removed. Can you name these nine alphabetically arranged English, Scottish or Welsh towns. The best answer opened on 31 January wins the handsome book Map: Exploring the world (see review on page 45). Answers accepted by email or by post to the editor at the Woodford Green address.
The troubled progress of the Scottish triangulation 1823-1858

David L Walker

An earlier article described how the initial triangulation of Scotland was nearly completed between 1809 and 1822, but remained incomplete until 1841, and unpublished until 1858.¹ This was put to use for various secondary triangulations in Scotland, but partly overtaken by fresh approaches during the 1840s, which were sufficient to define the county origins for the topographical survey of Scotland. After several changes of leadership, the configuration of the revised ‘principal triangulation’ was finally completed and published in 1858. By reference to previously little-used sources, this article explores these vicissitudes, illustrates some of the characters involved, and summarises their efforts to transpose the observed triangulation into latitudes and longitudes on the spheroid of the earth.

The initial triangulation of Scotland put to use

The triangulation of England and Wales that was published for the Board of Ordnance in 1811 was drawn upon by surveyors for many years. It extended into Scotland sufficiently beyond the Firth of Forth as to record the latitudes and longitudes of the peaks of Lomond Top East and Largo Law.² This potential baseline was put to good use in 1815 by George Thomas RN for his chart of the Firth of Forth³ which covered the area framed in red in figure 1 below.⁴

Unprivileged in other respects, Thomas had been educated in trigonometry at Christ’s Hospital. After surviving a ship-wreck in the Pacific, on the way home he was pressed into service on a frigate, where he rashly borrowed a midshipman’s sextant. Brought for punishment before a captain who fortunately had also been

educated at Christ’s Hospital, this secured his career as a master in the Royal Navy specialising as a hydrographical surveyor. His chart shows considerable topographical detail, and its marginal grid shows latitudes and longitudes that for Lomond Top East and Largo Law match those published by the Ordnance. Equipped with a 7½-inch theodolite, Thomas observed, calculated and plotted the positions of high points south of the Forth even before these had been visited by the Ordnance surveyors.

In 1819 the Ordnance placed Capt John Hobbs RE in charge of the ill-fated topographical survey of Wigtownshire (and part of Ayrshire) that has been researched by Brian Harley and Richard Oliver. As the Scottish triangulation had been extended as far as Ayrshire in 1815, Hobbs was able to secure some defined survey points from the surveyor, James Gardner, but their superior, Thomas Colby, seemed to display a lack of confidence (not for the last time) when he wrote ‘as you have the observation books you will make out any others that may have been fixed’, which left Hobbs to plead ‘You are of course the best judge of the advantage I should derive from having the angles taken from all or any of these stations and I am persuaded you will let me have them.’ Sadly Hobbs and his survey both died in 1828.

The next application of the initial triangulation was more enduring. Over a period of years starting in 1825, George Thomas, who had conveyed Colby (and Gardner) to the Shetlands in 1817 and to France in 1818, was ordered to the Shetlands by Capt Edward Parry, Hydrographer to the Admiralty Board, to make the survey that Thomas completed in 1833. His charts demonstrate meticulous attention to detail, inland as well as coastal, and diagrams in his supporting documents demonstrate his grasp of spherical trigonometry.

From these it is evident that Thomas and his able assistant, William Lord, equipped with at least a baseline from the Ordnance, observed additional triangles from the northern tip of the Shetlands to south of the Pentland Firth (figure 2). By reference to the latitude of Balta, observed by the Ordnance, and its longitude, determined by Thomas’s chronometer, he calculated latitudes and longitudes that Parry shared with the Danish Hydrographer and took with Thomas’s chart of Unst on his voyage to the Arctic in 1828.

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5 LE Taverner, George Thomas, Master, Royal Navy, Mariners Mirror, vol 36, no 2 (1950), 119.
7 The Shetland Isles surveyed by George Thomas commanding HMS Investigator 1833, National Library of Scotland [maps.nls.uk/coasts].
8 G Thomas, Projection of triangles for the survey of the Shetlands, UK Hydrographic Office (UKHO), plan 530a Dr, 1827; G Thomas, Triangles for the survey of the Orkney and Shetland Islands, UKHO, MP 98, 107-116.
9 Adrian Webb, The Expansion of British Naval Hydrographic Administration, 1808-1829, University of Exeter, 2010, 134-135; Capt Parry to the Danish Hydrographer, 26 January 1828, UKHO, LB2, 95-97; UKHO survey ledgers, notes re E530 Dr and E530a Dr, 1827.
Left: Figure 2, Above: Figure 3, Below: Figure 4
Thomas had reported to Parry that the principal points in the Shetland Islands had been fixed by the Ordnance Surveyors.\textsuperscript{10} As this was many years before Colby’s observations in northern Scotland had been published, it is unclear how much information Thomas secured from the Ordnance – or how. As his ship wintered in Deptford, not far from the Ordnance Map Office in The Tower, the most likely answer is that he simply consulted his former companion James Gardner, who was engaged there on trigonometrical calculations.\textsuperscript{11}

Surprisingly, Thomas’s triangulation, recorded around 1830 (in UKHO MP98), included Ben Hope and other Sutherland peaks which Lt Hastings Murphy did not include in his 1834 diagram of the initial triangulation.\textsuperscript{12} However, Ben Hope and three other peaks in western Sutherland had appeared on Murphy’s tracing made in 1830 (figure 3), from Arrowsmith’s map of Scotland published in 1807, showing the relative positions of survey points which ‘may then be depended on’.\textsuperscript{13} It may be that these peaks were observed from a distance in Colby’s expeditions of 1819 and 1822, but expunged by him as unreliable sometime between 1830 and 1834, although they had by then been used for a map of Sutherland ‘on the basis of the trigonometrical survey’.\textsuperscript{14}

In another application of the initial triangulation, the Board of Ordnance, at the request of the Admiralty, had commissioned Capt Henderson RE, with a small party of sappers, to carry out secondary triangulations from the Mersey to the Solway between 1834 and 1836.\textsuperscript{15} In 1838 Henderson moved on to the Firth of Clyde, and by 1840 to Port Glasgow, to observe and calculate a series of triangulation diagrams, including those between the points shown in figure 4,\textsuperscript{16} that provided reference points for the construction of Admiralty charts of the Clyde. Relative to points of the initial triangulation observed between 1815 and 1818, Henderson’s diagrams show distances in feet between numerous secondary stations – but only a few latitudes and longitudes (in the Solway).

**Completion of the initial triangulation**

Thomas Colby, Superintendent of the Ordnance Survey, returned from the Irish survey to Scotland in 1838, at first supervising two younger officers, Robe and

\textsuperscript{10} A Report of the Several Surveys now going on afloat, UKHO MB 1, October 1826.
\textsuperscript{11} David L Walker, ‘James Gardner - surveyor, computer, publisher and engraver 1808-1840’, *Sheetlines* 101, 32.
\textsuperscript{12} *Sheetlines* 98,14-15 and The National Archives, MFQ 1/269/13.
\textsuperscript{13} Lt Hastings Murphy at Ordnance Map Office, Tower to Capt Beaufort RN dated 5 April 1830, UKHO LP1857 M, f558 and enclosure (copied by permission of UK Hydrographic Office).
\textsuperscript{14} Gregory Burnett and William Scott, Surveyors to His Grace the Duke of Sutherland, *Map of the County of Sutherland made on the basis of the Trigonometrical Survey of Scotland in the years 1831-32*, National Library of Scotland [maps.nls.uk/counties/index.html#sutherland].
\textsuperscript{15} David L Walker and Adrian Webb, ‘Some collaboration between the Ordnance Survey and the Hydrographic Office in the Nineteenth Century’, *Sheetlines* 102, 10-14.
Robinson, at Ben Hutig. Colby then returned to England and they went on to Cnoc-Ghublias and Dunnet Head, near to the north-western and north-eastern extremities of Scotland. Robinson returned in 1839 to Fashven near Cape Wrath, Ben Clibrig and Scaraben in Sutherland and Monach in Lewis, and in 1840 to Cleisham in Harris and Ben More in South Uist – all as shown in figure 5 below. Together with observations at Ben Auler and Creach Ben in the Central Highlands, this programme largely fulfilled Colby’s intentions as set out in 1834.

Stimulated by Col Colby’s mention of ‘the energy and zeal of the officers who remained encamped during the inclemency of the weather at the end of [1840]’, Lts Robinson, Hamley, Hornby and Craigie earned the compliments of the Master General of Ordnance and the Ordnance Board for their conduct ‘in carrying on their operations on Ben More in South Uist and Creach Ben in Morvern’.

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17 Account of the Observations and Calculations of the Principal Triangulation etc, Drawn up by Capt Alexander Ross Clarke under the direction of Lt Col H James etc, Ordnance Survey: London, 1858. Its list of stations at pp 71-166 is also the source for other references to trigonometrical observations, unattributed below.

Unusually, an illustration (figure 6, above) survives of the survey camp at Creach Ben that shows men from the Corps of Miners and Sappers building windbreaks, surveyors at work on the summit of Creach Ben, and the path from the camp to the summit. On the Canmore website this is complemented by a recent photograph of the same setting (figure 7, below).

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20 Copied by permission of Historic Environment Scotland, Canmore site ref NM85NE 2, Creagh Bhein.
Robinson’s zeal was also recognised in more practical ways: in 1840 his advice had secured the purchase of a hut in place of three double marquees, a new observatory tent, and adaptation of the axles of the theodolite wagon so as to bring the weight nearer to the ground on mountain roads. In 1841 the Board of Ordnance advised the Inspector General of Fortifications ‘that it had accepted Colby’s request on the advice of Lt Robinson in charge of the triangulation of Scotland on the advantages which arise from the substitution of portable huts in lieu of double canvas marquees for encamping the officers and men during trigonometrical operations’ – and so the purchase was authorised of seven more huts ranging in size from 12ft by 12ft to 9ft by 9ft at a cost of £170, ‘to be divided equally between the Scotch and English surveys’.  

In 1841 one of the survey officers, probably Lt Hornby, published first-hand reports from Merrick and Ben Lawers that include revealing comments on the local people. Writing from Merrick in July, the officer scoffed that ‘The thinly-spread natives in the country around can’t make us out at all. Some of them think we are preparing signal stations in the event of a French invasion; and others, that the sappers and miners are boring immense holes for the purpose of blowing old Merrick into the air.’ But from Ben Lawers in December his report was ruefully respectful: ‘The tenants of Breadalbane will feel a great loss from the departure of the party, as they were the means of circulating a great sum of money in employment for labourers to carry fuel and provisions to the top. The wages they earned [were] from 18s to 21s per week, and most of them say that 1841 has been the best harvest they ever made.’

*Calculations of latitude and longitude*

While adept in the field, Colby’s officers were less confident in transposing their observations from the apexes of an irregular polyhedron into latitudes and longitudes on the spheroid of the earth. So Colby sought help from the Astronomer-Royal, Professor George Airy, who on 13 July 1840 provided model trigonometrical calculations for ‘point to point’ determinations on the spheroid. This model was applied by the Ordnance to the angles observed and the distances calculated (apparently from the Belhelvie baseline) for a closed chain of stations extending between Kellie Law on the Firth of Forth and Cleisham in the Outer Hebrides, as shown in figure 5. By reference to the supposed latitude, longitude and meridional bearing at Kellie Law, the Ordnance calculated latitudes and longitudes that Capt Portlock shared with Airy on 11 March 1841. However, Colby on 10 March 1843 had to write to Airy to confess that the results kept by the Ordnance ‘got lost in the confusion caused by the fire’. Lt Yolland was blamed for this misfortune, although not previously given any credit for the calculations. Fortunately, Airy was able to provide a duplicate set within a few

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21 TNA, WO 55/961, f170 12 Feb 1840, f776 1 July 1840, f210 19 Feb 1840 and f326 10 March 1841.

22 Manchester Times & Gazette, 24 July 1841 and The Times, 1 January 1842 (from Nineteenth Century Newspapers on-line).
days. His files (which survive today) evidently were as well-organised as his mind.²³

It is not apparent that the latitudes and longitudes calculated in 1841 were ever put to use. Ben Cleugh and Cleisham, well separated and both adopted later as ‘initial points’ or county origins, provide useful examples. In both cases latitudes calculated in 1841 were about 3 seconds less and longitudes over 10 seconds less than those adopted for county origins²⁴ (and referred to below). More importantly, these calculations set an enduring precedent for the adoption by the Ordnance of Airy’s figure of the earth, ie the estimated polar and equatorial dimensions of the spheroid that he had first published in 1830.²⁵

**Fresh approaches I: trigonometrical observation delegated to NCOs**

Writing to his wife on 8 May 1840, Colby was pleased to report how he had ‘a very long conversation with Sir Hussey about the proposed survey of Scotland, and that the Inspector General [of Fortifications had] recommended the instruction of the young officers of the Corps, and non-commissioned officers on the survey. This [was] complimentary but what [would] Pasley say to it?’²⁶ Any reservations held by Charles Pasley, Head of the School of Military Engineering at Woolwich, proved unimportant as he was moving on to become Inspector-General of Railways. More importantly, the Master General, on the advice of the Brigade Major of the Royal Corps of Sappers and Miners, agreed to augment each of its survey companies by a sergeant, a corporal and a second corporal (offset by the loss of three privates).²⁷

The first NCO trained to observe with one of the 36-inch theodolites was James Steel, of whom it was written: ‘From the first he had a taste for the investigation of abstruse questions of science and philosophy, and his strong mind and perseverance, his power of application and fulness of resource, have made him acquainted with a fund of knowledge and information not commonly possessed by men in his sphere of life. As a mathematician he holds a fair reputation for proficiency and accuracy, but it is chiefly with the work of triangulation and astronomy he has most distinguished himself. His early service was passed on severe hill duty. Ben Auler and Creach Ben were his first mountain stations. There he experienced a round of the varied hardships and dangers peculiar to a trig camp. Possessing a buoyant temper and a hardy constitution he for many years bore with happy composure all the stern trials and changes to which the service exposed him, and carried on his duties with un-relaxed ardour

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²⁵ GB Airy, *Figure of the Earth*, Encyclopaedia Metropolitana, vol V, (reprinted)1848, 165-239.
²⁷ Master General to Lt Gen Mulcaster, TNA, WO 55/961, f396, 19 June 1840.
and success. At Creach Ben he learned the use of the instrument, and succeeded Lieutenant Hamley R.E. in its charge in 1841.’

Amongst the other NCOs who made impressive contributions was Corporal Winzer, who for example, in 1846 alone, spent six weeks observing at Mordington, four weeks at Lumsden, six weeks on Sayrs Law, fifteen weeks on Ben Nevis and eleven weeks on Kellie Law – and this was before allowing for travelling time with the 36-inch theodolite.

**Fresh approaches 2: trigonometrical stations added and revised**

The deployment of NCOs facilitated another strategic change, in England and Wales, as well as in Scotland, that is touched upon rather lightly in the ‘official history’ which says: ‘The primary triangulation did not satisfy geodetic requirements everywhere and most of the observations made before 1824 had to be repeated … The work of improving and strengthening the primary triangulation continued under Yolland during the 1840s and was eventually completed in 1852.’

It may not have been foreseen that observations from almost all of the primary stations would need to be repeated, mostly by non-commissioned officers instead of commissioned officers, to more rigorous standards than previously, and over longer periods at each station. But, if this was foreseen, it could hardly have been announced that NCOs were being called upon to ‘improve and strengthen’ their officers’ observations.

In the event, in Scotland, about twelve additional stations were occupied, including the peaks of Ben Nevis and Ben Macdhui, although not all of these were utilised for the principal triangulation. About fifteen stations were re-visited, and only the geographical ‘outliers’ were utilised without being re-visited.

**Fresh approaches 3: the Belhelvie baseline superseded**

Another strategic change was the substitution, for calculating the sides of Scottish triangles, of the base line measured at Belhelvie in Aberdeenshire in 1817 by that completed at Lough Foyle in Northern Ireland in 1828. The only reference in the ‘official history’ to this very significant change seems to place it in 1854 where it says: ‘[T]he Lough Foyle and Salisbury Plain bases were measured with the compensation bars, whereas steel chains were used between inadequately marked terminals for the others. The triangulation was therefore made to depend on the Lough Foyle and Salisbury Plain bases only.’

However, calculations of the latitudes and longitudes of the principal points in Scotland (on a similar basis to using Professor Airy’s ‘point to point’ model) are extant for 1851. These refer to a missing ‘Book 2’, and the page order of these references (illustrated in fig 8, below) suggests that Scottish triangles were by then calculated from the south-west rather than the north-east, that is from Lough Foyle rather than Belhelvie. Moreover, an unusual mention in some Scottish

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newspapers suggests that this change took place before October 1846: ‘Perhaps it is not generally known’ it was reported ‘that the base-line upon which the triangulation of the three queendoms and all their islands is reared was measured in Ireland … any distance from any point in Scotland to any other, with the bearing, can be determined to a nicety, without a line ever having been actually measured in Scotland. They are all divided from the original base-line in Ireland …,’ 31 Surprisingly, this dates the decision to abandon Colby’s own Belhelvie baseline before his retirement in April 1847.

**From triangulation to topographical survey**

After the false start in Wigtonshire (as mentioned above), the topographical survey of Scotland was resumed in 1843, and proceeded county by county, as described by Brian Adams. His paper explains how each county was plotted by reference to its own ‘county origin’, which in a few cases covered an adjoining county. It lists the latitude and longitude of these county origins, but he does not discuss the determination of these latitudes and longitudes from the trigonometrical survey of Scotland.32

Some of the ‘initial points’, as the county origins were at first known, coincide with the principal trigonometrical stations for which latitudes and longitudes were re-determined about 185133 (as described above). For each of another five county origins (at least), extant calculations demonstrate how latitude and longitude were determined on the ‘point to point’ basis using the previously triangulated distance and bearing from each of several principal stations of ‘known’ latitude and longitude. This is illustrated in figure 8, below, for the county origins of Ayrshire, Renfrewshire, Roxburgh, Selkirk and Stirling, for each of which the several slightly different determinations were simply averaged.

**Changes in leadership 1847-54**

Although recommended by Colby, Yolland was too junior to succeed him as Superintendent in 1847, and found himself reporting to the newcomer Col Lewis Alexander Hall, who had little relevant experience. Pre-occupied with a host of commitments, including the on-going publication of six inch maps, trigonometrical information for the Admiralty’s Hydrographer and maps for the General Board of Health, Yolland must have found it irksome to have to advise the man appointed to, as he thought, his job.

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31 Aberdeen Journal, anon., 14 October 1846 (from a report in the Glasgow Citizen), Nineteenth Century Newspapers on-line.


33 *Latitudes and Longitudes of Initial Points in Scotland etc*, TNA, OS 2/648, 239-246. Calculation books OS 2/647 and OS 2/648, apparently maintained by Lt D F McCarthy, include an exhaustive comparison of alternative formulae for transposing observed triangles into latitude and longitude. They also include tables that he constructed in 1847, using Airy’s figure of the earth, which continued to be used for converting seconds on the spheroid, at various inclinations to the meridian, into feet on the 6 inch (and other) sheets.
After the triangulation of Great Britain had supposedly been completed in 1841, the unheralded but intensive programme of new and repeated observations that took place in the 1840s left outsiders in the dark. Professor Airy wrote to Yolland on 11 May 1848 that ‘I find that I am not the only person who is disposed to grumble at the non-publication of so much of the Great Triangulation of Great Britain as applies to the Great Arc of Meridian’ \(^{34}\) and ‘I want you to inform me whether it is in contemplation shortly to publish the Triangulation’.

\(^{34}\) This point was not necessarily rhetorical: the Penny Cyclopaedia of the Society for the Diffusion of Useful Knowledge (vol 25 p 217)remarked in 1843: ‘Were it not indeed for the
Yolland replied on 13 May 1848 agreeing that ‘from the advanced state of the observations no time should be lost in setting about [its publication]’ and suggesting that ‘if a representation from you or emanating from the Councils of the Royal or Astronomical Society were made to the Lords of the Treasury or to the Master General of the Ordnance … such representation would probably be attended to without delay and produce an effect very different to what might be expected from any subordinate officer in my position, stepping out of the line of his official duties.’

The deteriorating relationship between Col Hall and Capt Yolland, who had been accustomed to corresponding direct with officers having common interests but higher rank, is illustrated by Yolland’s letter of 16 August 1852 in response to the recently promoted Rear Admiral Sir Francis Beaufort, apologising that Col Hall had ‘recently made some alterations in the mode of carrying on the duty here which will preclude me from complying with your requisitions on the instant.’

After he had posted Yolland to Ireland in November 1852, Hall’s lack of mathematical advice led him to write to the Astronomer-Royal that he would be much obliged if he would advise Capt Cameron, to which Airy responded with ‘Notes on the method proper to be used for reduction of the Grand Triangulation of the British survey.’

However Hall’s request was overtaken by the appointment of Col Henry James to succeed Col Hall, and the very fortunate, or well-planned, return from Canada of the mathematically-talented Capt Alexander Ross Clarke, who in 1854 embarked upon an ambitious re-evaluation of the trigonometrical observations of Great Britain and Ireland, selected from the potentially bewildering collection accrued by that time.

The principal triangulation completed

Unencumbered by other duties, Clarke in remarkably short time completed the work that enabled Col James to advise a Commons Select Committee, in April 1856, that the principal triangulation had been completed within the previous fortnight, and that a paper would be read at the Royal Society in the following week. This after the years of delay attracted a sardonic comment from one MP: ‘Do you say it has been completed within the last fortnight?’

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36 Capt Yolland to Rear-Admiral Beaufort, U K Hydrometric Office, LP 1857Y, 84.
38 British Parliamentary Papers, Report from the Select Committee appointed to consider the Ordnance Survey of Scotland; with the Proceedings, Minutes of Evidence, Appendix, and Index, 1856, XIV, 733-738.
The Royal Society paper,\textsuperscript{39} attributed to James but obviously written by Clarke, is as much concerned with geodesy, particularly the figure of the earth, as with the triangulation, and it was not until two years later that the Ordnance Survey published its full evaluation of the principal triangulation.\textsuperscript{40} Clarke's work was a mathematical and administrative triumph. To solve a multitude of simultaneous equations, he adapted the 'least squares of errors' procedures developed by Gauss and Bessel in the 1830s to estimate the most probable solution of the trigonometrical network to satisfy three conditions: angles of each triangle (less spherical excess) to equal 180°; sum of the angles observed at each station to equal 360°; and estimates of the length of each side of each triangle to be equal.

Although the Royal Society paper and the account of the principal triangulation established Clarke's reputation as a geodesist, and provided the basis for future work in other countries, they had surprisingly little enduring influence within the Ordnance Survey. Latitude and longitude continued to be calculated by reference to Airy's spheroid rather than Clarke's spheroid. Murphy's tables, calculated on Airy's spheroid, continued to be used for routine transposition between map co-ordinates and latitudes and longitudes. In 1860 Clarke wrote to Professor Airy, expressing his appreciation of the paper Airy had published in 1830, and suggesting that the time had come for a new edition – to incorporate his latest work, as Clarke presumably imagined. Airy had no difficulty in killing off this idea with kindness, responding that 'There is not the least prospect that I shall ever be able to undertake such a work. But I much wish that you would undertake it.' and referring to foreign work on the theory of homogeneous ellipsoids which meant that 'A treatise in English embracing all these [theories] is much to be desired.' Clarke then became concerned whether he would be involved in expense for printing plates &c, and both parties would have been relieved when the publishers proved unwilling to consider a new edition.\textsuperscript{41}


\textbf{Postscript}

Seventy-five years later, Airy's spheroid rather than Clarke's spheroid was adopted for the re-triangulation that started in 1935, and it continues in use today as the basis of the National Grid. Airy in 1830 had lucidly analysed all the international measurements of arcs of the earth (although Colby had not contributed any account of the British triangulation beyond 1811), but his actual calculations covered only four pages. Clarke's calculations cover 400 pages and he had the benefit of another forty years of British observations, as summarised above. However, Airy's work had been put to use when it was needed, and it is understandable that after 1858 the Ordnance Survey regarded the potential

\textsuperscript{39} On the Figure, Dimensions, and Mean Specific Gravity of the Earth etc, communicated by Lt Col James RE FRS &c Superintendent of the Ordnance Survey, Phil. Trans. R. Soc. Lond., 1856, vol 146, 607-626 [on its website].

\textsuperscript{40} Account of the Observations and Calculations of the Principal Triangulation etc, Drawn up by Capt Alexander Ross Clarke under the direction of Lt Col H James etc, Ordnance Survey: London, 1858.

\textsuperscript{41} Papers of George Airy, Camb. Univ. Library Manuscripts, RGO 6/420, item 31, ff 445-447.
confusion that could have stemmed from making a change (and the extra work involved) as an unnecessary cost simply to make an imperceptible improvement in the accuracy of its maps.\textsuperscript{42}

For their advice and support, the writer thanks Dr Adrian Webb, Archive Manager, and his colleagues at UKHO; Chris Fleet at the National Library of Scotland; Anne Taylor and the staff of Cambridge University Library, The National Archives and the British Library.

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**CCS on BBC**

Several familiar CCS faces were featured in a recent BBC4 TV programme in the *Timeshift* strand. Entitled *A Very British map: The Ordnance Survey Story*, it dealt with the history of the maps and the organisation in an interesting and engaging way, with much fascinating archive footage and marred only by the voiceover persistently pronouncing the non-existent ‘i’ in Ordnance.

The programme was first shown on 9 September, (series 15, programme 2) and will no doubt be repeated on BBC4 from time to time; well worth watching out for if you missed it.

**CCS on WIRED**

Yet more CCS faces appeared in a major article in the prestigious online journal WIRED.com in July. This told the story of the secret Soviet mapping of Britain and elsewhere during the Cold War, a topic *Sheetlines* has covered on several occasions since ‘Uncle Joe knew where you lived’ in 2005 (*Sheetlines* 72, 26 and 73/6).

The story can be read at [http://www.wired.com/2015/07/secret-cold-war-maps/](http://www.wired.com/2015/07/secret-cold-war-maps/)

**CCS communications**

The Society has been using email to notify members of topical items of interest or upcoming events. Our list of members’ email addresses is incomplete and, in some cases, out-of-date. If you have not been receiving CCS emails and would like to do so, please write to info@charlesclose-society.org. This is also the address to use if you wish to be removed from the Society mailing list.

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Mapping suitable for cycle-touring and the intimately related subject of national topographic cover at scales in the range 1:100,000-1:126,720 (‘half-inch’) has been discussed in Sheetlines and elsewhere on several occasions since 1998. Most of these comments were published before GPS in its various forms became widely used, but the issue of the mapping that is discussed here shows that electronic devices have not superseded paper maps. In short the qualities necessary for a completely successful map suitable for cycle-touring are:

1. A scale in the range 1:100,000 to 1:126,720: this affords a balance of breadth of cover and necessary detail in British and Irish conditions.
2. Contouring at an interval of 20 to 30 metres.
3. Depiction of the complete rural sealed-surface road network.
4. Indications of bridleways suitable as alternatives to ‘on-road’ cycling.
5. Indications of official cycle-routes and cycle paths.
6. Indication of landmarks, particularly churches, to aid navigation.
7. Complete national cover, rather than simply ‘tourist honeypot’ areas.
8. Inclusion of the National Grid in conveniently-sized squares on the map face.
9. Up-to-date in essential features.
10. The cartography should be clear and legible, enabling the maximum of information to be abstracted from the map.

It is to be noted that there is a difference between general-purpose mapping suitable for cycle-touring, such as the Ordnance Survey half-inch Second Series, abandoned in 1961 after only a few sheets had been prepared, and mapping designed exclusively for cycling. The first is of potentially much wider interest than is the second, which can only justify itself by complete fitness for purpose.

Of various maps, variously in sheet and atlas form, in the desired scale-range, published since around 1980, the nearest to approach the ideal are those by Mike

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2 For a ‘mapless’ journey of 1077 km across north-west Europe, navigating by smartphone, see Jon Lubikowski, ‘London to Copenhagen by bike’, Maplines 24 (2) (Summer 2015), 8-9.
Harrison, published by Croydecycle, which cover all the country to the west of a line from Bridgwater to Bridport (figure 1).³ Their one substantial fault is that the National Grid is only indicated in the margins; otherwise they are a template, in design and content, for national mapping at 1:100,000. The cartography is clear and information is conveyed in a ‘conversational’ manner: there is none of the over-emphasis, shouting, screaming, attention-seeking or outright hysteria from which not even the 1:50,000 Landranger and 1:25,000 Explorer series are wholly free.⁴

Thus a map series at 1:110,000 designed especially for cyclists, which at present covers most of England and Wales, ought to be a significant addition to national cartographic infrastructure, and asks to be judged by the ten qualities set out above.⁵ The maps are prepared and published by FourPoint Mapping, and include both Ordnance Survey and OpenStreetMap data. An extract is shown in figure 2. They are printed double-sided on glossy paper, at A1 size folded down to A6, with 1:110,000 mapping on one side, covering a basic area of about 87 by 69 kilometres, with bleed edges, and on the other the integral cover, some street maps, recommended day rides, and other information, and a few photographs. Roads are ‘white’, reversed-out against relief in shades of green and brown; settlements are grey, water is blue, and woodland is darkish green. All

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³ See www.croydecycle.co.uk for current publications and prices.
⁴ The faults here are of over-emphasis of some cycling, tourist and access information, and are considerably worse on the Landranger than on the Explorer.
⁵ This review is based on copies of Sustrans pocket-sized guide to the National Cycle Network 2 South Devon Cycle Map (ISBN 9-781900-623230; © 2014) and ibid 27 Lincolnshire and Wolds Cycle Map (ISBN 9-781900-623445; © 2014), purchased by the writer for £4.99 each.
watercourses are shown by double lines. There are four categories of cycling information, and fourteen point-symbols in the standard legend, mostly in square boxes. The density of place-names is closer to that of OS 1:250,000 or 1:253,440 mapping than that of OS 1:126,720 mapping, and several smaller places on map 2 that appear on finger-posts are not shown. The two sheets reviewed here cover south and east Devon and part of Lincolnshire.

![Map of South Devon Cycle Map](image)

**Figure 2. Extract from Sustrans pocket sized guide to the National Cycle Network 2 South Devon Cycle Map, © 2014: observe the placing and distribution of tourist symbols**

I will now assess how far the Sustrans mapping agrees with the ten desirable qualities set out above.

1. Bar-scales of miles and kilometres appear on the map face, graduated at five-mile and five-kilometre intervals respectively; the explicit statement of 1:110,000 appears relatively discreetly, on the ‘back cover’. This scale conforms neither to an international nor to a domestic standard; it appears to be an attempt to split the difference between 1:100,000 on the one hand and 1:125,000 and 1:126,720 on the other. The advantage of a standard scale related to metric units is that measurement of distance is easy, and grid references can be given accurately if a suitable ruler or romer is to hand. Similarly, an exact or close relation to imperial units enables easy

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6 There are fourteen such symbols on map 2; map 27 adds another, for North Sea Cycle Route.

7 For example, Humber (SX 8975) and Huxham (SX 9497) on map 2; Boswell (TF 9027) on map 27. The interrelationship of fingerposts, house name boards and other indications of names on the ground and placenames on maps appears to be a neglected subject.
measurement of miles. A ‘bastard’ scale such as 1:110,000 conforms to neither category, and it is difficult to understand why it has been adopted, as the detail shown could easily be accommodated at 1:125,000 or 1:126,720: the former is preferable, as more readily accommodated to metric measurement.\textsuperscript{8}

2. These maps are certainly contoured: but at what interval? They are hypsometrically tinted at 100 metre intervals. Counting contours between layers, and comparison with OS 1:50,000, suggests an interval of 10 metres, and possibly 5 metres in lower-lying areas such as around Grimsby and the Lincolnshire marsh, but this is nowhere stated, and there are neither contour figures nor spot heights. The source of the contours is not apparent: some seem to conform to OS ones, but there are others, notably on hill-tops, which do not. The highest point in Lincolnshire and an area west of Grimsby are cases in point: see figures 3 and 4. The overall effect of the contouring is ‘busy’ and, \textit{pace} the claim of ‘Easy to read contours’ on the cover, does not conduce to legibility vis-à-vis the roads. Shapes are certainly well shown, but absolute height at a given location is very difficult to determine. What ought to be the greatest strength of this mapping proves at best a puzzle, at worst a frustration.

\textbf{Figure 3.} Extracts from (A, left) Sustrans pocket-sized guide to the National Cycle Network 27 Lincolnshire and Wolds Cycle Map, © 2014

(B, centre) OS 1:50,000 Landranger sheet 113, edition D3, © 2012

(C, right) OS 1:25,000 Explorer 282, edition A1, © 2006, showing the highest point on the Lincolnshire Wolds

The apparent discontinuities in the contours in (A) are on the original. The scales have been changed to aid comparison

\textsuperscript{8} An advantage of Imperial scales, or ‘modified rational’ scales – for example 1:62,500 and 1:125,000 rather than 1:63,360 and 1:126,720 – is that they consume two-thirds less paper than do ‘metric’-scale maps – 1:50,000 and 1:100,000 respectively – and are thus more ‘portable’.
Figure 4, left. Extracts from (A, top) Sustrans pocket-sized guide to the National Cycle Network 27 Lincolnshire and Wolds Cycle Map, © 2014
(B, centre) OS 1:50,000 Landranger sheet 113, edition D3, © 2012
(C, lower) OS 1:25,000 Pathfinder 720 (TA 20/30), edition B, © 1989, showing ‘hills’ to the south of Healing
The scales of have been changed to aid comparison.

Figure 5, below
Extracts showing the gas terminal at Theddlethorpe and the road and path network to the east
(A, left) Sustrans pocket-sized guide to the National Cycle Network 27 Lincolnshire and Wolds Cycle Map, © 2014
(B, right) OS 1:50,000 Landranger sheet 113, edition D3
The scales of have been changed to aid comparison
3. The rural road network appears to be notionally complete, though there is an oddity near the ‘unnamed’ Theddlethorpe gas terminal, where the road from TF 481886 at 486880, instead of carrying on towards the shore at 489882 (as shown on current OS Landranger mapping and known to the writer for over fifty years), instead is shown as heading to a junction at 491870 (figure 5): I have cycled this in the past but, unless something has changed very recently, it is hardly ‘on road’. The complicated system between Ashburton and Totnes, in SX 76, seems to be complete, unlike on the OS ‘Tour’ 1:100,000 of 2000 which, being based on 1:250,000 data, omitted some roads – a negation of the choice of scale. However, ‘unnumbered’ roads are simply classed as ‘Minor’, with no division as to width. In 2000 the OS upgraded its 1:250,000 data to distinguish between roads over and under 4 metres (13 feet) in width and, whilst this is hardly perfect – 5 metres (16 feet) seems more appropriate to modern traffic – it is better than nothing in drawing attention to narrow roads.

4. No bridle ways are shown.

5. The National Cycle Network ‘On-road’ and ‘Traffic-free’, ‘Other traffic-free’ and ‘Recommended routes on-road’ are indicated; all but the last are the most prominent things on the map, and have the effect of pushing all the other road information into the background.

6. No landmarks as such are shown. This has the effect of accentuating the ‘spaghetti’ effect of the road network. Churches, especially, and structures with a vertical accent, such as water towers and communication masts, are punctuation marks both in the real and in the paper landscape. I find it difficult to believe that any map for way-finding that excludes churches, especially, can have been designed by anyone who has ever used a map in the field.

7. The series seems to be progressing northwards, and presumably complete national cover can be expected in due course.

8. The National Grid is shown at 5-kilometre intervals; there is no indication of 100-km square designations. It is possible to give references correct to 1 kilometre by estimation, but anything more precise – and 100-metre references are possible even at 1:126,720 – can only be done by actual measurement and calculation. This inability to be readily precise seems strange in a world of GPS.

9. An obvious omission from the South Devon sheet is the ‘new town’ at Cranbrook (SY 0095): some access roads are indicated, but there is no naming or building. This is a serious omission.


10 The 4-metre standard is a metric adaption of the former 14-feet – 4.3-metre – standard, adopted in 1892, presumably as satisfactory for horse-drawn military convoy traffic.
10. The legibility of the map is compromised in two important respects. One is the width of the roads: the ‘minor’ ones are about 0.8 mm wide, as compared with about 0.6 mm and about 0.45 mm for roads over and under 4 metres in width respectively on the OS 1:50,000 Landranger, and about 0.55 mm and about 0.35 mm for ‘secondary’ and ‘minor’ roads on the Croydecycle 1:100,000 maps. Even in the Lincolnshire Wolds the contours are overwhelmed by the roads, yet every cyclist knows that in reality the roads are at the mercy of the contours and that the topography takes precedence over the traveller. Road widths should be as narrow as is consistent with legibility. The other important defect is the ‘boxing’ of point-symbols. Whilst the boxing certainly draws attention to the symbols, it has the drawback of masking underlying detail, including sometimes the road network, for example south-west of Newton Abbot (SX 8369). As with the omitting of ‘landmarks’, one does wonder if those responsible for the map anticipated its use on the ground.

Most of the ‘point’ symbols only appear in connection with towns or larger centres. An exception is ‘Attractions’: the depiction of these seems fairly comprehensive, although one questions the omission of the Trago outlet at SX 8274, and wonders quite how appropriate the ‘castle gate’ symbol is to the likes of Crealy Adventure Park (SY 0090) or Go Ape (SX 8884). On the South Devon sheet, Greenway (SX 8754) is noted as belonging to the National Trust, but not so four others: A la Ronde (SY 0182), Castle Drogo (SX 7289), Coleton Fishacre (SX 9050) and Killerton (SS 9700). Other symbols include Toilets, Supermarket, Cycle Shop, Pub, Café, Shop and Accommodation: these symbols are conspicuously lacking outside towns so, particularly in respect of rural pubs and shops, the map is less informative than it might be. Granted, rural pubs and shops, like petrol stations, post offices and public telephones, are in decline, but to include them only in towns is to omit showing them in areas where this information would be really useful. The fault is compounded by grouping the symbols under town names: the Hospital and Cycle Shop symbols, in particular, would be of more practical use were they shown in their true positions – and not boxed, so that their context is not avoidably obscured. Exeter airport (SY 0093) is not hinted at: this seems strange, even if it is only regarded as a landmark.

The Croydecycle maps were designed by a cyclist to be suitable for cycling, but are correctly described in their titling as ‘ideal scale for cyclists and drivers’. Indeed, I have covered many more miles and many more hours using them to navigate my other half in cars than I have pedalling. The cycle-specific information does not obtrude; these maps can reasonably be classified as ‘suitable for motoring’, and indeed general reference. As I have said before, they communicate at a conversational, unobtrusive level: I hesitate to say this of the Sustrans-FourPoint offerings, where the indications of cycle routes leave in the

11 ‘Go Ape’ is an ‘Activity Centre’ on 1:50,000 Landranger 192, edition C5/, © 2013.
12 ‘National Trust’ annotations seem comprehensive on the Lincolnshire sheet, map 27.
shade the thoroughly objectionable and obtrusive green dots that the OS Landranger uses for cycle routes, and which are thoroughly distracting for motor-navigation.

The supplementary urban maps are at an unspecified scale or scales – comparative measurement suggests around 1:12,000 – and concentrate on towns through which Sustrans routes pass: thus map 2 shows Exeter, Exmouth, Newton Abbot and Plymouth, but not Torquay or Paignton, and map 27 shows Lincoln, Newark, Scunthorpe and Sleaford, but not Cleethorpes, Grimsby or Skegness. These supplementary maps are printed on the reverse of the 1:110,000 mapping, so that the map must be turned: the glossy paper is of the sort used for printing publicity leaflets, and the amount of wear shown on the copies I have used indoors in writing this review, taken with other copies belonging to friends who have used them outdoors, suggests that a more durable grade of paper is needed. The day ride maps are also at an unspecified scale – somewhere around 1:90,000-95,000 – and the remainder of the ‘reverse’ is occupied by photographs, the function of which is unclear, and general information.

In summary, then, at first sight this Sustrans-FourPoint mapping ‘ticks boxes’ – at any rate, for scale, contours, road network and grid – but ‘box ticking’ is the fulfilment of the letter rather than the spirit, and it must be all too clear from what I have written that, once again, we have a ‘cycling map’ that this cyclist, at least, finds less than fit for purpose. The great pity is that the crystal-clear example of the Croydecycle maps has apparently failed to spark emulation.

See page 47 for details of Richard Oliver’s new book, British Town Maps.

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**For Sale and Wanted**

Members wishing to buy and sell maps are invited to advertise on the ‘Small ads’ page which is now on Society website at www.charlesclosesociety.org/smallads

There is no charge for advertising and anyone wishing to respond does so direct to the advertiser. The page is available to view by all, not just CCS members.

However, members who are on the Society’s email lists will be notified weekly if new advertisements have been posted.

To place an advertisement or to be added to the email lists, contact info@charlesclosesociety.org

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See [http://solo.bodleian.ox.ac.uk](http://solo.bodleian.ox.ac.uk)

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The Croydecycle maps also include supplementary urban maps, with scale-bars. *South Devon* includes them for Brixham, Dartmouth, Exeter, Kingsbridge, Newton Abbot, Plymouth, Salcombe, Tavistock, Teignmouth, Torquay and Totnes.
More OS-related mapping online at NLS

NLS website has now added two new series of thematic maps: the Land Utilisation Survey mapping of 1931-35 (based on OS Popular edition) and Soil Survey of Scotland mapping of ca 1950-1980s, based on OS Seventh Series.

Detail from Land Utilisation Survey of Britain.
1:63,360.
See http://maps.nls.uk/series/land-utilisation-survey

Detail from Soil Survey of Scotland.
Courtesy of the James Hutton Institute
See http://maps.nls.uk/series/soils

Chris Fleet
Scaling the depths - a wet walk

David Andrews

The story of the underwater right-of-way in August Sheetlines, brought to mind a memory from 1966. At that time I was a young OS surveyor engaged upon the resurvey of Scarborough at 1:1250 scale. The local surveyors were sent a proof copy of the proposed revised edition of the North York Moors one-inch tourist map for comments. The previous, (‘A’), edition of the map, (figure 1), did not include public rights of way.

When we inspected the proof of the ‘B’ edition we very quickly noticed that the proposed revised map had public footpaths crossing the waters of the reservoir just south of the village of Scaling Dam, (figure 2).

We immediately notified OS HQ in Southampton, convinced that this must be a mistake. The amazing response was that it was not a mistake. The draughtsmen had noticed this at compilation stage, and had raised the issue with North Yorkshire County Council. NYCC’s reply had been that the footpaths were still legally public rights-of-way and OS was obliged to show them as NYCC were the authority for the routes and status of rights-of-way, and OS had to accept their authority in the matter and show them on the OS maps. Therefore the map would have to be printed with the footpaths crossing the water.

The map went to print and distribution. So much I know as fact from my own experience and knowledge.

The remainder of this article is based upon rumour, which is that there was a public outcry once the map went on sale. OS told the complainers, “it’s not our problem, NYCC are the authority for rights-of-way, tell them”.

Fig 1. North York Moors one-inch Tourist map, A/ edition, copyright date 1963

Right: cover of B edition

1 ‘Washed out’, Sheetlines 103, 52.
NYCC then became so fed up, (or probably embarrassed), with the public complaints that they rapidly amended the definitive map to delete the offending footpaths and asked OS to reprint the map without the footpaths. OS took the line, “we told you about this at proof stage and you said you were not amending the Definitive map. If you want our map reprinted you will have to pay for the reprint, and withdrawal of the existing stock”.

Whether that actually happened I don’t know, but the next edition, still copyright date 1966, appeared with the offending footpaths removed, (figure 3). Whether NYCC had to pay for the reprint and stock withdrawal I don’t know. What I do know is that very few copies of the “B” edition seem to be around, and I have five in my collection. My grandchildren’s inheritance
The road map problem

Between the advent of the motorcar and the arrival of the sat-nav two interconnected map-problems confronted the motorist. First, how look at a folded map conveniently (and preferably without damaging it) in the confines of the front seat of a car. Second, assuming that there is no second map-reader acting as navigator, how to view the map while driving at those points on a journey when a decision must be made.

The most enduring solution – surviving even in the era of the sat-nav – has been the large-page motoring atlas at scales of varying from a usable 1:300,000 to the very satisfying 1:100,000 of the Philip’s Navigator Britain whose most recent edition proudly, and correctly, announces on its cover that it ‘includes what sat-nav doesn’t.’

The drawbacks of any atlas with a page whose size is A4 or greater (and most of these atlases are almost A3 in size – before being opened) are obvious: they are hard to handle without a table surface, bulky to carry and, with no obvious place to store them when not in use, are liable to damage by being tossed about on seats or thrown in the boot. But the greatest problem is that anyone driving alone must stop to consult them. It is therefore not surprising that there has been no shortage of ingenious attempts to solve the problem. Most solutions have been variations on older maps themes.

The mini county atlases of the nineteenth century can be seen as the models for glove-box mini-atlases for motorists. Some were really small: I have one that is just 83mm x 133mm and 6mm thick (!), while Ogilby’s itineraries foreshadow the various kinds of strip maps and map cards.

However, the most curious attempt, to my knowledge, at a solution is the ‘Auto-Mapic’ – they registered the name as a trademark – road atlas produced in the early 1960s. Here in a shiny plastic box one had, in the words of the blurb, ‘the fully automatic road map’! With such a declaration on the cover, and the fact that it was presented as being used by the lone driver while actually driving (figure 1, above) one wonders why they were not ubiquitous.

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3 Johnson’s Pocket Road Atlas of Great Britain and Ireland which was still in print in the early 1970s, and showed main routes, with mileages, at 16 miles to an inch.
4 For example, the Jet Route Cards produced by Jet Petroleum in 1970; scale: 10 miles to an inch.
5 Nowhere is it stated in print that this map can be used while driving, but that is the clear impression given by the cover image. Not only would it be virtually impossible to see such
The blurb on the sleeve box is worth quoting:

The first fully automatic road map: automatic fingertip control moves large-scale maps into position as you travel. Every part of Great Britain comes progressively into view in the 9¾" x 6¼" clear plastic window of your Auto-Mapic. In addition all sections are numbered on a key map. Merely by moving your index fingers any section required is immediately visible. Safer and quicker to use than a folding map, the Auto-Mapic is a permanent solution to the road map problem. The precision and efficiency of the Auto-Mapic makes touring a pleasure. The perfect gift for the motorist.

Allowing for the fact that this is advertising copy, it is worth noting that every statement, apart from the measurement of the plastic windows, is questionable. But before examining its claims, a full description is called for.

**A 1960s product**

When exactly this atlas was produced is not stated anywhere on it. Nor has a Google search added much information: there are several references to these atlases there and a few on sale. However, from a study of the extent of the motorway system – the M1 is shown as running from Watford to Rugby with a spur to Coventry, and projected as far as Doncaster [map 9]; the M6 is only a projection near Birmingham [map 8] with the only open sections being the Preston and Lancaster by-passes [map 12] – the mapping reflects the road system in the middle of the 1960s.

Where it was produced is not mentioned anywhere, but the use of ‘map’ in ‘mapic’, the cover image of a right-hand drive car, and the fact that there was another version covering southern England points to Britain as its place of origin. That said, the inventors were thinking globally as they state that these are available for ‘South England, Benelux, New Zealand, Sweden, Austria, Germany, Spain, Switzerland, USA-East, and USA-West.’

Physically, it is a hard plastic box measuring 8" x 13½" x 7/8" (the actual box is 7½" wide but the finger tabs project beyond the box on each side) and it weighs 630gms (figure 2). It came in a cardboard sleeve cover, which would be needed to protect it when not being used, measuring 8 ½" x 13 ½" x 1". It contains twenty maps, each cut into seven strips, in a mechanical arrangement such that by sliding the tabs on both sides a ‘sheet’ comes into view. It has two windows, front and back, and when the first map comes into one window, the eleventh map comes into the reverse window, when the second map is in the front window (Cornwall) the twelfth map (the north of England) is in the reverse, and so on. It is, therefore, not possible to view two adjoining maps simply by turning over the device: each map has to be selected separately. The maps are hidden until pulled down into view; the idea underlying the mechanism is the same as that which is used in a theatre for dropping scenery.

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small mapping while keeping one’s eyes on the road, but the actual atlas box is larger than portrayed here.
From the examples for sale on the web, it appears that some car manufacturers, eg Jaguar, used them as promotional accessories; and there is a raised, blank panel on my atlas to take the name and logo of a sponsor. How widespread was this use of the Auto-Mapic I have been unable to ascertain. Nor have I been able to find out how successful the project was commercially nor for how long were these devices on sale. I suspect they were a flash in the pan!

The mapping
After the key map, we are given 18 maps covering Great Britain at a scale of around 12 to 15 miles to the inch. This is determined from the scale bars on the maps and from measuring the distance in inches between places on the maps connected by straight roads against the distance printed alongside the road.

Nowhere is the maps’ scale stated. Moreover, the scale is not constant. Most are just over 13 miles to an inch, in one or two maps it is slightly larger (12 miles to an inch), while in others it is slightly reduced (15 miles to an inch) – mainly in the Scottish Highlands – because of the need to fit ‘sheets’ to windows. Again, this is no mention of these variations in scale. Lastly, map 20 is a map labelled ‘London’ (it reaches, west to east, from Heathrow, called simply ‘London Airport’ to Bexley) at c. 3/8” to the mile.

The mapping merely pinpoints towns with the roads distinguished by their classification (motorways, principal A roads, other A roads, B roads, and few other connecting roads) and can be used for route planning between towns. Using a limited colour palette and with an attempt to show high ground with deeper colours, the overall effect is pleasing and gives the impression of full-colour mapping. The lettering, in a neat sans-serif font, is clear and well located on the map, the road numbers and distances between places are easy to read (if held steady as one would hold a book for reading), and some additional geographical information – a few coastal features, some mountains, and river

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6 Imperial is being used as the atlas used this with reference to itself (on the sleeve) and because distances on the maps are given in miles.

7 There is one on each map marked out in miles and kilometres.
names – is included without cluttering the ‘motoring atlas’ dimension. Also included are the railways – perhaps an unnecessary element in a maps so specifically intended for the car – and these show some of Dr Beeching’s cuts but leave other lines, already under sentence, intact. It is probably this feature of the maps, rather than the expansion of the motorway system, that went most rapidly out of date.

Given the small scale, the mapmakers have done an excellent job giving as much information as possible without compromising clarity. Certainly, when compared with some of the mini glove-box atlases at similar scales, these maps are not only rich in detail but pleasing to look at. Compare figures 3 and 4 for cartographic elegance.

Most of the maps are in portrait format (longer N-S than E-W), but maps 2 (Cornwall), 17 (Western Isles), 18 and 19 (NE and NW Scotland) and 20 (London) are in landscape format which, assuming one is holding it in one’s left hand while steering with the right, makes the device even more awkward to hold.

Was it a solution?
The appeal of this atlas is that it correctly identified what its blurb called ‘the road map problem’ and the inconvenience of a ‘folding map’ in a car. But its claim to be a ‘permanent solution’ was not only not fulfilled in practice, but was an arrogant claim to begin with. Mapping on such a small scale can never be of more use than a tool of route planning which, on the road, can then simply provide a list of waypoints used in relation to signposts. It is quite useless for road navigating: on an actual journey the driver, or navigator, would be actually reading road signs and not these maps. All one can ‘read’ on the maps is a sequence of towns, and even on the larger ‘London’ map one has only the names of districts and suburbs.

Just how little coverage the device gives can be seen by comparing the page area of the main mapping:

<table>
<thead>
<tr>
<th></th>
<th>maps x page area in inches</th>
<th>Total map area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philip’s Navigator (2014)</td>
<td>313 x 12 x 10</td>
<td>37560</td>
</tr>
<tr>
<td>Auto-Mapic</td>
<td>18 x 9.75 x 6.25</td>
<td>1097</td>
</tr>
<tr>
<td>Johnson’s Road Atlas</td>
<td>42 x 3 x 4.75</td>
<td>599</td>
</tr>
</tbody>
</table>

While we should note that 35 of the Navigator’s maps are at a smaller scale (1:200K), even those maps are much more detailed than the Auto-Mapic; while the Johnson mini-atlas is just as efficient for route-planning as the Auto-Mapic, is only slightly smaller in scale, it much more convenient since it would fit in a glove-box, pocket or handbag, and its font-size if virtually the same (and it retailed in the late-60s for just 3/6 [= 17½ p] whereas the Auto-Mapic presents itself as a more expensive item such as one would give as a gift). In effect, as a tool for motorists the Auto-Mapic has no advantage over the mini atlas!

But has it any drawbacks? The first and most serious defect is the notion – hinted at in blurb and suggested in the image – that it could be used by the driver while driving. No map, much less a coloured quasi-topographical one with
lettering that is less than 10pts, can be read with safety – each glance requires one to re-locate oneself on the map and then read it – while driving; and any map that encourages one so to do is inherently dangerous. Secondly, it would have to be held at reading distance to be intelligible. Thirdly, while it is presented as something one can hold in one’s left hand, doing so for more than a moment is tiring especially when it has to be held in a landscape format.

So what of its many claims? It claimed to be ‘automatic’ but it is a manually operated mechanical device and no more automatic than turning a book page. It claimed to have ‘fingertip control’ but it warns on the key map that ‘at all times move [the maps] with both index fingers’. In fact this means that one must use both hands to change maps with the other fingers and thumbs holding the device. It declared that it offered ‘large scale maps’ but allowing that ‘large’ and ‘small’ are terms relative both to one another and to their users, it is a little far fetched to call any map smaller than \( \frac{1}{4} \)" to the mile ‘large’. When one recalls the list of countries covered by Auto-Mapic maps one can only wonder how much detail could be shown on their maps of Spain or Germany, much less east and west USA. No matter which country was being mapped, including Switzerland, the coverage is at atlas scales. The claim that one can use the map ‘as you travel,’ the image of the driver holding it, and the title ‘auto’ (alluding both to automatic and automobile) is its greatest falsehood: it cannot really be done and, hopefully, was not often attempted. While it is true that ‘every part of Great Britain’ is covered, the rest of the sentence (‘comes progressively into view’) is false. The mapping does not unfurl by itself, but is made visible manually with more effort and time than turning to a particular page in a motoring atlas. In doing this one needs both hands and not ‘merely … your index fingers.’ And by now it should be clear that I do not consider it either ‘safer’ or ‘quicker … than a folding map.’

The Auto-Mapic is a wonderful cartographic curiosity, its style, look and feel image the confidence of the 1960s, but it has no claim to have been ‘a permanent solution to the road map problem.’

Fig 3 (far left).
Most of ‘sheet’ 7 covering Wales.

Fig 4.
The same area in Johnson’s mini Road Atlas.

\[8\] These claims are taken from the blurb quoted above.
A Kesteven road atlas
Rob Wheeler

Mention a ‘large-format road atlas’ and most readers will think of the sort of floppy volume they carry around in their car. The item I describe here weighs about 10kg, and measures some 60 x 45cm, so would hardly be convenient for the motorist. It is worth describing, both for the indication it gives of one of the ways in which OS maps were employed, and for putting back the origin of C-roads by a couple of years.¹

The atlas² consists of a rigid loose-leaf binder containing a set of OS six-inch maps covering the Parts of Kesteven, which prior to 1974 was an administrative county.³ The purpose of the volume is indicated by a barely legible annotation on the inside cover: RRD Act. The Restriction of Ribbon Development Act, 1935, gave county councils the power to restrict development along roads. But to take advantage of these powers, the authority had first to publish a schedule of roads to which the provisions would apply. Ribbon development was hardly a problem in Kesteven, but the council seems to have been apprehensive of the mere possibility and to have determined that the act should apply to all roads for which they were responsible. This atlas seems to have served in lieu of a schedule.

Before anything else was done, the maps seem to have had a boundary alteration marked in red ink: the boundary with the Parts of Holland against Hart’s Grounds (TF1952) had been moved to run consistently along Kyme Eau. The Kesteven boundary was then shaded in a greyish blue, and roads maintainable by the county were marked in five different colours. There is no key, and the pencil road numbers may have been added later, but the five categories appear to be: trunk roads in slate-grey, ‘A’ roads in red, ‘B’ roads in green, ‘C’ roads in yellow, ‘D’ roads in brown.

For all categories, the zone prescribed by the Act extending 200ft from the edge of the road was outlined in red ink. This was carefully drawn, to the extent of using an arc of radius 200ft at bends or where a road terminated. At least, that is what was done initially. About halfway through the volume, the red ink appears to have been abandoned and all we have is a rougher pencil line; on some sheets even that is missing. It seems likely that this laborious process was seen as unnecessary for the purposes of the volume; or perhaps it was undertaken as a background task which was dropped during the war.

Another colour of road, a purplish magenta, was used to mark new residential roads. These always lack RRD zones, presumably because they did not exist at the time of the relevant council resolution – although taking powers to control ribbon development on a built-up residential road would be somewhat nugatory.

¹ See Richard Oliver, ‘C-roads on signposts and maps’, Sheetlines, 59,40 for a good summary of early evidence.
² Lincolnshire Archives MISC DON 1138.
³ Joan Varley, The Parts of Kesteven, 1974, provides a useful administrative history.
There was evident uncertainty as to whether certain D-roads were indeed maintainable by the county. This applied particularly to dead-ends, where the end-point was sometimes amended. This seems to have been an early process: RRD zones are added or deleted in accordance with the decision about the maintainability of the road. This close correspondence between coloured roads on the map and the marked RRD zones is strong evidence that the road colouring, and hence the two-fold division of roads below the ‘A’ and ‘B’ roads, dates back to the compilation of the atlas.

When was that done? The strongest evidence comes from the print codes on the maps. A sample of these is: up to 1933: 19, 1934: 0, 1935: 7, 1936: 7, 1937: 1, 1938-40: 0, 1941: 1.

I am inclined to regard the 1941 map (Lincs 60SE) as being a replacement: perhaps the number of alterations made it desirable to start from scratch, something the loose-leaf format will have facilitated. On that basis the atlas would appear to have been compiled in 1937.

The maps continued to be maintained until at least 1958, when a change to the Lincoln City boundary was marked. Over their life, they appear to have been used by the legal department as somewhere to note information of a topographical nature. Inspection of inclosure awards in the council’s custody seems to be the source of notes on allotted widths (‘AW’) of highways, and on the stone and sand pits that were often allotted for the maintenance of highways. There are also field names and, in some areas many drains have been named. In Metheringham, certain footpaths have been named and in Navenby, a footpath is annotated ‘Line of old Watery Lane’.

The pencil road numbers may possibly have been applied later as part of this process. ‘A’ numbers seem to be altogether absent, possibly being thought too well-known for numbering to be necessary. ‘B’ road numbers are often accompanied by a schedule number, eg ‘(Schedule 2(2))’; at one point a road changes from Schedule 1 to Schedule 2. ‘C’ numbers are applied only to yellow roads and ‘D’ numbers only to brown roads. The ‘C’ numbers (with up to two digits) seem to represent a Kesteven-wide numbering system and to correspond with those in use today. The ‘D’ numbers are preceded by a geographical designator (N/W/E) which represent divisions used internally, rather than corresponding precisely to Urban and Rural District Councils. Up to two digits are used, but it is possible that D1 is a catch-all. There is also an ‘ED1(FP)’ on Lincs 80SW: was this a surfaced footpath maintainable by KCC?

I hope this description may be of use if anyone should encounter a similar volume from another county. Whilst it does not provide conclusive proof that Kesteven employed ‘C’-road numbers as early as 1937, it does appear to show that KCC employed a two-fold categorisation of roads below ‘B’ status as early as 1937, and that as late as 1958 the system had not been elaborated beyond ‘C’ and ‘D’ classes.
The moving story of river boundaries

Paul Bishop

My thanks to Rob Wheeler for his comment on rivers and boundaries.¹ My original query² was asking a slightly different question (namely the extent to which problems of ‘fit’ when converting from Cassini grid to the British National Grid were accommodated in rivers, lakes etc) but it is worth amplifying a little on Rob’s comment. Rob’s description of the ways of handling changes to riverine boundaries is called the ‘doctrine of avulsion [abrupt changes of course, either natural, such as meander cutting off, or artificial, such as engineered river straightening] versus accretion [the slow lateral movement of a river]’. This doctrine means that when a boundary-marking river changes its position by the slow lateral movement associated with sediment deposition (accretion) on the insides of river bends and the corresponding erosion of the outside of bends, the boundary moves with the river. The boundary stays where it is when the river changes course abruptly by avulsion, either natural or artificial. Good examples of the latter abound on OS maps.

The River Kelvin where it marks the boundary between Baldernock Parish (to the north) and Cadder Parish (to the south). The parish boundary coincides with the “Centre of Old Course of River” (as the map is annotated). Local landowners straightened and embanked the river in the late 18th century to alleviate flooding. A small part of Baldernock Parish thus lies south of the river (WNW of Cadder House). (Lanarkshire six-inch First edition sheet 1, surveyed 1858, published 1864, reproduced from NLS website by courtesy of the National Library of Scotland).

The boundary in the figure above coincides with the centre of the river. This centre-line definition indicates that the boundary is relatively old because from about the nineteenth century onwards riverine boundaries were in general located along the river’s thalweg (the line of deepest water), reflecting the

¹ Sheetlines 103, 62.
² Sheetlines 102, 29.
nineteenth century growth in trade and ship navigation along inland waters during the colonial era. The boundary between Scotland and England – of some interest of late with independence referenda being in the air – is likewise an ancient one, lying in the centre of any river that marks the border, such as the Tweed. The logic of a centre-line location was to give each ‘state’ equal access to the river’s waters. Other parts of the river may be used to mark the boundary, including the water’s edge on one side, giving one of the ‘states’ access to all of the river. A boundary may even coincide with the top of one of the river banks, which gives one ‘state’ access to the whole river plus the land between the water’s edge on the ‘far’ side and the bank top. This latter is how the border between the Australian States of Victoria and New South Wales is defined.

The way in which an historically more recent riverine boundary will be handled over time is usually laid down in that boundary’s defining treaty and many treaties invoke the doctrine of avulsion versus accretion. Equally, a treaty may not invoke the doctrine and specify that the location of a riverine boundary on a particular day is where the boundary will stay, notwithstanding movements of the river. A striking example of such an approach is provided by the border between Thailand and Myanmar in northern Thailand. As Donaldson has noted, the border “is now marked on the ground by pillars following a twisting course that snakes from one side of the river to the other. … The boundary pillars mark an older course of the Mae Sai which the two governments agreed was the last conclusive definition of the boundary even though the river itself has long since shifted from this course.”

The Google Earth image of northern Thailand at Mae Sai, showing the border between Thailand and Myanmar in yellow marking a former course of the Mae Sai River. The border has stayed where it was set by agreement, even though the Mae Sai River has moved slowly by accretion away from those locations (courtesy of Google Earth).


**Asked .. and answered – those suburban Skeggy types**¹

**John Fowler** writes: On 1:50,000 Second Series sheet 122 Skegness, edition A1, all the placenames are in the usual sans serif typeface, in differing point sizes, except for two names. The first letters of these are at TF 554658 (Winthorpe) and TF 561660 (Seathorne), the full names being in a condensed font. What is the significance of this difference? I can find no other examples on the sheet.

**Richard Oliver** replies: The typeface in question is ‘condensed Univers’, and Seathorne and Winthorpe are treated thus from edition A (1980) of 122 to at least C1 (2002: I don’t have a later edition). This style is normally used for suburbs of towns, presumably to save space: there are numerous examples on the Landranger, including several on 122’s neighbours, at Grimsby on 113 to the north and at Lincoln on 121 to the west. My latest copy of 121 (C1, 2002) has the style for an empty area, ‘Swanpool’. The Lincoln examples are mostly post-1850, indeed often post-1950, suburbs, but include one ancient parish, Boultham; edition D3 (2012) of 113 includes several ‘ancient parishes’ in the ‘condensed’ style. It seems reasonable to conclude that it is used for reasons of space and aesthetics rather than of any sort of place-classification. Seathorne and Winthorpe strike me as marginal cases: Winthorpe is an ancient parish with a notable church, Seathorne only reached the one-inch on 114 ed B (1963). Thoughtful locals (like someone I was at school with) will no doubt say that Winthorpe is far more significant than Seathorne!

**JF:** Many thanks for your detailed response. It seems to me a smaller point size and normal width would have been more in keeping with the rest of the map – they do not look like ‘suburbs’, which, in my experience tend to be absorbed villages in a conurbation, or, as you mention, post-war accretions. These two settlements are half a mile from ‘Skeggy’. Incidentally, the (what I call) ticket inspector on the train from King’s Cross, when nearing Doncaster in the rain, said “Change here for .... sunny Skegness”. Hope no-one took him at his word!

**RO:** Thank you for this. In administrative terms, Winthorpe (and that johnny-come-lately, Seathorne) has long been incorporated in Skegness parish, so its treatment as a ‘suburb’ on that basis seems to me reasonable. I also think, from personal knowledge of the neighbourhood, that its treatment as a ‘suburb’ in terms of ‘continuous urban development’ and (lack of) service functions is reasonable, even though the balance of it is about 52-48!

Winthorpe seems to have been treated as urban for 1:1250 purposes from the start in the mid 1960s.

I agree that, from a ‘lettering’ point of view, the condensed Univers does seem a little odd.

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¹ Adapted from dialogue which first appeared in July 2015 on the Ordnance maps online discussion group: [http://uk.groups.yahoo.com/group/ordnancemaps/](http://uk.groups.yahoo.com/group/ordnancemaps/)
Proposed and mystery tunnels

Three contributors have responded to the item in the last issue on the depiction of proposed tunnels on Bartholomew maps.¹

Rob Wheeler writes: It occurs to me that the position of the tunnel mouth near Lymington may be significant. The implied open cutting landward of that point would suggest that reclamation of the salt marsh nearer to the coast was to be part of the project. One might conceivably rely on impermeable embankments either side to prevent the sea from filling the cutting at high tide, but embankments like that are liable to failure, whereas a newly-created zone of dry land would offer extra security, as well as another source of income.

Alan Fair writes: London Transport's proposed Northern Line extensions, including north of Edgware, postponed by World War II and cancelled after the post-war Town and Country Planning Act have been well documented. However, readers may not be familiar these depictions:

¹ ‘Tunnel vision’, Sheetlines 103, 53.
John Ambler writes: Using historical Ordnance Survey maps I have found evidence of two tunnels separated by just one mile in South Yorkshire, the purpose of which at present remains unexplained.

Tunnel 1 south of Denaby Main village is exemplified by the extract from the OS County Series six-inch map sheet 284 SW, Second Edition 1903. This shows a pair of entrance cuttings with two intermediate air shafts on a north-south alignment just south of the Flameless Explosives Works on the southern edge of the village. The almost half-mile long tunnel seems to be straight and level emerging from the hill at both ends between the 150ft and 175ft contours. The northern entrance which appears to be still extant but heavily over-grown is at SK 4923 9886. The southern entrance cutting has been filled in.

Tunnel 2 on Conisbrough Parks a mile to the south-east of Tunnel 1 is exemplified by the composite extract from OS county Series six-inch map sheets 290 NW, Second Edition 1904 and 284 SW Second Edition 1903. This shows six air shafts on a curved alignment north-east to south-west with the entrance cuttings separated by just over half a mile. The south-western entrance cutting is still extant at SK 4979 9637 at an elevation of 210ft according to digital mapping (Memory-Map). The north-eastern entrance
cutting which is not visible on modern maps or Google aerial photography was very close to the 225ft contour on the 1903 map.

Having an interest in railway history I immediately jumped to the conclusion that these were railway tunnels for lines which were never completed, though no other signs of earthworks (cuttings and embankments) can be seen on the mapping of the early twentieth century. To date I have also been unable to find any reference to failed railway projects in this area. Pure conjecture could suggest that work on the tunnels was started in advance of any other works as the completion of the tunnels would be the rate-limiting step for a railway project. By the first decade of the twentieth century, all of Britain’s main line railways had been built and speculators were promoting short lines to link different systems to facilitate efficient transport of coal to ports and to access new mines along the way. If these tunnels were for railway lines, what connecting links could they have provided?

Looking at the elevation of Tunnel 1 at approximately 160ft it is probably too high to connect easily (ie with acceptable gradients) in a northern direction with the nearest railway which was the Great Central (GC) at an elevation of only 55ft in the valley bottom. The Dearne Valley Railway however which crossed the River Don via Consibrough Viaduct (deck reported as 116ft above river level) at a similar elevation to the tunnel might have been a possibility. Another expensive viaduct would be required if travel in a north-westerly direction were envisaged or a tortuous route on a hillside ledge avoiding Conisbrough Castle if a south-easterly link was proposed. To the south-west the GC and Midland (MR) railways would have been accessible via more tolerable gradients as could the GC-MR joint line from Thrybergh to Worksop.

The alignment of Tunnel 2 would suggest a potential link from the Hull and Barnsley (HB) and Great Central Joint Railway east of Consibrough to the GC-MR Joint line near Ravenfield though a valley would have to be bridged and several cuttings would be required making it expensive to build.

A chance enquiry on a local history Facebook page (Dearne Valley in Old Photographs) brought to my attention an alternative interpretation for these tunnels. A respondent suggested that they could be waterworks tunnels. This suggestion appears to be quite plausible. Tunnel 1 is almost in a direct alignment with the former Doncaster Corporation Waterworks reservoir at Thrybergh which has a surface level of 190ft suggesting that gravitational conveyance of water towards Doncaster (50ft above sea level) via the tunnel at 160ft might be possible, though the open-topped filter beds at the base of the dam appear to be only 150ft above sea level. Tunnel 2 is similarly in good alignment with the small Doncaster Corporation Waterworks reservoir at Firsby (mis-spelled on the 2014 edition of the 1:25k digital map supplied by Memory-Map as Firsdy Reservoir), though here the elevation of the water surface at 185ft does not suggest gravitational water movement via the tunnel which is both higher and has an adverse gradient, falling downhill from the Doncaster direction towards Firsby. No pumping station is evident on the map. Neither of these reservoirs remains in waterworks service and they are now used as a country park and a nature reserve, so any aqueduct
pipes and associated infrastructure may have been removed for scrap or simply buried.

There is a confirmed precedent for the use of tunnels by Doncaster Corporation Waterworks. Beside the A630 (Sheffield Road) at Butterbusk between Conisbrough and Warmworth, a line of mounds and brick shaft collars can be seen in the fields to the south of the road leading away from the large water tower towards Doncaster. OS 284 SE, Second Edition of 1904 identifies the tunnel’s eastern portal as “Entrance to Water Works Tunnel” very close to the 150ft contour. Although not shown on the 1904 map, a large water tower now sits directly opposite the westernmost airshaft of this tunnel, though there is no cartographic evidence of an aqueduct leading to the tower from the tunnel at Denaby or onwards towards Doncaster from the tunnel portal. A valley-side route for an aqueduct in a shallow trench from Tunnel 1 to Butterbusk is just about imaginable.

It would be good to hear from any members who might have knowledge of the history of these tunnels.

Map extracts reproduced with kind permission of National Library of Scotland.
Books for Christmas and special offers

**Cartography: a reader**, Steve Chilton and Alex Kent (editors), Society of Cartographers, £25

Celebrating the fiftieth anniversary of the founding of the Society of Cartographers, *Cartography: a reader* presents a special selection of over forty papers from the archive of *The Bulletin of the Society of Cartographers*, the Society’s respected international journal. Arranged chronologically, the book charts the key technological and theoretical developments of cartography from the 1960s to the present through the work of leading authors such as Danny Dorling, Peter Hagge, Henry Castner, Martin Kemp, Peter Vujakovic and Michael Wood.

The papers are complemented by a series of new essays written by editors Steve Chilton and Alex Kent (both CCS members) which set these major advances in their wider context.

**Buy Cartography at preferential CCS price of £20 by post**¹ or **online²**


This is essentially a coffee-table book. It presents sixty or so maps from the Seven Years War insofar as it concerned North America and from the American War of Independence. They are generally well-presented: the book’s large format (30 x 32cm) and the high quality of the printing allow most of the maps to be presented entire, though some readers may find a magnifying glass useful. Often the most salient portion of the map is presented separately as an enlargement. Not everything comes out perfectly: both the maps by Blaskowitz are largely illegible when presented entire, and insufficient care has been taken to prevent important detail from vanishing in the gutter. The text explains the context of each map and is structured in sections that allow the casual reader to dip in, almost at random. So as a coffee-table book it works very well.

Might it have been more? As a history of the War of Independence it has the problem that basing it on maps leads to a focus on the tactical level, when, as with any other insurrection, it is the strategic level that mattered. How did the rebels persuade so many to join them when their grievances were so inconsiderable? What was the British strategy? The answers to such questions will not be found in maps. And besides, the authors’ writing about the war is irritatingly partisan.

Where the book might have achieved more is in helping to clarify the limitations of battle maps of this era. The compilers of such maps often had a reliable topographic base; they had access to the recollections of participants; but battles can be a confused mêlée, and map compilers may leave out anything that does not fit their narrative. Although the authors do not seek to address this issue, by presenting high-quality maps...²

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¹ Send cheque to Miles Irving, Room G15, UCL Department of Geography, Pearson Building, Gower Street, London WC1E 6BT.
² Contact payments@soc.org.uk
images of different maps of the same battle they allow the reader to compare, for example, Lartigue’s ‘official’ depiction of the fall of Louisbourg (1758) with the anonymous view in the Library of Congress. The former is planimetrically accurate but sanitised; the latter – probably drawn by a prisoner-of-war in England – is naïve in presenting multiple incidents as occurring simultaneously and bunching together the interesting parts of the scene at the expense of the uninteresting, almost like an early-Renaissance view of incidents in a saint’s life. Its depiction of, say, the town’s fortifications is consistent with the ‘official’ view but it shows so much more detail of buildings and the actual form of the outer obstacles, where Lartigue shows stereotyped fences. It also shows a suburb to the town, completely omitted by Lartigue.

The first author has also provided yet more resources: his collection of Revolutionary War maps is on the Boston Public Library website. The interface is not quite as user-friendly as NLS’s, but the resolution is quite phenomenal.

There is scope too for anyone wishing to compare Board of Ordnance practice with, say, French military mapping, even though the authors have not sought to make such comparisons themselves. So the book would make an attractive Christmas present for CCS members interested in the origins of the OS.

Rob Wheeler

Map: Exploring the world, [unnamed editors], Phaidon Press, £39.95

This new and large-format book features more than 300 maps from, as the blurb says, the “birth of cartography to cutting-edge digital maps of the 21st century”. Unashamedly international, each spread in the 26x30cm book features a pair of maps from different sources, which may be similar or contrasting. Each pair of maps is accompanied by title, date, publisher, and size of the original maps, with a rigidly-applied simple three paragraphs of descriptive text.

The maps have been selected by “an international panel of curators, academics and collectors”, perhaps explaining its eclectic content. The eloquent and thought-provoking foreword is by John Hessler, Specialist in Modern Cartography and GIS at Library of Congress in Washington, who quotes Brian Harley’s definition of a map as the best, before deconstructing and updating it.

There are maps for devotees of just about every age of cartography and every part of the world in Map. From Britain and for OS devotees there is an extract of NW Kent from “An Entirely New and Accurate Survey of the County of Kent” (1801, William Mudge for Ordnance Survey). Strangely, the description dwells on London’s dock development (on the Middlesex side!). For comparison, this starkly faces the beautiful and coloured Illustrated map of London of 1575 by Braun & Hogenberg.

Another example of OS material in this book is the LCC Bomb Damage Map, 1945, by London County Council Architect’s Department. The base map for this is the OS 1:2500 map of 1916. Rather than showing an extract of this 60x100cm sheet, the publishers have chosen to show the whole sheet on one page, in a space about 15x21cm. The larger format of this book just about allows legibility at this scale of

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3 maps.bpl.org/highlights/ar/richard-b-brown-revolutionary-war-map-collection
reduction, but it’s a close call. Facing this ‘terror map’ is one from the USA, “Terror in Afghanistan”, topical but crude in comparison.

Also from Britain is The Road from Whitby to Durham, 1675 by John Ogilby, a strip map from his Britannia at a scale of 1 inch to 1 mile, “an innovative scale later adopted by Ordnance Survey”. Perhaps inevitably, there’s an extract from the A–Z Atlas and Guide to London and Suburbs, created in 1936 by Phyllis Pearsall “after becoming lost while using an OS map” (ho hum!) and the almost-first-edition 1933 London Underground diagram by Harry Beck (facing the novel but unreadable Vignelli New York Subway map of 1972).

The most up-to-date and perhaps most intriguing British entry is the 2014 Lego-bricklike Minecraft Map of Snowdonia by Joseph Braybrook, an intern at OS, developed for the popular online game Minecraft and “taken from a map of the whole of Britain”. This reproduces well here – I’d like to see the rest of it!

A fascinating “Timeline of Cartography” takes up 18 pages at the end of the book, followed by selected biographies, a limited glossary, about 50 suggestions for further reading, and a very clear index of cartographers, maps and publishers.

The scope of this splendid book’s material is so wide that this is not principally a book for the collector, but one for the curious connoisseur of worldwide cartography. To call it a “coffee table” book would be unfair and would not do justice to this satisfying and splendid book.

Gerry Zierler


This is a substantial publication, clearly refined over many years, and providing details of almost everything a noviate walker would wish to know. At 350 pages, however, it is a tome to be read at home before departure, rather than one to be carried in the rucksack. It is now over twenty years since the previous edition and there has clearly been much updating in the interim. So that, for instance, the CRoW act of 2000 is covered as is the slightly later Scottish equivalent of 2003; which latter gives a walker greater rights than in England & Wales but in Scotland the walker has responsibilities and these are enshrined in law. Similarly, prominence is given to Lyme disease. This tick borne disease is an increasing scourge that is too little acknowledged; early recognition and diagnosis is necessary if long term complications, which can be severe, are to be avoided.

This reviewer started walking, oh so many years ago, by just stepping out of the front door in ‘school’ shoes – no trainers in those days – with friends or parents. I suppose it is just a sign of the times that a book like this make it all seem a bit more formalised these days. Still, it is nice to see the author endorse one of this reviewer’s personal enthusiasms – the use of an umbrella. Except in high winds, it keeps one dry and makes temperature control so much easier.

One chapter of the book covers the maps likely to be used by walkers, concentrating on the Landranger, Explorer and Harvey map series. Three chapters follow on navigation techniques; all these are comprehensive – OS changes of June 2015 are noted – and excellent. But then all CCS members will
already be aware, for instance, that for *Explorer* maps, ‘The contour interval is 5 metres on the 333 sheets that cover lowland areas, 10 metres on the 70 sheets that cover upland areas.’

The following chapter covers ‘The Global Navigation Satellite System’ and opens ‘… [these] systems are moving so fast that only a general outline can be given here. For the latest information readers are advised to make internet searches.’ There follows a summary of the satellites and the various handheld devices that will establish a user’s position, together with information on devices to which maps can be downloaded. This review is being written just after the Ordnance Survey has issued the first maps that include, within the (increased) price, the facility to download a copy of that map onto a tablet or phone. (The remainder will follow in the next few months). Sadly therefore, I find this book weakest in the area which will be of great interest to CCS members – the developing field of mapping available in electronic formats. It is noted that satnav functions are available on smartphones but their use is discouraged as they lack robustness and are not sufficiently weatherproof. Nothing is mentioned here about battery life; perhaps this should have received more emphasis. Recently there seem to have been a series of misty afternoons in the Lake District. Several of the mountain rescue teams have been called out because walkers had not realised that the batteries on their phone would not enable them to view on them maps throughout a full day’s walk. Appeals have had to be made by the rescue teams to tell walkers to take a paper map with them as well as their phone. Nothing in the book mentions that, even if a device itself is waterproof, there are hazards in using some touch screens in the rain.

This therefore is a substantive tome for somebody wishing to increase their knowledge of walking but one of lesser interest to a map specialist.

*Peter Haigh*

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**British town maps a history by Roger Kain and Richard Oliver is just out!**

With 165 illustrations, mostly in colour, this book covers the whole range of British urban mapping from 1300 to the 2010s. It includes numerous extracts from Ordnance Survey mapping, and from earlier Board of Ordnance mapping of urban areas. Some of the maps are well-known; others have languished in obscurity. Here are maps for way-finding, urban planning, boundary recording, insurance purposes (including the consequences of distilling) and much more. All this is the outcome of a comprehensive search of British libraries and archives extending over many years.

*Published by British Library, 2015, £30*
Some other books for your Christmas wish list

The Railway Atlas of Scotland, David Spaven, Birlinn, £30
Glasgow; mapping the city, John Moore, Birlinn, £30
Mapping the Second World War, Peter Chasseaud, Harper Collins, £30
Great Escapes; the story of MI9’s second war escape and evasion maps, Barbara Bond, Times/Harper Collins, £25


Metropolis: mapping the city, Jeremy Black, Bloomsbury, £30
(available for £9.99 at www.Bookpeople.co.uk)

And don’t forget these important books, available with members discount from CCS website:

The first Ordnance Survey map
The Ordnance Survey in the nineteenth century
Ordnance Survey maps: a concise guide for historians
Old Series to Explorer: A field guide to the Ordnance map

Special discount offers for CCS members

SplashMaps make personalised maps on weatherproof fabric using 1:25,000 Explorer-style mapping. Go to www.splash-maps.com/shop/make-map and use code ‘charlesclosesociety’ for 15% discount.

WW Norton is offering 30% discount on Revolution (see page 44). Use code WN323 at wwwnorton.co.uk/book.html?id=3864 (valid until 31 October 2016).

A 35% discount is offered by Phaidon on Map: Exploring the world (see page 45). Go to www.phaidon.com and at checkout enter code MAP35. Valid until 31 March 2016.

Ordnance Survey special 30% discount offer to CCS members has now been extended to include OS Maps subscriptions and Activity maps, as well as paper maps. Go to www.shop.ordnancesurveyleisure.co.uk and use code CC2PMGAMCM.
Tanks on Dartmoor? No, not even those you might expect
Anthony Francis-Jones

It is interesting the anomalies that an aerial survey can create when mapping an area. This is especially true in places, often very rural, where there are no significant changes for years and where there is little need for accurate up to date mapping. As a keen walker on Dartmoor and a fan of John Haywood’s book Dartmoor 356 (Curlew Publications 1993), which encourages you to visit every square on the 1-inch map of Dartmoor National Park - one for every day of the year, I came across an interesting anomaly. Each square is referenced in the book with some interesting feature within it to visit. It is quite a challenge to visit all 365 of them! Square I-21 in the book encourages you to visit Bullaton Farm (SX 801821) to see the late medieval farmhouse, an ash house, and, in a field above the farm, two stone-faced rick stands (above).

I thought I would see how they were depicted on the 1:1250 OS Master Map© Topography Layer map (below). To my surprise a quiet country scene had turned into a military base or chemical factory with the presence of ‘Tanks’! I can only surmise that this has been caused by the use of aerial survey methods that have been unable to distinguish between silos and tanks and a more bucolic feature. I wonder if other members have come across similar examples of ground and air surveys getting confused?

As an aside, recent Sheetlines articles on the mapping of ha-has have been very interesting and there are features on Dartmoor that are somewhat similar. Square I-12 in Dartmoor 365 encourages you to visit ‘Wall’s End’ (SX 656815) to see the wall that runs in a southerly direction from this point. It is an excellent example of a corn ditch. The lack of red deer on the moor after the 1780s meant that no more of these were built. These are not totally dissimilar to ha-has but as far as I know were just mapped as walls even though their structure was much more like a ha-ha. Maybe someone knows otherwise?
Cagoules, beer and free maps

John Cruicksbank noted this story in The Times of 16 July 2015, reporting the setting-up of a sponsorship agreement between Ordnance Survey and the outdoor clothing company Craghoppers.

Meanwhile, bottles of Cumberland ale brewed by the Lake District brewer Jennings carry a label offering free 3-month subscription to Ordnance Survey digital mapping.

These reminded John of a long-ago joint promotion by OS and Trent Brewery, advertised on the beer can below. He can’t remember the date and says that as the beer has long since been drunk he can’t produce the ‘best-before’ date on the cap, but the text mentions the popularity of a previous offer in 1984. Has any reader got any these Trent Trails? There’s more OS beer on page 64!
Internet mapping and, by extension, digital cartography have become critical in many walks of life, and in many branches of academic research. It is an oft-quoted, and possibly apocryphal, statistic that around 80% of all webpages contain some form of geographic information: a place-name, a coordinate, a link to an online map, and so on. The ubiquity of geodata on the web is linked closely to its inexorable move from the desktop to the mobile; meaning its users are not merely consuming that data, but physically interacting with it and modifying – and creating – it as they do so. In this world, digital geographic data, and Geographical Information Systems (GIS), have never been more important to how information is found, stored and used. In this context, the release of the data underlying the Ordnance Survey’s maps since 2010 can be seen as part of a global shift in technology and communications. The internet had shifted from a model of ‘web 1.0’, where publishers published and readers read much as they had in the world of ‘dead tree’ communications, only faster and (perhaps) more easily, to one of ‘web 2.0’ where anyone anywhere could blog, publish, upload, post and mash-up – and maps were no exception. As many pointed out at the time, the release enabled the potential for a vast array of re-use of OS data in new ways and in third-party applications. This in turn sparked numerous debates on the relative accuracy, approaches, ethics and licencing of official map data, such as the OS, and geodata from crowd-sourced mapping platforms such as OpenStreetMap. However, looking at certain aspects of the history of geodata online, this seems to somewhat miss the point. It is not about the data products that we have, but rather about the processes of their creation.

These intellectual currents have impacted on the use of digital and online mapping data in academia, and in my own little niche there of the exploration of historical and archaeological space. Web mapping has driven some of the very latest development in this field. Historical Geographical Information Systems (HGIS) has practically become a sub-discipline in its own right, and the digitalization of old maps is now a topic of great interest to the academic community (many of the most important developments have been chronicled by Chris Fleet in various editions of Sheetlines in the last few years).

This brief paper seeks to provide an outline of this process, to acknowledge OS’s role in current thinking about digital cartography as applied to the archaeology of the UK; and to express some hopes as to how both OS and the Charles Close Society might engage with these currents in the future – and to suggest that the main significance of the OS data releases is the kind of work they represent and enable, rather than the data products themselves.

1 The author is Lecturer in the Department of Digital Humanities at King’s College London.
Mapping the features, processes and societies of antiquity requires high-quality data, just as current applications have come to rely on high-quality data.gov.uk data released in 2010. And as with the OS release, questions have been raised about who produces that data, who curates it, who is responsible for it; and the extent to which it can be relied upon. Often historical and archaeological geodata is derived from official and/or peer-reviewed sources. Such resources, and the scholars behind them, have had to respond in much the same way as the OS to the changing currents on online peer-production and crowd-sourcing. One key activity in this area is the Pleiades gazetteer project, coordinated by New York University’s Ancient World Mapping Center. Pleiades is an online repository of all the place-names cited by classical authors documented in the Barrington Atlas of the Ancient World, historically one of the most authoritative sources for Ancient World geography. In Pleiades, every Barrington place-name is given a unique referent with a unique number which forms part of a web-readable Universal Resource Identifier (URI). This approach allows one place whose existence is attested, and whose name might be spelled in a myriad of different ways, to be identified by a single entity. In the same way that only one web page can occupy a particular URL (eg only the Charles Close Society’s website can be resolved from www.charlesclosesociety.org), so only one place can ‘live’ at a Pleiades referent.

For example, http://pleiades.stoa.org/places/579885 is the unique referent for Athens. All the different variations of the spelling of Athens (eg Athenae), and all locations attested as being associated with/and or part of Athens (eg the Acropolis, the Keramikos, the Agora etc) are linked to this referent in the gazetteer. This allows references in other datasets, such as online museum catalogues, texts, other gazetteers etc, to use Pleiades as a reference for that place. Most importantly however, any member of the community who registers on Pleiades can propose new names, or edits to existing ones. In this ‘democratization’ of the Barrington dataset, all community-sourced names are documented according to the same standards, and given unique referents in the same series. This ‘Linked Data’ approach (the basis of Tim Berners Lee’s Semantic Web concept) – which has been embraced by the OS in the data already released – allows such resources to be seamlessly cross-searched together using these common place references. Geography, in other words, becomes the thing which links them together. This approach lies behind the Pelagios project, which is seeking to build a community of online gazetteer resources using Linked Data, in order to enable ‘new modes of discovery and visualization for scholars and the general public’.

This open approach to community-sourced (a term that is in many ways preferable to ‘crowd-sourced’) geographic data provides an interesting perspective on the history of mapping the antiquities of the British Isles themselves, a topic

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3 http://pleiades.stoa.org/home
4 http://pleiades.stoa.org/welcome
5 http://pelagios-project.blogspot.co.uk
with which the Ordnance Survey has been engaged since at least 1924. In fact, the early history of this subject is the story of the amateur and the antiquarian. It is hard to say when the mapping of Britain’s ancient sites and monuments began, but as with many such questions, the first complication is the question of what is actually meant by ‘mapping’.

John Leland’s *Itinerary* (1538-43) and William Camden’s *Britannia* (1586) are both written accounts drawn from first-hand observation. These are documents of their time, the Renaissance, and reflect that era’s reawakened fascination with the antiquity of Greece and Rome, which was becoming familiar again throughout Europe from the rediscovery of Classical texts. Camden’s own stated aim was to ‘restore antiquity to Britaine, and Britaine to his antiquity’. But they are hardly maps in the cartographic sense; rather they are geographical explorations of the physical manifestations of the past in the writers’ contemporary present; and reflect that public fascination, at least in intellectual circles.

William Roy, of course one of the early architects of the processes and methods which led to the establishment of the Survey, was himself a keen antiquarian. His *Military Antiquities of the Romans in North Britain* posthumously-published in 1793 is widely considered a foundational text of archaeological mapping. In terms of the modern scholarship of this work, there is little that can be added to the recent survey of Yolande Hodson, whose very title, quoting Roy directly, speaks to his interest in mapping antiquities as a leisure pursuit; and the PhD thesis of Carolyn Anderson among various other excellent works, but a brief recap of the main points will help to set the scene. This magisterial tome contains over fifty plates, many presenting plans of individual military camps and emplacements, along with cross section at large scale, taken by Roy in the course of his Military Survey of Scotland (1747-1755). These plans are without question things of beauty; and in terms of their Cartesian accuracy would not disgrace a modern field survey. Relief is shown by shading, in a manner which anticipates the techniques that become widespread in the nineteenth century. Roy’s own account of his motivations for exploring the historic landscape speak to his occupation as a military man with experience of battle, being ‘naturally led to compare present things with the past … [to] converse with the people of those remote times’. The blurring of the amateur and the professional is not a feature of the web 2.0 world; although the often insidious distinction between the two might well be.

The military associations of mapping lead almost inevitably to another connotation, that of empire. In the wake of the six-inch to the mile surveys of Ireland between 1824 and 1855, the expansion of the Overseas Dominions in the East set further challenges for Britain’s cartographers. One of these was the

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6 Which, thanks to the excellent digitization programmes of the National Library of Scotland, is now freely available online at [http://maps.nls.uk/roy/antiquities](http://maps.nls.uk/roy/antiquities)


acquisition of Cyprus from Ottoman Turkey in 1878, as a means of forming a bulwark against Russian expansion in the region. By all accounts – or rather by accounts written by British administrators of the late 1870s and 1880s – the island was in a sorry state. In The Birth of Cyprus (1885), Lieut. H. H. Johnstone RE wrote that ‘Cyprus came into the hands of the English … after suffering for three hundred years Turkish oppression, mismanagement and bad government’. One of the Imperial administration’s first priorities was to understand better the topography, geography and demographics of the island for the purposes of taxation, and in 1882, another Lieutenant of the Royal Engineers, Herbert Horatio Kitchener – later known better as Lord Kitchener of Khartoum – was commissioned to produce a ‘Trigonometrical Survey of the Island of Cyprus’, which was completed in 1882 and published by E. Stanford in 1885. The Trigonometrical Survey was set at a scale of one inch to one mile, ‘the same as the Ordnance Survey of the United Kingdom’.

I have combed various archives in both Cyprus and London looking for a direct link between the Trigonometrical Survey in Cyprus and the domestic Ordnance Survey, but as yet have found no such smoking gun. However, indirect evidence of a certain mutual influence can be detected, in addition to the reference Kitchener makes to the scale. In presenting Kitchener’s map to the Scottish Geographical Society, Trelawny Saunders (with whom Kitchener corresponded on the ‘miserable state’ of the island after Turkish rule) noted that ‘the execution of the engraving work, which was intrusted to Mr. Stanford, has been well done, and perhaps much more speedily than if it had got into the Government office at Southampton’.

For the place-names on his map, which included both Greek and Turkish toponyms, Kitchener drew on Imperial censuses conducted between 1878 and 1882. What is interesting is that in these circumstances the populations being mapped did not have available to them the channels of redress and complaint that were available to those who objected to the error-prone ways in which, at times, the Ordnance Survey’s map-makers dealt with Welsh place-names in the 1820s.

The politicization of toponymy in contested areas such as Cyprus, and the need for correct identification of names used both in the present day and historically, is the subject of a project at King’s College London which seeks to employ the URI-based gazetteer approach exemplified by Pleiades and Pelagios to address the kinds of issues in mapping historical and archaeological names, which ‘official’ organizations such as the OS have encountered throughout their histories, both colonial and postcolonial. The Heritage Gazetteer of Cyprus (HGC) is an online names database which assigns a numerical URI to a place every time it is mentioned in a text of any period. To ensure compliance with local laws, the default toponym for every place is given from the official lists

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11 http://www.cyprusgazetteer.org
submitted by the Republic of Cyprus to the UN, and documented by the latter’s appointed authorities in 1987. These texts can be anything: travelogues, maps, histories, itineraries, manuscripts etc. Identifying each spelling of each attested name in each text with a unique ID allows us to build a profile of the toponymic history of any individual place: Nea Paphos (New Paphos) for example now has 11 such variants, all tagged with unique IDs according to Linked Data principles: http://www.cyprusgazetteer.org/bu/17. As with Pleiades, any member of the community can contribute variants and, subject to a review and moderation process, have it published and thus contribute to that profile. This is a very good example of how digital data structures can mediate between ‘official’ sources and texts, and those provided by the community, to create ‘community-sourced’ digital maps.

The value of digital mapping does not lie in the fact that it allows geographic material to be distributed more broadly than paper maps; rather it lies in the kind of collaborative and community-sourced work it enables. The OS Open Data initiative brings very exciting prospects to expand work of this kind; and developments of the next couple of years will undoubtedly have a heavy influence on any map-based analysis of the UK’s archaeology. The Linked Data model for the 1:50,000 gazetteer (withdrawn in June 2015) contained a label type for ‘Roman Antiquity’, to denote sites of this class in the OS database. However, as far as I can see, the service which has replaced the 1:50,000 gazetteer product does not yet have such a label. The OS’s mapping of Roman Britain began in 1924, a mere forty years after Kitchener’s Trigonometrical Survey (although few would claim this first edition was the Survey’s finest offering) and its maps of features such as Hadrian’s Wall are invaluable to both hikers and researchers (I have been both).

The development of Pleiades from the Barrington Atlas dataset, and that of the Heritage Gazetteer of Cyprus from various ‘official’ sources of attestation show that such sources, when released to the open web, take on broader roles in the web 2.0 environment as platforms of communication, negotiation and collaboration. After five years, the ongoing OS data release is a critical part of this conversation; and it is to be greatly hoped that the availability and use of OS Linked Data relating to the history and archaeology of the British Isles will be possible, in the face of inevitable competition with OS’s role as the UK’s agency of record for modern geographic data.

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13 http://data.ordnancesurvey.co.uk/ontology/50kGazetteer/RomanAntiquity

14 https://developer.ordnancesurvey.co.uk/blog/os-open-names-v12-released
Roger Hellyer asks: what is the connection between the London maps and the RAC map below. His answer is in next Sheetlines.
Ian was born in Alvechurch in Worcestershire in 1927. His father, Clare O'Brien was then an agricultural advisor in Tanganyika, who married Esther, the daughter of Colonel Charles Milward. She rejoined Clare in Africa returning only for the birth of Ian's sister Mary. Ian remained in England and would eventually attended Beadles school near Petersfield as a boarder. Ian’s National service in the Royal Engineers was spent as a sapper before going up to St John’s College, Cambridge to read Geography in 1948. After graduating in 1951 he started post-graduate research but by 1953 had begun a job as a map curator in the Directorate of Colonial Surveys (DOS). Thus he began a lifetime working with maps, his great passion since discovering his paternal grandfather's six-inch to the mile estate plan around Alvechurch. It is likely that he walked over that ground during the holidays as this was his chosen outdoor pursuit. He travelled by train or on foot and never learnt to drive. His knowledge of railways was acquired from maps and books which accompanied a growing collection of maps of Britain, Europe, Africa and the Middle East. Those who have been privileged to visit his home in Epsom will know how massive was his collection of maps. Many of them were annotated by him, as a record of when they were bought, where, from whom and their price. A large proportion of the map collection unusually consisted of flat sheets not exclusively OS, but including European and colonial series.

The first ten years working in DOS were spent first in air photography, followed by stints in the map and book library and later the Survey Data Library. He was instrumental in the production of what proved to be the sole complete catalogue of DOS maps replete with many sheet indexes, published in 1960. In 1963 Ian was promoted to Assistant Director superintending mapping services. In the same year he married Marion Lloyd who worked in the DOS Library and they moved to Epsom, where Ian had space for his considerable collection.

It was in 1964 when I first met Ian when he was Vice-chairman of the working group preparing English technical terms in cartography for the International Cartographic Association. Frequent meetings at DOS, then in Tolworth revealed the quiet competence of a very experienced practical map user embedded in this map-making body. Dedicated to supporting the development and route to independence of British colonies Ian never lost touch with Europe. His competence in German made him the ideal link with the German chairman of the Commission. With the help of a secretary who worked in the DOS Library, he became our Chairman on the death of WDC Wiggins (1971). Although the Royal Society published our English terms in 1966, the multilingual dictionary did not appear until 1973. This work took Ian to Germany and to ICA conferences in several countries, although his regular work with DOS led to several reports. He did find time to be President of the British Cartographic Society (1980-82) and subscribed to several societies in the field of cartography and geography.
Invited to the inaugural meeting of the Charles Close Society, he became a founder member number 14 in 1980. After early retirement in 1984 he was persuaded to take over as Editor of *Sheetlines* in 1987. His cartographic knowledge was quickly demonstrated in his editorials, when he outlined the scope of topics the CCS should embrace. By December 1988 he established his editorial policy and matters of copyright. A year later he confidently distinguished a newsletter from a magazine, which *Sheetlines* had become. Letters to the Editor were lively and forceful, raising some fundamental issues, but no one resigned over them. His tenure of office marked a new standard of typing professionally done, but illustrations remained a problem, especially when trying to render those red OS covers from early folded maps. His association with Peter Clark, who had moved to the Royal Geographical Society on retirement, helped us to frank and distribute *Sheetlines* through the RGS. Contents were listed on the front cover and our logo designed by Bill Batchelor first appeared during his tenure. Under Ian’s editorship our journal matured.

DOS merged with the Ordnance Survey in 1984, and had continued to pass its registry files to the Public Record Office (PRO). A change of policy around 1997 resulted in further transfers of such files to be limited to those discussing high policy, not day-to-day technical work in up to sixty countries. Consequently many files recording the history of this work from 1970 onwards would have been destroyed.

By 1998 it had been agreed that Ian O’Brien, whose knowledge of this work was unparalleled, volunteered to grade the files and OS was prepared to present those he had selected as significant to the CCS Archive in Cambridge University Library. This important collection, safeguarded by Ian’s efforts, today resides in Cambridge.

For these achievements and others less conspicuous he was awarded an Honorary Membership in 2008. By then the illness of Marion and her death in 2009 saw Ian, increasingly frail, less able to travel on map collecting to the near continent. Doubtless his collection of guide books allowed him vicarious travel. Perhaps his considerable collection of railway histories allowed him to relive previous journeys now impossible.

Ian remained aware of what was happening in cartography and the history of cartography. He got much pleasure from reading and was always open to offer advice and information based on his prodigious memory. In recent years he found it hard to attend even meetings in London. His legacy will live on through his generosity and various contributions to the CCS. Self-effacing and modest, avoiding cartographic politics, Ian’s career in DOS and retirement will be celebrated as conscientious and reliable – a model public servant.

*Christopher Board*

*I should like to acknowledge the help of Richard Porter and John Barney for information used in the above text. CB.*
**Kerry musings**

**David Archer**

A few issues ago, when I told of my fondness for plan chests, I did not mention that these were never my first love amongst office furniture. Long before I bought my first plan chest, I was hooked on filing cabinets. And still am, seeing no need to kick the habit. As so often happens, it started in a small way, very innocently really. In the second half of the sixties, Saturday mornings would see my mate Jim and me head up to the clothes shops in Shaftesbury Avenue and Wardour Street, *Take Six* and the rest. But whilst there, we would be lured into a very well stocked Rymans in Soho. Yes, you can imagine the outcome. An assistant would sidle up and tempt us with wonderful displays of pencils, pens, notepads and other small things, which, in our innocence, we started buying, soon to progress to A4 folders and box files for ‘A’ level notes. Filing cabinets were the logical progression, but there was no room at home for such, and anyway serious money was needed for records (vinyl as they are now referred to).

As with plan chests, acquisitions only arrived in bulk after we started selling maps (though I did have a couple before then). In many ways, filing cabinets are to folded maps, what plan chests are to flat sheets. Initially, I bought a good supply of strong plastic Curver boxes, which sit on top of each other with no gaps, helping to keep the dust out. And then we took to English apple boxes with the top flaps cut off, which were just as strong, and free from the greengrocer. However, it was only when we converted the car port to a map store, that we hit the filing cabinets in a big way, and now have 19 in there.

Why cabinets rather than boxes? Boxes sit on each other, get heavier as one gets older, and requests are always for something in the lowest box. Lots of humping boxes about. The only real advantage of keeping maps in boxes, is that they can be moved fairly easily. Across a room, or to take them to the Charles Close Society AGM. If one becomes a convert to filing cabinets, such flexibility can be had by retaining a few boxes. A filing cabinet needs the same floor area as a pile of boxes, plus the space in front, whereas the boxes need an additional space to one side to decant a pile on to. And anyway, nothing in a map room can compare to opening a filing cabinet drawer, heavy with folded maps.\(^1\) The smoothness of the runners, the feel of the action and the unmistakable swishing sound of the mechanism as a drawer opens or closes; reminiscent of a Victoria Line train appearing from a tunnel, except for the clunk at the end.

Filing cabinets are not so classy as plan chests, but are far easier to accommodate, and probably easier to use. Just pull the drawer handle, the contents can be seen at once and are immediately accessible. Open a drawer containing one-inch Seventh Series maps, and one looks down on the information needed to select that which is required. Sheet numbers, names and cover styles. Early short covers stand out, or rather shrink down, from later longer covers, whilst earlier thick cloth backed examples are distinct from paper maps in

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\(^1\) Well, metal plan chests are probably comparable.
red laminated covers. Having selected a map, one just lifts it out. Replacing it is equally easy compared to flat sheets in a plan chest. If one is looking for several maps, those taken out can sit on the other maps in the drawer whilst one works, allowing the tops of the cabinets to be used for other purposes. And a heavy weight on top will not stop the drawers opening. Though I cannot speak for chipboard filing cabinets.

There are not many disadvantages to using filing cabinets for map storage. Flimsy folded maps lacking card covers, most 1:25,000 First Series and Second Series Pathfinders for example, tend to slip down and vanish unless really crammed into a drawer, which makes them increasingly difficult to handle. There is also the temptation to have three rows running the length of the drawer, which for post-war maps risks damaging them whilst taking them out. And if a run of maps is stored across the width of a drawer, from left to right, flimsy examples also tend to lean over and catch the cabinet sides when a drawer is opened and closed. Although filing cabinets can easily take three rows of pre-war maps, there is often a trough down the centre of the drawer and damage can occur if shunting maps. In such cases, I line the drawer bottom with cardboard. Drawers also benefit from a cardboard divider between the rows of maps. I always have dividers in whatever I use. In boxes, this means that if one is carrying them at an angle and the maps slide about, they will not hit each other and damage.

Overall, filing cabinets fulfil all the requirements of storing maps, where they are away from direct sunlight, away from dust, and the metal casing gives some protection from damp and excessive heat. Indeed, a metal drawer front is quite an advantage, in that fridge magnets can be used to hold notes and labels, rather than sticky labels that are difficult to remove after use. All drawers have a label holder, enabling clear identification of the contents, which is usually restricted to the map series. In some households, an unacknowledged benefit lies in the very fact that the contents are out of sight, so that a sudden influx of maps, does not arouse comment, and I have been told that other contraband can be hidden at the back of a drawer quite easily.

But, someone will ask, ‘How can you afford to spend so much money on 19 filing cabinets? Look in any office furniture catalogue, and the prices are horrendous. There must be money in map-selling’. To which I would reply ‘I did not. True. Nugatory’. No, the key to success is to have a source of supply, and be adaptable. My source was the man in charge of the local recycling centre, where ‘useful’ items are saved, and then sold at the gate to raise funds for a school charity. Every time a filing cabinet came in, he would ring me and I would pop down, paying £10 for a nice four drawer cabinet, which is easy to get home. But as I mentioned, one has to be adaptable, and not be fussy about a few scratches, dents or colours. And if you buy a ‘master key’, even locked cabinets are no problem. A CCS member must always be ready for the unexpected.

2 Although most are grey, I do have a green one, which of course houses half-inch maps.
3 Twice, I have been to an auction and seen filing cabinets with keys in, only to find them later locked with no key in sight. Prices then plummet.
On getting a cabinet home, the first thing is to remove any hanging files, and to wipe the whole thing over to remove any grease or spilt coffee stains that might damage the maps. Most cabinets have small holes in the sides to bolt them to each other for safety reasons, but I have never seen these used, nor considered using them. There are a vast number of designs, but they are all fairly consistent in size, although the weight varies, in the same way that the metal in cars gets lighter all the time. The next thing is to decide which map series is to go into a cabinet and to cut lengths of cardboard for the drawers to separate the rows of maps. As mentioned, I consider this essential, even with plenty of space between rows, as one can then work quickly and need not worry about maps getting caught up with each other. At last, one can then introduce maps to their new home. As opposed to plan chests, which one just seems to fill up, it is easier to plan for expansion with folded maps in filing cabinets, where gaps can be left if more maps are anticipated, though a gap between cabinets, wide enough for another would be more useful than gaps in each drawer. Maintenance is minimal, a little grease on the runners, and a light wipe over with furniture polish prevents rust.

Now, I am tempted to say forget all that I have written, as there exists something far better than filing cabinets. Even better than filing cabinets are pattern cabinets. Pattern cabinets as found in haberdashers or whatever the shops are called that sell lengths of material for making into dresses, and sell the paper patterns to make them from. These patterns are kept in wonderful cabinets similar to office filing cabinets. They look like a shorter and wider filing cabinet, but each drawer has three metal dividers, giving four rows, into which even Seventh Series maps will fit with ease. But for pre-war maps, they really are excellent, and a cabinet will take 1300 maps comfortably. Alas, I only have one, which was bought at a local auction about twenty-five years ago. I telephoned and wrote to the pattern company, asking whether it was possible to buy more, even old battered examples, but got nowhere. If you are passing a material shop, pop in, have a look, and ask whether they have any for sale.

Of course, a lot of members keep their folded maps on shelves, as most normal people keep books. This is certainly the most visually satisfying storage method, and, depending on the height of the shelves, the easiest way to retrieve a map. But I defy anyone to say that maps stored on shelves do not attract dust or the spines fade, or that they regularly dust or vacuum them. Given a completely free hand, I would keep a collection of folded maps on shelves, but protected by slightly tinted glass doors. Which would release filing cabinets for other purposes, but not disposal.

Next week: Paper clips. Should we use coloured plastic or silver metal paper clips to keep the four quarter sheets of northern Old Series maps together? Two map librarians will debate the issue.
With reference to John Cole's letter in Sheetlines 103 about the depiction of bus stations, the two which have always amused me are those marked alongside the A458 at Halfway House (above left) and B4386 at Worthen (above right), which appeared on versions A and B of Seventh Series sheet 118. These were simply the rural depots of two small independent coach operators; presumably the surveyor turned up in the middle part of the day and found most of the fleet parked up between school bus duties! Thankfully the symbols were deleted from subsequent editions (certainly by C, which is the next one I have). Note the unsatisfactory registration of the red infill at Worthen.

Derek Persson

Reading David Archer's Kerry musings in Sheetlines 103 I was alerted by the reference to oil company maps. I have several of these, mostly of USA and Canadian origin. Most of them were issued in the 1960s by the big three companies, Chevron, Esso and Texaco and copyrighted by Rand McNally & Company, The HM Gousha Company or General Drafting Co. Inc. They must have been printed in the hundreds of thousands and probably very common. However I have some issued by American Oil Company (presumably AMOCO), Clark, Gulf and Kerr-McGee again copyrighted by the main map publishers. I have never researched these and assume that very few survive after half a century.

One odd example in my collection is a survey map of Israel originally dated 1950 with part revisions dated 1957. This was issued by SONOL ISRAEL LTD petroleum products. The map is at 1:500K with inset urban areas at 1:50K and showing the Armistice Demarcation Line.
could be possibly the first survey map of the new state of Israel although it is intriguing as to how SONOL became involved. Perhaps the Survey of Israel were a bit short of funds. SONOL originated out of Standard Oil (another variation being ESSO) operating in Palestine since the early 1900s. The Survey of Israel was established about the same time under the British Mandate but Israel as a separate state wasn’t established until the late 1940s.

John T Pounder

From time to time members raise the question of fingerprints on maps – those deliberate errors which would reveal illicit copying. There was an example in Sheetlines in 2004 where the cover of a commercial map shows an extract with false street names.¹ The PetrolMaps website² has information about OS additions to maps, as revealed after the 2001 case in which AA paid a £20 million penalty. Below is a photo of an extract of the A-Z map of the Isle of Dogs which shows a fictitious Bartlett Place. This was identified in Nicholas Crane’s Map Man on BBC-TV, series 2, programme 7, ‘Mrs P’s A-Z’, broadcast in 2013. Unfortunately the programme is not available on iPlayer at present. My photo comes from a 2003 edition. Do OS still insert deliberate errors? I do remember that on the CCS visit to the new OS HQ in 2013 that one of the CAD operators did mention their additions to maps but was very cagey about revealing anything.

John King

¹ Fingerprint all over it, Sheetlines 71, 51.
² http://www.petrolmaps.co.uk/special/errors.htm
I have just come across a one-inch Third Edition Winchester District, published in 1910 and held within a 1930s Ellis Martin hiker cover (Hellyer 30 in Map cover art). Mounted on linen, price three shillings. Nothing special. A manuscript note on the inside front cover reads: Cardiff. Stationery Office. 19.9.51. Sale 1/6 [and a squiggle, possibly initials] Had this really been in stock for around thirty years, before being sold at half-price?

David Archer

Anyone who has tried to locate a copy of the Book of Reference (aka ‘area book’) for a particular parish, and failed, may be interested to know that the Internet Archive has a large collection of (out of copyright) scanned texts at https://archive.org/details/texts. Searching on suitable terms, eg “book of reference parish survey” produces about 135 hits. Each hit turns out to be a composite of, say, twenty area books. For the counties I was interested in, they were all sourced from Oxford University. For one county (Denbighshire) I found four files which between them appear to give complete coverage of approximately 80 parishes.

The items appear to have been uploaded in 2008 and 2009 but I wasn’t aware of them until recently. Perhaps other readers are also unaware of this resource?

Pete Bland

Roger Hellyer replies: I feel obliged to warn readers to be wary of placing too much reliance on this potentially valuable resource, so many were the instances of duplicated, missing and misplaced pages that I encountered when working through it earlier this year. Better by far, for image quality as well as accuracy, are the area books of Scottish parishes owned by the National Library of Scotland available at https://archive.org/details/osbooksofreference.

David Andrews’ article about the depiction of boundaries on OS mapping (‘Merely a question of boundaries’, Sheetlines 103, 31) has prompted several interesting responses and David is planning a follow-up article for the next edition of Sheetlines.

If any reader has any further comments or information, please contact the editors.

Dave Bennett of Kidderminster recently came across a long-forgotten bottle of Ordnance Survey Bicentenary Ale of 1991