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Sheetlines

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The Society’s latest publication The First Ordnance Survey Map, by Roger Hellyer and Richard Oliver, describing the Old Series, will shortly become available. During the research it was discovered that sets of Old Series maps were held in the National Libraries of Australia and New Zealand. The map librarians in Canberra and Wellington were approached, and asked to send sample scans from their sets in order to establish whether the condition of the maps was good enough to make further investigation worthwhile. Both libraries were glad to help and the images received indicated that the maps should be included in the book. Roger Hellyer says: ‘We are very grateful to the committee who approved the purchasing of images of the sheets. The results have clearly made the exercise worthwhile, with some twenty new states being recorded. We are particularly grateful to Anne Taylor for making the arrangements to achieve this’.

The 2015 visits programme is proving popular and anyone wanting to attend should contact Bernard Anderson without delay (contact details opposite).

22 April Essex Record Office, Chelmsford. This interesting trip will include a tour of the building and a behind-the-scenes view of the work of the office. There will be a display of items from their collection including early county maps, estate maps, the Walker map of Chelmsford and a 1757 map of Saffron Walden. There will also be items of more specific Ordnance Survey interest, including a selection from the OS collection and surveyors drawings from 1799.

19 May BGS Keyworth. This visit will include an introduction to the work of the British Geological Survey and an opportunity to see their ‘core store’ and the 3D visualisation suite. There will also be opportunities to see their records centre and to visit the library and archives.

24/25 June National Railway Museum and Network Rail York to view the maps held in their archives and libraries.

25 September Visit to Land & Property Services, Belfast, successors to Ordnance Survey Northern Ireland, with optional activities on the Saturday.

In Sheetlines 101 we invited members to offer to set up occasional local meetings. The first such is Frank Iddiols frankiidiols@hotmail.com who has arranged a daytime meeting in St Albans on 16 May. Another meeting is proposed in Kingston-on-Thames at a later date. Bernard Anderson will have details in due course.
**OS announces new logo and increased sales of paper maps**

OS reports that in 2014-5, sales of paper maps increased by 7% despite an overall fall over the past ten years, in line with the rest of the publishing industry, whilst sales of Custom-made maps rose by 12%. Nick Giles, Managing Director of Ordnance Survey Leisure, says: “There’s an emotional attachment to OS paper maps. People love their iconic design and the feel of them in their hands”. Paper maps now account for only five percent of OS annual revenue.

### Top 10 Explorers
- OL17 – Snowdon
- OL7 – The English Lakes: South-eastern area
- OL24 – The Peak District: White Peak area
- OL6 – The English Lakes: South-western area
- OL1 – The Peak District: Dark Peak area
- OL4 – The Lake District: North-western area
- OL2 – Yorkshire Dales: Southern & Western area
- OL15 – Purbeck & South Dorset
- OL5 – The Lake District: North-eastern area
- OL22 – New Forest

### Top 10 Landrangers
- 115 – Snowdon
- 90 – Penrith & Keswick
- 41 – Ben Nevis
- 119 – Buxton & Matlock
- 200 – Newquay & Bodmin
- 23 – North Skye
- 203 – Land’s End & Isles of Scilly
- 114 – Anglesey
- 32 – South Skye & Cuillin Hills
- 194 – Dorchester & Weymouth

Meanwhile OS has introduced new brand identity, the first in fifteen years. According to marketing and communications director Katie Powell, quoted in *Creative Review*, central to the identity is a new logo, which features the letters ‘O’ and ‘S’ above the brand name. In most cases, the O will be filled with a map showing OS head office in Southampton and the S with a map of a rural location in Yorkshire, designed to reflect the organisation’s work mapping Britain’s towns, cities and countryside.

The new logo is shown (top left), with charcoal and white versions, for use on brightly coloured or photographic backgrounds (middle) and smaller version for use on map spines (bottom).
Unfair competition, or an overstocked market?
Richard Oliver

Late in November 2014 it was reported that several companies with interests in geographic information had filed a complaint with the European Commission.¹
The substance of the complaint was that Ordnance Survey was receiving illegal state aid from the United Kingdom Government: of total revenue of some £144 million, £70 million was derived from the OS Open Data agreement of 2010 and the Public Sector Mapping Agreement of 2011, and only £20 million was returned to the Exchequer as profit. At the time of going to press no more had been heard of the complaint, but such things take time to process.²

The leader of the complainants is Getmapping, a company founded in 1998 as the Millennium Mapping Company, and which is largely concerned with aerial photography. The company has an interesting history of variously competing with Ordnance Survey, supplying it with aerial imagery, acting as a licenced partner, and challenging OS in court. Such action goes back to February 2002: it may be germane that whereas in 2000 the company’s shares had reached 224p, when it first challenged OS they were trading at 15.5p and falling, though it is fair to say that the latest available results, announced in July 2014, indicate good growth.³

The complaint to the European Commission follows OS’s acquisition of a controlling interest in a recently-formed company, Astigan, whose activities are a little mysterious, but appear to include developing a drone or dirigible that can remain airborne for days or weeks at a time to undertake aerial imaging.⁴ According to the latest OS annual report, ‘Astigan is a new 51% owned subsidiary, which is researching new ways of remote data collection. We view this as a medium-term investment and have partnered with technical experts in the field. In the year, Astigan made a loss of £0.7m. We consolidate Astigan as Ordnance Survey has control of the Board.’⁵

Three points may be made here. The first is that Ordnance Survey is required to ‘operate commercially’, and that means a constant search to reduce costs. Whatever Astigan is up to may be presumed to have the potential, one day, to be financially worthwhile for OS. To complain about OS’s taking a controlling interest in Astigan is, in effect, to ask that OS desists from pursuing efficiency. Is it reasonable to ask that of a public department, whatever the niceties of its financial status?

¹ Cahal Milmo, ‘Has the Ordnance Survey lost its moral compass?’, The Independent, 29 November 2014, pp 24-5. See also ‘Ordnance Survey expansion “is anti-competitive”’, The Times, 6 January 2015.
² This article has largely been researched by typing ‘ordnance survey unfair competition’ into Google on 23 February 2015.
⁴ The Independent, 29 November 2014.
⁵ Ordnance Survey Annual Report and Accounts 2013–14, 14, available online at the OS website.
The second point is that, although it is alleged by Tristram Cary, the founder and chairman of Getmapping, that OS is ‘hopelessly inefficient’, nothing is offered to substantiate this.\textsuperscript{6} It may be questioned whether such allegations represent much more than the ingrained and long-standing view of many Britons that anything in which the state has a hand must inherently be inefficient. Such allegations are a form of mass defamation that cannot readily be refuted. It may be presumed that the OS interest in Astigan is in pursuit of greater ultimate efficiency: that is, ‘hopeful’ rather than ‘hopeless’.

The third point is that there is perhaps enduring over-optimism as to the size and potential of the geographic information market in Britain. There is nothing new in this: such over-optimism in the 1850s lies behind the adoption of the 1:2500 scale – effectively the core of OS MasterMap – and by the time that the 1:2500 was approaching completion, around 1890, it was apparent that the group of activities that made up the Ordnance Survey had not fulfilled the hopes of the 1850s. There was enough support for the OS to ensure its maintenance, but it was evidently not an asset being exploited anything like as it might.\textsuperscript{7} Since the 1890s new uses have developed, and labour-saving technologies have been adopted, to the extent that demand has risen and costs have been cut so that Ordnance Survey is profitable.

It is surely open to question how much Ordnance Survey is ‘taking unfair advantage’ of its position, and how far complaints are simply a cover for poor business decisions by some of its rivals in the past.

\textbf{Future developments ...}

On 22 January 2015, the Government announced that Ordnance Survey, which currently operates as a Trading Fund, would at the end of this financial year be converted into a GovCo, a government-owned company, which, it said ‘will better place the business to act at pace in rapidly changing markets and remain at the forefront of the global geospatial industry’.

According to \textit{The Independent} of 24 February 2105, The Public & Commercial Services Union believes that this is a precursor to privatisation. PCS official Tony Conway said: “We are worried that the creation of the GovCo is the first step to full or partial privatisation. Ordnance Survey should retain its role as our national mapping service, working for the national interest, not for profit.”  

\textit{JD}

\textsuperscript{6} \textit{The Independent}, 29 November 2014: in fairness, the source is a newspaper article, but surely a line or two of justification, for example a suggestion of overstaffing or over-pernickety standards, might have been offered.

Some collaboration between the Ordnance Survey and the Hydrographic Office in the Nineteenth Century

David L Walker and Adrian Webb

Following the recent Society visit to the archive of the UK Hydrographic Office at Taunton, the editor of Sheetlines and the UKHO Archive Manager, Dr Adrian Webb, kindly encouraged David Walker to explore this extensive and well-kept resource. Considerable evidence re-emerged of many years of effective collaboration between the Ordnance Survey and the Hydrographer to the Admiralty Board, which this article begins to illustrate.

Previous references to this collaboration

Adrian Webb’s DPhil thesis, available online, provides a well-documented account of the arrangements made between the Admiralty Board and the Board of Ordnance from 1808 onwards, resulting in the mutual exchange of relevant maps and charts, shared survey work (especially trigonometric data from the Ordnance and surveys below high water level from the Admiralty) and, occasionally, transport of Ordnance personnel on Admiralty craft.1 Two histories2 of the Hydrographic Office recognise these co-operative arrangements, and AHW Robinson provides the most detailed account, from the eighteenth century until 1855. Inter alia, he describes the use by Graeme Spence and Joseph Foss Dessiu from 1795 onwards of the trigonometrical surveys published by William Mudge; collaboration in the Shetlands from 1817 onwards; and long-lasting support by the Ordnance Survey for the ‘Grand Survey of British Isles’ instigated by the Admiralty’s Hydrographer.3

‘Insider’ histories of the Ordnance Survey have paid remarkably little attention to the collaboration that benefited both organisations. Portlock, Close, Harley in Seymour’s History and Owen and Pilbeam variously mention the need to resolve a few different results for geographical positions, and recognise the support provided by Admiralty survey vessels for Colby’s maritime expeditions. However, Harley describes the survey of the Clyde Estuary in 1838 as a resumption of the trigonometrical survey of Scotland without realising that this was an extension of the secondary triangulation of the Solway in support of the Admiralty.4

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1 Adrian Webb, The Expansion of British Naval Hydrographic Administration, 1808-1829, University of Exeter, 2010, online at: https://ore.exeter.ac.uk/repository/bitstream/handle/10036/116990/WebbA.pdf?sequence=4.
3 AHW Robinson, Marine cartography in Britain: A history of the sea chart to 1855, Leicester UP, 1962.
Other writers are more informative. Harley’s introduction to the reprint of Close’s *Early Years* mentions that there were various instances of co-operation with what he calls the Hydrographic Department in the first half of the nineteenth century. His introductory essay to volume five of Margary’s *Old Series Maps* quotes the first recorded request from Thomas Colby, Superintendent of the Ordnance Survey, for help from the Admiralty Hydrographer. In May 1820, when sending a dry proof impression of the Lynn and Boston map-sheet, Colby wrote: ‘I shall esteem it as a particular favour if you will have the kindness to direct the deficient part of those [sand]banks to be supplied at your offices.’

Even earlier, Rachel Hewitt suggests by reference to Archibald Day and Andrew Cook that in 1801 ‘the [Ordnance Survey] map-makers’ representation of the Thames estuary was indebted to information from Britain’s new Hydrographic Office’. JH Andrews points out that JW Croker, Secretary to the Lords of the Admiralty, in 1819 advocated a combined geographical, maritime and statistical survey of Ireland – and that when this came about the Admiralty hydrographers used the Ordnance Survey triangulation, while the surveyors used the hydrographers’ tracings of the low water line (and even in some cases their submarine contours). Richard Oliver also makes a nice comparison between the evolution of the two organisations and he explains the context of the secondary triangulation undertaken for the Admiralty from the Solway northwards, starting in 1835.

However, the UKHO archive in Taunton contains evidence of a much more extensive (although fragmented) picture and recent research has brought to light aspects of the Ordnance Survey otherwise lost in the fire at the Tower in 1841, or due to the bombing of Southampton in 1940.

**The triangulation of England and Wales**

As the hydrographers came to depend upon the Ordnance triangulation, it is useful to note how it was made available. Mudge published accounts of his trigonometrical survey, stage by stage, in the *Transactions of the Royal Society* for 1795, 1797, 1800 and 1803. When demand for these particular issues created a shortage, William Faden was furnished with the original copper-plates and allowed by the Royal Society and the Master General of the Ordnance to

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republish accounts of operations from 1784 until 1796 (as volume I) and operations from 1797 until 1799 (as volume II). Then in 1811 the Ordnance entrusted to Faden the publication of Mudge’s operations from 1800 until 1809 (which was described as volume III), entitled ‘Account[s] of the Operations Carried on for Accomplishing a Trigonometrical Survey of England and Wales’.11

From 1795 until about 1816 this information was made available to surveyors, as well as map- and chart-makers including Joseph Foss Dessiou12 and Graeme Spence. Dessiou, a former master in the Navy, collaborated with William Faden from 1804 in the publication of charts and joined the Hydrographic Office in 1828. He used Mudge’s trigonometrical survey as a basis for some of his charts (eg figure 1)13 and made handsome tribute to Mudge’s survey in the title plates (eg figure 2).

After Spence retired as the Admiralty’s ‘Maritime Surveyor’ in 1804, he was employed to adjust earlier hydrographic surveys to bring them into line with Mudge’s trigonometrical survey. Figure 314 shows part of one of these charts, published in 1811 among the earliest of the modern genre of ‘Admiralty charts’.

It is of particular interest that only those trigonometrical points shown in red in figure 4 are described as principal or even as secondary points in Mudge’s volume III, published in 1811.15 So it is possible that Spence was provided by Mudge with unpublished information and also that he might have been enabled to survey the additional coastal points himself.

For at least thirty years after 1811, the ‘great points’ of the trigonometrical survey, described and delineated in Mudge’s three volumes, provided the basis for the secondary surveys made by the Ordnance Survey to support the coastal charts of the Admiralty Hydrographer. The information that the Admiralty provided in exchange appears in those Old Series OS maps which show sand banks, mudbanks and submarine contours, sometimes with the marginal note ‘The Shoals from Admiralty Surveys’ or ‘The Coast below high water mark supplied by the Admiralty’.

11 Account of the operations carried on for accomplishing a trigonometrical survey of England and Wales, revised from the Philosophical Transactions, by Capt William Mudge et al (vols I and II) and …carried on in the years 1800 to 1809, by Lt Col William Mudge and Capt Thomas Colby (vol III), London: W Faden, 1799-1811.
13 Chart of the Coast of Cornwall from Rame Head to Tintagel Head, 1811, revised 1816, UKHO, A514 Db.
Figure 1 (above) and figure 2 (below): Part of and title box of Coast of Cornwall etc, 1816 (note 13 refers)
Figure 3 (above) and figure 4 (below): Part of and detail from Coasts of England and Ireland etc, 1811 (notes 14 and 15 refer)
Figure 5 (left): Coverage of Henderson's surveys made in 1835 and 1836 (notes 19, 24 and 26 refer)

Figure 6 (below): Detail of Isle of Man from UKHO,L4926, 1835 (note 19 refers)
Positions from the OS trigonometrical survey were translated into Admiralty charts in a variety of ways. The following case study provides but one of many possible examples.

By 1809 the primary triangulation of England and Wales had reached the Firth of Forth (via Criffel and Wisp Hill), and in 1815 James Gardner had extended this triangulation to the Firth of Clyde. By 1822 only the north west of Scotland remained, but Ireland then became the priority until the primary triangulation of Scotland was resumed in 1838.

Meanwhile the OS topographical survey continued in England and Wales, and its secondary triangulation was augmented where required by the Hydrographic Office. To this end, in 1834, Captain Henderson, whom Portlock regarded as a key officer in the Irish triangulation, was detached with Sergeant Derbyshire, said to be a capable theodolite observer, and five Sappers on what was described as ‘the triangulation of the Lancashire and Cumberland coasts with the Isle of Man, and part of the coast of Scotland’. By November 1834 he had extended the secondary triangulation of the west coast of England as far north as Whitehaven, and on 31 March 1835 he signed off an extensive triangulation diagram showing the distances between primary and secondary points extending from Delamere to Criffel.

Only a week later, Henderson signed off an even more impressive diagram covering the area shown in figure 5. This diagram is of particular interest in regard to Colby’s reluctance to publish the results of the trigonometrical surveys of this period. It may be the earliest complete record of Ordnance Survey calculations of distances across the Irish Sea, and it also appears to be the first position for Knock of Luce, which by 1844 was designated as the Wigtonshire meridian for the first enduring surveys of Scotland. Figure 6, a detail of the Isle of Man from Henderson’s actual diagram, illustrates a few of the numerous distances shown between principal and secondary points. It is unclear which of these distances he calculated from his own observations, and which he recovered from previous work. However, it is clear that the distances from North Berule to Black Comb[e] and Scilly Bank match those in Mudge’s volume III, that Gardner’s

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17UKHO, Incoming Letters pre-1857, LP1857 C262, Thomas Colby to Captain Beaufort, 29 Nov 1834.
18UKHO, L4927, *OS Diagram to Workington, Bengairn and Mt Criffel*, scale half inch to a mile, 31 March 1835.
20*An Account of the trigonometrical survey carried on in the years 1800 to 1809*, by Lt Col William Mudge & Captain Thomas Colby, vol III, London: W Faden, 1811, 144.
calculations for south west Scotland were available at The Tower in 1834,\(^\text{21}\) and that Henderson was familiar with the Irish calculations.\(^\text{22}\)

From June until October 1835, Henderson was engaged, with his six men from the Royal Corps of Sappers and Miners, around the Solway and on the surrounding mountains, where he returned in the summer of 1836.\(^\text{23}\) On 17 March 1836 Henderson signed off a triangulation diagram comprising nearly thirty points within the area marked on figure 5 in pink,\(^\text{24}\) together with ‘a small book containing the distances, angles, &c made use of in its projection, also the Latitudes and Longitudes of the Principal Points’\(^\text{25}\) and by 17 June 1836 at the Hydrographer’s request (referred to below) he had extended this to cover the area marked in blue from Southerness to Glasserton.\(^\text{26}\)

For some reason, possibly due to the large backlog of surveys waiting to be published, the Hydrographic Office’s progress lagged considerably behind the Ordnance Survey. By April 1835 Robinson wrote to advise Beaufort that he ‘had personal communication with Captain Henderson as you desired regarding the Points and matter that the Ordnance could supply for that portion of coast [of North Wales?], as well as the Solway Frith [sic] which you also mentioned, and thereby made myself conversant with the same. I further beg to state that I have been gaining what local information time has permitted since my arrival.’\(^\text{27}\) Yet he was allowed to spend 1835 completing his survey of the waters around Anglesey, as he wished. In December, in response to a request, he reported that ‘I have been looking over an old Chart of the Solway, and consider the Coastline from St Bee’s head to Carlisle, then proceeding with the Mid Channel Shoals, the Low water feature, and Soundings in the English Channel, would I imagine not be accomplished under £250 unless the hire of Vessels are more reasonable than on this Coast.’\(^\text{28}\)

Eventually, in March 1836, Robinson wrote from Beaumaris to inform Beaufort that ‘I have received Instructions from their Lordships Secretary to proceed to the Firth of Solway, and survey from St Bee’s Head to Wigtown Bay with the various


\(^{24}\) Capt Alexr Henderson RE, *Diagram of the Ordnance Trigonometrical Points adjoining the Solway Firth fixed for the Hydrographical Department of the Admiralty*, UKHO, L2944, 17 March 1836.

\(^{25}\) UKHO, LP1857 H325, Capt Alexr Henderson RE to Captain Beaufort, 17 March 1836.

\(^{26}\) Capt Alexr Henderson RE, *Diagram of Ordnance Trigonometrical Points for the continuation of the Survey of the Solway observed and computed by Capt Alexr Henderson*, UKHO, L2944a, 7 July 1836.

\(^{27}\) UKHO, Surveyors’ Letters, SL 22a, CG Robinson to Captain Beaufort, 2 April 1835.

\(^{28}\) UKHO, Surveyors’ Letters, SL 22a CG Robinson to Captain Beaufort, 22 Dec 1835.
Rivers up to the first Bridge, also that you will be pleased to provide me with a copy of the Ordnance Triangulation in that neighbourhood.’

In April Robinson was based in Carlisle, and from May until October in Allonby on the Cumberland coast. Unlike the Ordnance Survey routine, he retired over the winter to Carlisle rather than London, to complete a fair version of his survey of the southern part of the Solway estuary. By April 1837 he was in Dumfries and from May until October in Carsethorn on the north coast, before returning to Dumfries for another winter’s desk work recording the northern part of the Solway as far west as Abbey Head.

Although Henderson’s diagrams had provided Robinson with the positions of numerous secondary points on each of the south and north coasts of the Solway estuary, as shown in figure 7, Robinson in his reports rather takes his use of these for granted, and there is no record that he was in direct contact with Henderson over this period. Colby, unhappy with the course of events, commented in testy mode to Beaufort:

‘...You are aware that very considerable extra expense and delay has already occurred in Captain Henderson’s point fixing for the use of the Admiralty, in consequence of my not having been made fully aware of all...

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29 UKHO, Surveyors’ Letters, SL 22a, CG Robinson to Captain Beaufort, 26 March 1836.
that would be required at the commencement. Hitherto, this inconvenience from partial demands has been unavoidable. The first application was for points preparatory to deep sea soundings in the Irish Channel, the second for a more minute nautical survey of the Solway Firth; the third, for its extension to Wigton Bay. Had all these three applications been simultaneous, much time and expense would have been saved, in the selection and visitation of stations. Now, an application is made for the Firth of Clyde, and I am apprehensive that this is only another commencement of partial applications - In fact that when Captain Henderson has fixed points for one half of the Firth of Clyde, he will be called upon to fix points for the other half, and thus that great expense and loss of time will be again incurred ...'

From Robinson’s letters it appears that he enjoyed considerable discretion and responsibility (subject to regular reporting) to hire boats, horses and ‘instrument men’, to set his own programme, and, for example, to advise the directors of the Carlisle Canal Company over the provision of channel lights and buoys. When he identified a suitable candidate as second assistant surveyor, his advice was promptly accepted. When his small theodolite and box sextant needed repair, he made his own way to Liverpool to get them repaired by the makers. When he wrote to Beaufort at the end of the season that ‘I have been obliged to exceed my estimate sent up last winter by £30, a Bill for which I have drawn, and trust the work will fully bear me out the expense’ it seems that this plea was accepted without the quibbling which usually characterised the Admiralty.

In 1838 and 1839 Henderson’s survey party was engaged on the Clyde estuary, defining coastal points for Robinson’s subsequent use, and in 1840 was despatched to the Cape of Good Hope for a re-measurement of that meridian. Robinson’s work in 1838 included a chart of Kirkcudbright Bay, which showed inland details well before the first OS map of the area, and a chart of Solway Firth which illustrates his use of Henderson’s points. Over the following years he worked northwards to the Clyde and on to the west coast of Scotland.

**Conclusions**

This case study illustrates the wealth of material in the UKHO archive, but also the patience required to unravel the various geographical threads. It also provides a reminder that, although history may be written by reference to the Admiralty Hydrographer and the Superintendent of the Ordnance Survey, they depended upon the ability and resourcefulness of officers like Lieutenant Robinson and Captain Henderson.

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30 UKHO, LP1857 C184, Lt Col Colby to Captain Beaufort, 12 Nov 1836. Interestingly, AW Robe had responded earlier that ‘I have none but what are in daily use here and we have to purchase them ourselves from Gardner who bought the copyright from Faden …’ (UKHO, LP1857 R275, Robe to Captain Beaufort, 18 April 1835).

31 UKHO, Surveyors’ Letters, SL 22a, CG Robinson to Captain Beaufort, various dates 1836-37.

32 These charts, and many others of the Scottish coast, are available within the on-line map collection of the National Library of Scotland at: [http://maps.nls.uk/coasts/admiralty_charts_list.html](http://maps.nls.uk/coasts/admiralty_charts_list.html).
Members wishing to pursue these matters further are invited to read the Appendix of this paper; to consult Dr Adrian Webb, the Archive Manager, via the UKHO website; and to consider David Walker’s database. We thank the UKHO for permission to reproduce the figures; the research room staff for their competent and patient support; the archivists of the past for their enduring bequest; and Dr Richard Oliver for his helpful comments.

Appendix

Notes on relevant sources at the UKHO Archive, Taunton

The website of the UK Hydrographic Office provides a high-level guide to its archive. This is supplemented by these notes, which distinguish between, firstly, logs, journals, letters and pamphlets and, secondly, surveys, maps, views and charts. In each case further information is available on the shelves of the research room and on request.

Logs, journals, letters and printed pamphlets

These are listed in the UKHO Catalogue of Manuscripts, compiled by Lt Cdr Andrew David RN, which is available in a Word document on application to the Archive Manager. This includes detailed lists of the following series that illustrate various aspects of the collaboration between the Ordnance Survey and the Hydrographic Office:

- **Minute books (MB 1, MB 2 etc)**
  93 volumes of Departmental minute books covering the period 1825 until 1912. Indexed after 1846.

- **Outgoing letter books (LB 1, LB 2 etc)**
  32 volumes covering the period 1815 to 1887; each volume is indexed at the back. LB2 for example includes four letters to Colby and six to Richard Mudge, mostly thanking them for coastal tracings received, as well as requests for geographical positions.

- **Letters prior to 1857 (Incoming) (LP 1857 A – letters from surnames A, LP1857 B etc)**
  An index is available in Excel listing each letter by year and name of correspondent but not its content. Each letter has a unique number. This series contains about 400 letters from Ordnance Survey officers (Colby, Yolland, Robe, Vetch etc) and David Walker has (so far) indexed about half of these 400 letters by topic, places and persons.

- **Surveyors’ letter books (SLB 1, SLB 2, etc)**
  From 1866 a series of letter books survives recording letters sent to surveyors from the Hydrographer.

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33 For information on references to OS/HO collaboration, contact d.l.walker@blueyonder.co.uk.

34 http://www.ukho.gov.uk/AboutUs/Pages/UKHO-Archive.aspx.
• **Surveyors’ letters (SL 1a, SL 1b, SL 1c, etc)**
  Separate file or files for each surveyor’s letters and reports sent to the HO, in date order. A fruitful source of detail but not a quick read. This series contains no plans, which were removed to the ‘Original documents’ series when received (see below). There are summaries of surveyors’ reports in SL 101/1 (1825-33), SL 101/2 (1833-48) and SL 101/3 (1848-56).

• **Miscellaneous letters and papers (MLP)**
  The contents of each volume are summarised, and indexed by author. These contain a few relevant papers but are mostly about an impressive variety of overseas survey work and scientific subjects. An electronic list is available.

• **Miscellaneous survey data books**
  A modern catalogue is available. Home Waters are in books 34 (1838), 35 (1841-43) and 41 (1847).

• **Geographical positions**
  A collection of lists of geographical positions (mainly from the 1820s onwards) compiled from a variety of sources that includes for Home Waters: box B, South coast and Channel (41 items) and box C, Scotland (15 items).

**Surveys, maps, views and charts**
Some catalogues of published Admiralty charts, from 1825 onwards, are available on the UKHO website (referred to above) in pdf format. Catalogues of the complementary collection of surveys, maps, views and charts (including manuscript material) are held in the research room at Taunton. Some triangulation diagrams made by the Ordnance Survey are identified on pages 18 to 30 of the UKHO geographical catalogue of England, Scotland and Ireland but this list is known to be incomplete. The series of ‘survey ledgers’ (in the research room) is voluminous, but the numerous entries are in chronological order, and Ordnance Survey work is clearly identified as such. Some at least of these references have proved useful.

Charts and MS surveys (described as ‘Original Documents’) dated before 1826 are gradually being re-catalogued and transferred to The National Archives at Kew, where the catalogue entries are becoming electronically searchable in ADM 352. Part of the collection of coastal and riverine views has been held at Kew for some time and is searchable in ADM 344; a further 20,000 views have been identified for cataloguing and transfer.

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Members are reminded that a useful forum for questions and discussion about Ordnance Survey and associated maps and mapping is the Yahoo Group, *ordnancemaps*. This is a public group to which anyone may post and reply. Topics raised here sometimes later find their way into *Sheetlines*; Jack Kirby’s article on page 56 is a good example.

You can join online at Yahoo Groups UK or by sending an email to *ordnancemaps-subscribe@yahoogroups.co.uk*
Two of the articles in Sheetlines 101 particularly caught my eye and prompted this response.

In ‘Error and efficiency’ (page 48), Richard Dean comments on the rapid and efficient update of the 1:2500 scale mapping of the area around his house following an email to Ordnance Survey. He includes an extract of the overlay of the corrected detail and the original 1:2500 map detail.

The first thing to take into account is that the extract has been printed at 230% of its original survey and publication scale, as evidenced by comparing the 50 metre scale bar with an actual 1:2500 scale. The effect is that differences that look serious are not as significant as they appear at first sight. The maximum difference measured on the extract would appear to be 7 metres, but when corrected to allow for the magnification of the image it is actually 3.04 metres. This is not too far away from Ordnance Survey’s published Absolute Accuracy figure for County Series derived 1:2500 scale mapping of ±2.8 metres RMSE.

However, the situation is not as simple as that. Richard appears to have constructed his overlay by fitting the old mapping detail with the new, corrected, mapping detail to achieve a ‘best mean fit’. This results in a comparison of the shapes and sizes of the detail, but the absence of any National Grid coordinates from the old and new mapping makes a calculation of the Absolute Accuracy impossible. It is, however, possible to comment on the Relative Accuracy of the old mapping.

Since the corrected map detail has been supplied by differential kinetic GPS methods it can be assumed, for all practical purposes, to be error free. Therefore a comparison of measurements between points common to both the old and corrected mapping should establish whether the old mapping meets Ordnance

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1 The writer is a retired OS Chief Surveyor and Production Group Manager, now an expert witness in boundary and right-of-way disputes.
2 Absolute accuracy is a measure that indicates how closely the coordinates of a point in the map dataset agree with the real coordinates of the same point on the ground in the British National Grid reference system. RMSE = Root Mean Square Error, and is a measure of the magnitude of a set of numbers. To calculate RMSE: Square all the values, Take the average of the squares, Take the square root of the average. For example, the RMSE of: -2, 5, -8, 9, -4 is 6.16. The RMSE is always the same as or just a little bit larger than the average of the unsigned values.
3 Relative accuracy is a measure of the positional consistency of a data point in relation to other near points of detail. Relative accuracy compares the scaled distance between features measured from the map data with distances measured between the same features on the ground.
Survey’s published Relative Accuracy figure for County Series based 1:2500 scale mapping of ±1.2 metres RMSE.

The largest difference in the relative positions on the extract is an apparent 6 metres in the measurement from the frontage of the house at the SW corner of the extract to the front wall. When corrected for the enlargement of the map extract this actually becomes 2.6 metres. Most of the measurements along and between mapped features agree very well as can be seen by simple visual inspection of the extract. This extract is a very small sample of the total map however, and if a proper analysis of the whole map were conducted I would expect that this isolated error of 2.6 metres would not significantly affect the expected Relative Accuracy of the larger dataset.

Richard’s closing comment about the warring neighbours disputing the position of the boundaries based upon the lines shown on an Ordnance Survey map is well founded, not only for the reasons contained in the text above, but also as is stated in Ordnance Survey’s published statement on the subject:

‘The purpose of an Ordnance Survey map is to depict, within the limitations imposed by the particular scale and in accordance with the rules and conventions adopted by Ordnance Survey and which were in being at the time, the topographical features in existence at the time of survey or revision. Whilst parliamentary and local authority boundaries are shown where appropriate, as made clear in the Ordnance Survey Act 1841, Ordnance Survey is not concerned with private property boundaries as such: for example, a fence, if shown, will be located on the map in the position it occupied at the date of survey without prejudice as to whether or not it was erected along a proper boundary of legal ownership.’

Land Registry Title Plans are copies of the Ordnance Survey large scale map, so these too are of no use in precisely positioning property boundaries. Land Registry show only ‘General Boundaries’ and the legal authority for property boundaries is contained in the pre-registration Deeds, Conveyances and Transfers and their accompanying plans. It is surprising how many solicitors, banks, mortgage companies and householders have destroyed old deeds because ‘the property is now registered and we don’t need the old documents’. However, don’t tell too many people about this, those warring neighbours contribute significantly to my post-OS retirement pocket money.

In the other article that caught my eye, ‘OS and Land Registry’ (page 52), John Cole mentions some of the unfortunate experiences of OS surveyors conducting surveys for Land Registration. It brought to mind my experiences of carrying out tacheometric surveys in Catterick Garrison in the 1970s. The survey team rolled up to the guardhouse of the Royal Signals depot to ask permission to enter the depot to conduct a survey traverse. ‘No problem’ said the pleasant young man on sentry duty, and in we went. No problem at all that day. However, on arriving the next morning, what a change. Overnight miles of barbed wire fencing had been erected, sentries carried firearms and wore helmets and body armour that had been absent the previous day, and the same pleasant young man absolutely
refused us entry. The reason, the previous afternoon a bomb had been detonated in the Aldershot barracks. ‘You’ll have to talk to the Garrison Security Officer’ we were told. Off to Garrison HQ where we were told that the Garrison Security Officer, a Colonel, was far too busy to see us. Over a period of five hours we were passed down the command line with everyone refusing to allow us civilians into the areas inside the security perimeter. At last we got to talk to the man who I came to realise actually ran the army, the Garrison Sergeant Major. Suddenly, no problem, profuse apologies for the inconvenience we had been put to, tea and sandwiches in the Sergeants’ Mess while photo passes were arranged for us, and a warning not to enter any buildings as ‘the chaps are a bit jumpy at the moment’! (Understandable!). With passes personally signed by the Garrison Sergeant Major we were treated like gods for the remainder of the task, with lunch in the Sergeants’ Mess as often as we liked.

Later on in Catterick Garrison we had to traverse through a garden in the officers’ housing to link two overlong traverses and meet the specifications for maximum length of a tacheometric traverse. We knocked on the door and a Major’s wife answered the door. We explained that we needed to put a wooden peg in her back lawn and traverse through the garden. ‘No problem, don’t bother to knock when you come back to do the work, just let yourself in through the side gate’. Two days later, having placed the peg on the first visit, we returned to conduct the traverse. Dave, my forward staffman, entered the garden without knocking as instructed. He seemed distracted and not as efficient as usual in erecting the tripod and staff. Probably suffering from last night’s beer I thought.

Observations completed I waved Dave off and he exited to garden and moved onto the next station. I took up the tacheometer and tripod and moved onto the peg in the garden. As I rounded the rear corner of the house I was confronted by the sight of the major’s wife, and her two teenage daughters, stark naked sunbathing on sun loungers in the garden. A cheery wave and a ‘Hello’ from them and they returned to their paperbacks. I must confess that I was now distracted, the more so when the major’s wife strolled up to me and started asking questions about the tacheometer, followed by the offer of cups of tea for the team. I think, prudently, I declined the offer on behalf of the team and made an exit from the garden as soon as I could. I did think to warn John, the back staffman, before he entered the garden! He was a little older than Dave and me, and he had suffered from high blood pressure and a heart flutter. Much as I liked him, I didn’t want to have to practise my recently learned mouth-to-mouth skills.
**John Cole adds:**

With reference to Richard Dean’s cautionary note on large scale linear accuracy, I found a further aspect somewhat disturbing. According to the online OS tile selector, which is admittedly not updated since July 2011 for detail but not, as I understand, category, SJ 8959 in which Richard’s house lies, is supposedly classed as AR. In effect this indicates 1:2500 scale to 1:1250 accuracy – certainly not the kind of discrepancy shown on the diagram.

As I understand it (from a consultation paper of 1997) the relative accuracy (i.e. point of detail to another point) is +/- 0.4m over 63% of the map; +/- 0.8m over 95% and +/- 1.0m with 99% confidence level for the rest.

I suspect that in this case the 63% can only apply to the limit of the Biddulph built-up area and Marsh Green, the remainder being rural or semi-rural and ‘R’ (or 1:2500 accuracy). Nevertheless, I assume anyone purchasing the whole or any part of the 1km square would be charged as for 1:1250 accuracy.

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4 *Sheetlines* 101, 48.
6 See also John Cole, ‘Testing the enhancement’, *Sheetlines* 72, 46.
Ordnance Survey forgets about roads
Rob Wheeler

Suppose the OS issued a map in one of its standard series and forgot to put in the road fill, so that it reached the shops with all the roads 'white'. What a kerfuffle there would be, with letters to The Times, perhaps even questions in Parliament. Well, it happened in 1987, and I suspect it may have taken 27 years for anyone to notice.

The map in question, Pathfinder 376, Jura (North), is not exactly well-endowed with roads, but there is an unclassified road that struggles up the east side of the island, a proper road as far as NR 670930 according to Landranger 61 (A1 - revised 1985, selected changes 1992). Beyond that it becomes an 'other road, drive or track'. The Pathfinder to the south shows it as a proper road too, right up to the neat line at 661900.

But the clinching evidence is the width of the Pathfinder road symbol, 0.6mm as far as 685950, beyond which it narrows to 0.4mm – see above, where the change occurs between the 130 and 100 contour values. The latter width is indeed that shown on the Pathfinder key for ‘other road, drive or track’. A width of 0.6mm was only used on Pathfinders for pukka roads, and these should always have had a fill of some kind.

The observant may also notice that Pathfinder 376 had ‘Major roads revised 1987’, a somewhat specious claim. I suppose it means that someone had checked that the motorway programme had not reached the island. This still leaves the question of which of these maps tells the user what he really wants to know: where does the right of way for motor vehicles stop? I haven’t inspected this in person, but a photograph appearing on Google maps (opposite) indicates that the Landranger's depiction is the accepted one.
More on the UTM Grid system – international aspects
John L Cruickshank

In Sheetlines 96 and 98 Mike Nolan presented what he termed a ‘short note’ on the introduction of the Universal Transverse Mercator (UTM) Grid on military maps.¹ His note is in fact a very substantial one, but concentrates almost exclusively on the process of the application of the new grid system to British military maps as revealed by the associated implementation documentation.

It is worth appreciating, however, that because the UTM grid was initially introduced by the United States Army, and was only subsequently adopted as a NATO (and so British) worldwide standard, the process of introducing the grid was less linear than Mike’s account might suggest. Furthermore documentation was produced and distributed by NATO countries other than Britain,² and also by countries outside NATO, particularly those of the Warsaw Pact. The present note is firstly intended to draw preliminary attention to some elements of this additional documentation that exist and may be encountered in libraries and collections, and secondly to point out their wider significance.

The need for unified worldwide grid systems became starkly clear in the final months of the Second World War (WWII) and early years of the Cold War. Put briefly, the grids of WWII were designed for use in targeting conventional artillery. For such weapons, the presence of a grid junction is a nuisance, but can be dealt with by constructing overlap areas at the junctions of grids. The vastly greater ranges of the V2 rocket and all its successors made such expedients unworkable. Targeting intercontinental ballistic missiles depended crucially on accurate worldwide geodetic data, and the construction of worldwide reference systems. In the USSR, the reference system used was based on their 1942 System of Gauß-Krüger grids, constructed using Krassovsky’s newly-calculated figure of the Earth (1940) and introduced into service in 1946. The geodetic calculations underpinning this had originally been intended merely to unify the hitherto incompatible geodetic systems of the USSR, and to establish a single geodetic framework spanning the vast extent of that country from Central Europe to the Bering Strait. However the size of the USSR was such that subsequent extension of this system around the remainder of the globe required no fundamental change.³ The USA and its allies seem to have been slower off the mark, perhaps

² The NATO Treaty was signed on 4 April 1949.
because for them WWII was experienced as a conflict fought in a number of quite separate theatres of action. Many of these theatres were covered by various existing British grids (and map projections), which had been adopted unchanged by all the allied powers where they existed.\(^4\)

Geodetic systems and map projections within the Continental USA and elsewhere in the Americas had developed in isolation from each other and were often incompatible. Following the First World War the United States Army had introduced a series of Lambert Polyconic projections with two standard parallels to be their standard within the USA, and had based their grid system on this projection. The USGS and the USCGS used their own projections and reference systems. From 1936 these had been coordinated such that the Polyconic projection was used for some scales and what became known as the Transverse Mercator was used for others. Individual Polyconic grids were established for each individual state of the Union and for the Panama Canal Zone, Hawaii and the Philippines. As an expedient during WWII this grid system was extended, as the World Polyconic Grid, to combat areas for which British grids had not been established, but was soon recognised to be unsatisfactory.\(^5\)

Following WWII the US Army and Air Force thus worked to develop new ‘universal grid systems’. Mike Nolan quoted (from a 1952 US manual) a description of the adoption in 1947 of the Transverse Mercator Projection with UTM grid as a standard ‘for use in US joint Army-Navy-Air operations involving close contact with the enemy’. The very specificity of this definition of the applicable operations clearly indicates that at that date application of the system was still limited. The general introduction of the UTM grid system can however be dated to 8 August 1951 when the manual The Universal Grid Systems (Universal Transverse Mercator) and (Universal Polar Stereographic) was published (left). After some introductory text, the bulk of this fat volume (324 pp) comprises sets of tables of numerical values for the construction of UTM grids based on the Clarke 1866 spheroid. The

1967, 21-90, esp 69-72. It should be noted that a Gauß-Krüger projection is essentially similar to a Transverse Mercator projection.


\(^5\) The clearest summary that I know of this complex topic is unfortunately in Russian: AM Komkov, Gosudarstvennaya Kartografiya SShA, Moscow: Geodezizdat, 1961, see especially chapter II, section 13, 56-61. There is an extensive English-language bibliography to this work.
section on the construction of the Polar Stereographic Projection is much shorter, as this projection was intended only for use between 80° and 90° North and South. The novelty of this publication is emphasised by the fact that Changes No. 1 to this manual, issued in August 1952 (just twelve months after the first publication), included a complete rewriting of an introductory section headed ‘The Basic Structure of Military Mapping’ as well as several other significant changes.6

And furthermore, notwithstanding the publication of this manual, a unified worldwide reference system for the western powers had still not been achieved. What now seems jaw-dropping is that five different spheroids were still to be used for different parts of the globe, reflecting the different spheroids historically used in the construction of the then existing mapping. Appendix II of the 1951 manual is a diagram showing the patchwork of areas of the world to be gridded using different spheroids. The grid values for the Clarke 1866 spheroid tabulated in the manual were thus only applicable to the North American continent, Greenland and the Philippines. Several of the boundaries between areas with different spheroids seem to have been chosen to cause confusion and incompatibility. For example the international spheroid was to be used for western and central Europe, including the USSR west of the Leningrad meridian, while the Bessel spheroid was to be used for the rest of the USSR together with Norwegian Svalbard. Revision of the boundaries of these areas was clearly inevitable.

In fact, the use of these multiple spheroids by the western powers was unavoidable at that time. Unlike the Soviet Union, which had a continuous geodetic triangulation chain from the Baltic and Black Seas to the Pacific Ocean, augmented with complementary astronomical observation data, the western powers had no equivalent data set from which to recalculate the figure of the earth. Not until techniques of geodetic measurement using orbital satellites could be developed (from October 1957 onwards) was it possible for the western powers, including the United States, to adjust all their separate geodetic triangulation nets and bring them into conformity on a single spheroid.7 Even then, the practical computation of such adjustments also required the development of electronic computing technology.

Nevertheless it can be seen that the introduction of UTM grids on British military maps from 1952, in accordance with the Army Council Instructions described by Mike Nolan, formed part of a sequence of events triggered by the

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7 The immediate impact of the launch of Sputnik I on the geodetic work of the Ordnance Survey is mentioned in a chapter on geodetic developments in WA Seymour, A History of the Ordnance Survey, Folkstone: Dawson, 1980, chapter 34, especially p 346. It is however now obvious that the content of this chapter was substantially constrained by security restrictions; the topic thus requires re-evaluation.
publication of the 1951 American manual, which in turn arose from the experience of WWII and the development of long-range ballistic missiles.

In a further Sheetlines article Mike has illustrated the complex patchwork of grids used within Europe and North Africa by the western powers before the introduction of the UTM system.³ Historically this pattern had arisen quite simply because different countries had constructed their geodetic nets using independent datums and different spheroids, and had constructed their maps using different projections. The existing grids had subsequently been established on the basis of the existing maps. Not until WWII, when warfare and conquest swept across both much of continental Europe and Africa north of the Sahara, did the necessity to unify all these different systems appear. Nor indeed was it possible to do so before conquest had led to the sharing of geodetic data that had previously remained unpublished in national geodetic archives. Following the German conquest of much of Europe, which included the taking over of many geodetic offices and archives, members of the German General-Staff Kriegskarten- und Vermessungswesen organisation began the process of collecting and unifying the geodetic data of the continent.⁹ After the eventual German defeat and organisational degradation, many of the same individuals were once more recruited to continue the same work (with allied encouragement) as part of the Institut für Angewandte Geodäsie (IFAG, the Institute for Applied Geodesy), in Frankfurt am Main. The Army Council Instruction of January 1952 pictured in Sheetlines 96 refers to ‘the recently completed adjustment of European national triangulations’.¹⁰ In a very real sense this British Army Council Instruction represents the culmination, and indeed fulfilment, of a German wartime project initiated a decade before. However it should of course be appreciated that the Army Council, in their Instruction, silently excluded Britain from Europe. According to Seymour, the incorporation of the Ordnance Survey’s triangulation network into this adjustment did not take place until more than a decade later.¹¹

Mike has also shown that the process of substituting UTM grids for the pre-existing British grids was a very drawn-out one, extending over at least two decades. This was reflected in American manuals, for example a 1955 manual on the compilation of maps specifies that between 80° North and 80° South the major grid indicated should be the UTM grid ‘except in areas for which British grids are prescribed’.¹² It is also reflected in the continued acceptance for use by NATO forces within this country of the Ordnance Survey’s National Grid, which although a transverse mercator grid does not conform to the UTM standard.

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¹⁰ Sheetlines, 96, 28.
¹¹ The British and French triangulations were linked in 1963. The time taken for the subsequent adjustment is not mentioned. WA Seymour, op. cit., 345-346.
Extract from fold-out diagram in FM-84-35 showing Gauß-Krüger grid zones in Western and Central Europe. Note that while the grid-zone boundaries are formed by the same meridians as used for UTM grid zones, the G-K zone to the east of the Greenwich Meridian is grid zone 1, while in the UTM system this is grid zone 31.

Inset: Cover of FM-84-35, dated September 1981
The introduction and extension of UTM gridding by the NATO armed forces was of course noticed by the intelligence services of the Warsaw Pact nations. During the Cold War each side watched the other's technological developments closely, both to assess where they themselves were ahead, and to plagiarise or replicate significant innovations by the other side. Geodesy was most certainly a topic of interest to both sides, not only because of its central role in the targeting of intercontinental ballistic missiles, and later of cruise missiles, but also because each side needed an accurate locational framework within which to place satellite imagery and other remote sensing data. An example of the Warsaw Pact response to the introduction of UTM grids is the creation and issue by the East-German *Militär-Topographische Dienst* of an entire series of 1:200,000 military topographic maps, covering the expected central and western European battlefield, carrying both their usual Soviet System 1942 Gauß-Krüger grids and an overprinted UTM grid. These were clearly intended for use in interpreting intercepted signals and other intelligence material. Examples of a provisional edition of this series are known from 1960-1961, but a more developed form of the series extending as far as the English Channel was issued in 1985. This incorporated not only both grids, but also placenames and marginal information in both the Russian and German languages. To date I have not seen an analogous purely-Russian series produced by the Soviet Military Topographic Service, but it surely must exist.

Likewise US Army Intelligence officers needed to be able to interpret intercepts. An intelligence field manual *FM 34-85 Conversion of Warsaw Pact Grids to UTM Grids* was produced, with supplementary manuals giving detailed conversion tables for particular parts of the globe. Thus *FM 34-85-1 GK Conversion (Mideast)* was issued in February 1983 (left). Unlike earlier US Army manuals, these have attractive graphics on the front cover, although rather than using Soviet-pattern dividers (which are very distinctive) the Russian bear is shown using a western-style instrument to measure part of northern Iran. The prospect of changes in the spheroids used for different areas of the globe within the UTM system was mentioned above. Whereas in 1951 the Middle East had been a meeting point of mapping and grids with four

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13 See AM Komkov, *op. cit.*
14 Kartenart 05.6. UTM-gridded maps were also produced at 1:500,000 and 1:1M (Kartenarten 05.7 and 05.8).
different spheroids, in the 1983 manual the whole area was referred to the European Datum and International Spheroid. Nevertheless the foldout map at the back of the manual carries a note that yet further changes were pending in the boundaries between spheroids, particularly as they concerned Afghanistan, Saudi Arabia, and Kuwait (all of them areas of Soviet and/or NATO military interest). One is left wondering whether this represents disinformation, since by this time the transition to a unified worldwide system based on satellite data had become both possible and imminent. It became an actuality the following year with the introduction of the World Geodetic System (WGS 84).

Even so, while WGS 84 still remains the standard to which the American Global Positioning System (GPS) relates, in the decades since its introduction it has undergone minor revisions, including revisions to its ellipsoid. Similarly the Soviet (and now Russian) parameters of the earth have also been updated to achieve progressively greater accuracy and precision, new values being established in 1977, 1985, and 1990.16

Mike Nolan’s ‘short note’ should thus be seen as opening a door into a broader history of the development of modern geodesy. In our small islands off the coast of western Europe we have tended to take geodesy for granted, or even to regard it as a nasty habit that foreigners indulge in, yet GPS, GLONASS and Google Maps are now ubiquitous in our lives and in the economy of our country, as well as in the rest of the world. Ordnance Survey practice and procedure have certainly been transformed. While the most visible indication of this transformation may be the dramatic reduction in the number of trig points and pillars to be maintained, this is merely a reflection of rather more fundamental changes which seem overdue for description. Indeed, despite some important recent essays,17 a comprehensive historical account of the development of modern geodesy and its impact on our lives is still awaited.

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**Hiding awkward things under the bed (the river bed)**

*Paul Bishop asks what happened to misfits, Richard Oliver and David Andrews offer their thoughts. Can anyone provide more information?*

**PB:** I am doing some work on using rivers as boundaries (borders) and have been struck by how well the Scotland-England border still coincides with the present river on OS Scottish First Edition mapping of the Tweed (which might tell us something about river and border stability). But I wonder about mismatches between National and Cassini Grids and how these might be ‘hidden’ in rivers.

Colleagues have told me that anecdotal evidence suggests that when early OS mapping was recast onto the National Grid in the 1950s, problems of fit could be ‘lost in the rivers or lakes’. I’ve checked *Concise Guide*¹ but don’t see anything on this particular point. One colleague remembered something about it in *Sheetlines* but I haven’t been able to trace it.

**RO:** I don’t know of any specific references to this, but possibly your colleague was referring to Phil Budd’s *The Cotswold method*.² This is all rather a ‘grey area’, and I’m not sure how far one can square anecdotal evidence, years after the event, with rigorous measurement, or detection of errors!

**DA:** The story of “errors” in the 1:2500 scale County Series mapping being “pushed” into rivers during the “Overhaul” onto National Grid, particularly into estuaries, has been circulating within OS for decades. Whilst I have no firm evidence of these, I have heard that errors in the width of the Humber Estuary on OS mapping came to light at the time of the planning of the Humber Bridge. I suspect that similar stories abound about the Severn Bridge. The “errors” are of course not mistakes, but the consequence of the distortions at the limits of the Cassini projections. I do know from personal experience that in the 1970s, during the 1:1250 scale Resurvey of Barnard Castle, it was found that the River Tees was significantly the wrong width as depicted on the old 1:2500. Barnard Castle falls on the junction of Yorkshire, Durham and Cumbria, and this may provide a clue to what happened. It is only fairly recently that the Primary Triangulation of GB was able to be computed as a single entity. Before that it was necessarily computed in several smaller blocks due to the limited computational power available. If the edges of the smaller blocks coincided with county/national boundaries, and the 1:2500 County Series meridians also changed along the same boundaries, then the accumulated errors at the edge of the Cassini projections, combined with the shift introduced by the change of computational block, would occur in the Humber, the Severn and the River Tees at Barnard Castle.

Now that the Primary Triangulation has been adjusted as a single entity, and the Absolute Accuracy of the 1:2500 mapping has been improved during the Positional Accuracy Improvement Programme, all these errors should have been eliminated.

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² *Sheetlines* 62, 57 (2001) available at www.charlesclosesociety.org/SheetlinesArchive
Popular maps, principal stations

John Cole

I have in front of me a treasured ex-school copy of *Map Reading* by Thomas Pickles BSc. It is in fact a 1950 reprint of first version of which appeared in 1937.

Five coloured one-inch extracts are included with a page or so of exercises on each: Ingleton, North Wales, northeast Yorkshire, the Peak District and Swanage. Immediately inside the cover were the conventional signs ‘as used on the New Popular Edition’ and I was immediately baffled by the fact that double-tracked railways and vegetation in woods were at odds on four of the extracts. It was a very long time before I discovered that these were from New Popular Provisional Editions.

But I was even more worried by the depiction on the extract derived from the Fifth Edition – that of Swanage railway station in rectangular form. Surely not a ‘principal’? No more than a branch line terminus of pretty average size.

At this point readers’ attention is directed to *Sheetlines* 54 (1999) ‘The representation of railway stations on the one-inch Seventh Series maps’ by Alan Young and *Sheetlines* 68 (2003) ‘Stations on Landranger maps’ by KM Bromley with follow-ups by myself, Keith Pendray and Martin Lee in the following *Sheetlines*.¹

Inconsistency or just plain bewilderment were apparent and my attempts at an explanation regarding ‘principals’ were in one case correct and in the second seemingly wide of the mark, albeit I claim my idea to have been a good one!

Whilst my Popular collection stands at only 47 plus three duplicates, I have all the New Populars for England and Wales, 64 of these being Provisional, presumably reflecting the latest state of the Popular just before the second World War. I also have 28 of the railway-bearing Scottish Populars, the whole enabling me to attempt a reasonably thorough investigation.

In the case of criticisms by Bromley and Young there isn’t a shred of doubt that the blame must be laid at the door of the Popular map. My suggestion as to why it was necessary to pick out a ‘principal’ (or main?) station was a fair one – that in the days when railways were far more important to the map user, a station where most, if not all, trains could be guaranteed to stop and where facilities such as refreshment room, luggage office, bookstall and waiting room could be found needed to be identified. But that was at odds with stations such as Cardigan, Hornsea and indeed Swanage. Michael Bromley suggested that OS might have equated seaside resorts with principals but pointed out that in Landranger days such resorts as Eastbourne and Torquay were reduced to circles. And even by the time of the New Popular this fate had befallen the likes of Dawlish and Teignmouth (both principals on Popular 138 1931 printing).

But the most recent surprise for me, which prompted this postscript on the matter, was Popular 103 (1932) whereby branch line termini comprising Dursley, Malmesbury, Nailsworth, Tetbury and Thornbury (but not Stroud LMS) were all depicted by rectangles. By the time of the New Popular Nailsworth and

¹ all of which can be downloaded from www.charlesclosesociety.org/SheetlinesArchive
Thornbury were ‘closed to passenger’ circles; Malmesbury and Tetbury relegated to red-filled circles, with Dursley, bizarrely, surviving as a rectangle.

What made this a mockery is that on Popular 135 (1921), of the nine stations in the Bexhill-Hastings locality, not one appeared as a rectangle. Both main stations now appear as such on the Landranger.

Eventually I drew up a list of 403 ‘Popular’ rectangles though the figure could be open to challenge. At least a quarter of these could never be justified as ‘rectangles’, if one assumes size and/or importance was the OS criterion.

Why the inverted commas? Purely because there were large rectangles, small rectangles, elongated rectangles – even the odd black filled: Norwich (Victoria) NP126, Hartlepool NP83. Squares and even very small squares quite easily mistaken for and fitting into a circle: Bacup NP95 and of course the odd double mishap: Hereford’s large station: a tiny rectangle depicted as closed to passengers NP142. Add to that some ‘closed to passengers’ shown as still open: Hull (Cannon Street) NP99 and Plymouth (Millbay) NP187.

All but the last (closure came during World War 2 after bombing) and possibly Hereford, certainly inherited from the Popular, whilst mention should be made of oddities in the form of ‘splitting’ rectangles: Shipley (Popular 31), Holyhead (41). A triangle Radcliffe (36) and a bogus rectangle or indeed separate station alongside the larger rectangle for Salford also on 36.2

As stated my figures are approximate as it is easy to miss examples especially of the small square variety although there was no such excuse for my missing West Worthing (Sheetlines 69) or Blaenavon GW in my ‘private’ list first time round. The latter was also spotted on a recent acquisition Popular 102 (1931) along with Sengenhydd which as per most of the 103 list did not survive New Popular days as a principal.

Has the situation improved on the Landranger since Sheetlines 69? Well, maybe, thanks to Michael Bromley. Woking duly appears as a rectangle – as indeed it did on Popular 104 (1932). I still have doubts about the large scale outline bestowed on Blackburn and indeed Huddersfield – either relegate to rectangles or at least promote to such the circles at Norwich, Shrewsbury, Peterborough, Doncaster etc., themselves all former rectangles and all studied recently on Google Earth. This facility indicated Windsor Central (Sheetlines 69) to be a massive complex caused by the adjoining shopping centre. As pointed out – no more than a single platform branch line terminus and no larger (less if anything) than Windsor Riverside.

I doubt that either Southend Central and Southend Victoria are worthy of rectangles or naming but that is a personal opinion. I also have a job making my mind up about Bognor Regis, Littlehampton and Weymouth, all still rectangles.

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2 When finally rebuilt in 1895 Salford station serving the Lancashire & Yorkshire Railway comprised five platforms whilst the original London & North Western line from Ordsall Lane to Victoria did not serve Salford, running outside this station. Quite where the ‘bogus’ station came from is a matter for speculation.
Blackpool, Bradford Interchange and Chatham all appear as strange shapes due to space considerations. The former, supposing it merits a rectangle, could have been more favourably depicted in a north-easterly direction. Compared with the circle at Bradford Forster Square, Interchange (formerly Exchange) should be similar whilst Chatham (two-platform through station?) merits only a circle.

The depiction at Gatwick is odd, to say the least, and Michael Bromley’s final remark, ‘An ordinary station? Surely not!’ says it all.

**Principal stations on Landranger (names not necessarily on map)**

**Depicted by large scale outline**

Aberdeen  
Ashford International  
Birmingham New Street  
Blackburn  
Bristol Temple Meads  
Carlisle  
Crewe  
Darlington  
Dundee  
Ebbsfleet International  
Edinburgh Waverley  
Glasgow Central  
Queen Street  
Huddersfield  
Inverness  
Kingston-upon-Hull  
Leeds  
Liverpool Lime Street  
London Clapham Junction  
Euston  
King’s Cross  
Liverpool Street  
London Bridge  
Marylebone  
St Pancras  
Victoria  
Waterloo  
Newcastle upon Tyne  
Perth  
Preston  
Reading  
Sheffield  
York

**Rectangles**

Barrow  
Bexhill  
Blackpool  
Bognor Regis  
Bolton  
Bradford Interchange  
Burton upon Trent  
Canterbury East  
Cardiff  
Chatham  
Colchester  
Coventry  
Derby  
Exeter St David's  
Folkestone  
Grimsby  
Guildford  
Hastings  
Havant  
Littlehampton  
London Blackfriars  
Cannon Street  
Charing Cross  
Fenchurch Street  
Maidstone East  
Middlesbrough  
Motherwell  
Nottingham  
Paisley  
Plymouth North Road  
Portsmouth Town  
Southend Central  
Victoria  
Southport  
Stoke on Trent  
Wakefield Westgate  
Watford  
Weymouth  
Wigan North Western  
Windsor Central  
Woking  
Worcester Shrub Hill
**Principal stations on Landrangers**

Left, top to bottom: Aberdeen, Ashford, Birmingham, Blackburn, Bristol, Carlisle, Crewe, Darlington, Dundee

Right: Edinburgh Waverley, Glasgow Central and Queen Street

Below, top row: Sheffield, Huddersfield, Kingston-upon-Hull, Leeds

Second row: Perth, Liverpool, Newcastle, York

Third row: Clapham Junction, Preston, Reading, Inverness

Bottom row: Waterloo, King’s Cross and St Pancras, Euston, London Bridge and (bottom right) Marylebone

Has anyone tried a similar exercise with what is and isn’t shown as a Bus Station? Ed.
More large-scale maps online at NLS

Chris Fleet

We have recently begun a large project to make available online National Grid 1:1,250 and 1:2,500 maps of Edinburgh and south-east England.

This includes firstly the earliest editions of OS National Grid maps covering the Edinburgh environs (1940s-1960s), to assist the MESH Edinburgh Atlas project. As the vast majority of our map digitisation work is externally funded, further progress has recently focused on the south-east of England, with 7,676 sheets so far available covering central London and the TQ 100 km National Grid Square. All these sheets are geo-referenced too, so whilst you can view the sheets as individual images, they can also be viewed on top of or alongside other historical or modern map and satellite layers in our Explore Geo-referenced Maps and Side by Side viewers.

The coverage includes 4,973 1:1,250 sheets, forming the earliest post-War coverage of Edinburgh and central London. The surrounding rural coverage at 1:2,500 of the TQ square is necessarily more patchy, focusing on those areas that were surveyed in the 1950s. Crown copyright currently permits us to put online published maps dating before 1965, and so coverage will hopefully become more comprehensive over time.

We are also working concurrently on scanning OS 25-inch County Series for these counties in south-east England too, and plan to release an initial batch of sheets by April: both layers will expand geographically over the next few years.

For OS in-copyright maps and those we have not yet scanned, you can also view sheet-lines and map references for all modern 1:10,000 and larger scale maps for the United Kingdom in our OS map records viewer at http://maps.nls.uk/geo/records. For Scotland, this also includes dates of all published sheets of 1:2,500 and 1:1,250 mapping too.


Opposite top:
Comparing National Grid 1:1,250 mapping from 1951 of the former Abbey Brewery on the Holyrood Parliament site in Edinburgh, with a modern Google Hybrid layer in the NLS Side-by-Side Viewer

Opposite bottom:
Comparing National Grid 1:1,250 mapping from 1951 of the Festival of Britain exhibition on the South Bank with the Dome of Discovery and Skylon, to a modern Google Satellite layer in the NLS Side-by-Side Viewer

1 The author is Senior Map Curator at the National Library of Scotland.
2 www.mesh.ed.ac.uk.
At Christmas I treated myself to just one book-fair, and noticed a large folded map with this enticing cover title printed on marbled paper. The seller knew nothing about it, and the title meant nothing to me, but lifting a corner I saw that its base was Third edition OS one-inch mapping. I’m glad to say a deal was struck on my second stroll past, and how intriguing this purchase has turned out to be.

It’s a huge, dissected, 7ft square uncoloured map of greater London and more, with an extension into part of south-eastern Essex. Obviously a composite of 4/5 sheets, the cover title is printed twice along the top, with a repeated imprint at the bottom: *Ordnance Survey, September, 1917*. The Essex addition is part of a coloured sheet dated 1908.

So far, not much mystery apart from the title, but the intrigue starts with the 133 neatly annotated placenames in manuscript. These are throughout most of the area but noticeably in a broad circle around the metropolis, roughly where M25 was to go decades later. Each name labels a symbol, also in black, which is one of: (a) a single dot; (b) a small open circle; or a pair of dots joined by a straight line, of differing lengths and directions. There is no legend, so what do they and the titular ‘A.D.’ mean?

First impressions from the main base map date was that this was late World War One material, though not apparently GSGS. However, the cover (*above*) has a pencilled inscription beneath an illegible signature: *Capt P.C/T.) Horse Guards, London SW.1*. The captain’s organisation’s initials have defeated us so far, but below them in a different hand is: 1/7/17, a date earlier than the OS imprint!

Analysis of the symbols of two dots linked by lines (I’ll refer to them as ‘dumbbells’) shows an interesting preponderance of certain directions: about half were aligned roughly east-west to SE-NW. The lengths are typically up to half a mile, although half a dozen were a mile or longer. As an example, one dumbbell of ¾ mile is on my home patch and linked two high spots on Parliament Hill Fields, though not the highest locally. They could not have represented anything continuous on the ground, and were probably not even line-of-sight at that time (*see extract opposite*).

What of the other symbols? If indeed military, could the open circles be searchlights? Analysis showed that all bar one of the open-circle symbols are in Essex, and all ten of the symbols in the Essex extension to the map were indeed open circles. Maybe the single dots were guns. So, in perhaps the likeliest place to defend London from raiders from the east, just searchlights and no guns? Unlikely.

Encouraged by suggestions and separate bits of information from CCS members and several other cartographic experts, I decided to research whether there was a flying connection to the strange symbology. Was it chance that most
dumbbells were at right-angles to prevailing winds for example? But why were all the airfields and other military establishments there at the time not annotated at all? RAF Museum Hendon’s head of archives Peter Elliott produced for comparison their large and fascinating contemporary (Bartholomew’s) map of London, annotated with gun emplacements, their control lines and searchlights.

Although of just inner London this undated map showed some corroboration of my map’s symbols – but differences too, so were these just coincidences? For example, the centre of Tower Bridge (!) and edge of London Docks showed the same (dumbbell) line on both maps, between a three-inch gun emplacement and a searchlight (a large yellow blob on his). Was there really a gun emplacement on the middle of that bridge? His map showed another ‘sub-control station’ with three-inch guns on Hackney Marshes, where mine showed a single dot named Clapton. The gun emplacement shown as ‘Parliament Hill’ was however nowhere near that toponym’s dumbbell, however.

Rob Wheeler had meanwhile found useful notes on a remarkable man, Major General Edward ‘Flash’ Ashmore, who had trained as a pilot with the RFC, and recalled from Ypres had created the Metropolitan Observation Service. This was to coordinate effort in the London Air Defence Area, soon extended out to Essex. So perhaps ‘A.D.’ is at last explained? Observers were drawn from the police service, which may explain too why the map is not overtly military (Ashmore later went on to organise all the UK’s air defences, which led to the founding of the Royal Observer Corps, but that’s another story).
In May 1917, the Zeppelin airship bombing raids had given way to fixed-wing Gotha bombers, and their raids had been sporadic but successful. Moral outrage was expressed after more than 20 bombers attacked London, largely unopposed, in June 1917. ‘Flash’ took command of the LADA later in July 1917: the same month as the pencilled date on the map cover.

Gothas gave way later in 1917 to the three-times larger Staaken bombers. One big raid had come from the east, but had overflown Essex, wheeled over Hendon (ironically, where I was reading this history), and attacked London from the northwest. So maybe that’s why there was such a predominance of dumbbells to the north, west, and south. But what did dumbbells represent?

The RAF Museum library had a copy of Ashmore’s own 1929 book, *Air Defence*, a recommended read. This book mentions that after a night raid there was established a ‘balloon apron barrage’ linked by cables with wires hanging down. The frontispiece has a grainy aerial photograph (see opposite) of such an array: three balloons in a straight line, linked together. Could this be a ‘dumbbell’ on the map?

This book also explains that information on aircraft sightings was phoned through to 26 sub-controls (a term also used in the legend of the RAF Museum map) which then phoned their plotted positions through to… Horse Guards, the world’s first air-situation operations room, manned by ten plotters. There’s an evocative drawing of this room (see opposite), in another excellent book, *Attack Warning Red* by Derek Wood.

So, it would seem that this ‘mystery map’ is possibly a one-off, and that its origin although datelined Horse Guards is in fact from the police service, explaining its outwardly ‘civvy’ appearance. We need some more research on the symbology but almost certainly these represent a mixture of balloons, guns and searchlights, possibly also sound ‘ranging’ stations of some sort.

I am grateful to those who have helped so far with this fascinating conundrum. All further suggestions are very welcome!

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Richard Oliver adds:  
The map described by Gerry Zierler presents two quite separate puzzles: one is the purpose of the additions, and the other is the base-mapping. There are actually two components: one is an apparently hitherto unrecorded four-sheet outline map of London, produced by the Ordnance Survey in September 1917, and the other is hitherto unrecorded variants of one-inch Third Edition (Large Sheet Series) sheets 98 and 109. To take the latter first: both have black outline and blue water (see extract below, which shows Tyle Hall and Doggetts added). No such version of the Third Edition (Large Sheet Series) has hitherto been found, and one naturally asks whether 97 and 109 were the only sheets printed in this style, or whether there were others.¹

The outline map of London is based on the one-inch Third Edition in engraved outline; the four sheets each measure about 27 inches west-east by about 24 inches south-north, and are printed zincographically in grey. This suggests that the mapping was intended as a base-map, just as it functions here. It will be interesting to see if further examples emerge, and in what contexts.

WOOGs, WOOSies & WOMAT – the War Office Archive
Crispin Jewitt  

The British Library is seeking external funding to catalogue, digitise, and to make available as web-based research resource the War Office Archive. A grant has been secured for an initial portion: significant further funding is required to continue the work.

During the first part of the twentieth century the War Office built up comprehensive holdings of topographical compilation materials, maintained as a working archive supporting cartographic production. Primarily made up of cartographic items, ranging from small sketch maps done by intelligence officers in situ, through surveyors’ field sheets to cartographers’ fair drawings, most of these items are unique manuscripts and short-run prints (often further annotated) made for limited distribution within the War Office. The archive is also rich in associated textual material (eg itineraries and name lists), and includes some photographic material. The period covered by the material in this archive runs from the 1890s up to the end of the Second World War, and extends to 8,200 map sheets and 5,300 pages of text, arranged in 1,350 files. Currently this rich archive is not accessible to the public: we are now actively fund-raising to change that.

The geographical cover of the Archive closely reflects the areas of British political and commercial interest over the period 1890 to 1945. Around 50% of the archive comprises Africa, with West Africa, South Africa, and British East Africa all strongly represented, but also including Portuguese Africa, Abyssinia, German East Africa, and Egypt. About one sixth of the Archive relates to China, larger than the holdings for any other single country. Railway and mining concessions provided the stimulus for some of these items: journeys made by British and Indian Army officers and surveyors yielded products covering routes and areas in all parts of the country, with the security of concessions being a consideration in some cases. Turkey-in-Asia (Anatolia and the Middle East) makes up 15% of the material, which includes post-First World War boundary surveys, and records of extensive travels in central and eastern Anatolia during the first decades of the century. There is also material on Russia, South-eastern Europe, the Americas, Iceland, and British-held islands around the world.

The material was transferred (from the predecessor of the Defence Geographic Centre) in two tranches, the first in 1965 (to the British Museum Map Room), and second in 1989-90 (to the British Library Map Library, where it joined the 1965 tranche). The Archive is in three sections, ‘Original Surveys’ (WOOS), principally surveyors’ fair drawings with some aerial photography, closely related to the War Office Trignometrical Archive (see below); ‘Material’ (WOMAT), miscellaneous material from various sources kept to support the compilation of new or revised cartographic product; and ‘Originals of GSGS Maps’ (WOOG),

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1 The author is Specialist Adviser, British Library Cartographic & Topographic Materials
which comprises material created in the later stages of production of maps in the GSGS series. Approximately 70% of the archive is made up of the class WOMAT, with WOOS comprising the majority of the remainder. All three classes are UK Public Records.

The Archive is currently un-processed and thus, not available for public access, but in recognition of its unique character, and value as a research resource, is now accorded a higher level of priority by the Library than was previously the case. It has been possible to recruit an archival cataloguer on a fixed term part-time contract to process the material relating to British East Africa (about 5% of the Archive). This will provide public access over the web to high quality downloadable images and metadata, through the British Library’s Archives and Manuscripts catalogue. Funding is now being sought for the remaining 95% of the Archive. The estimated total amount required is £800,000.

The British Library now holds three important archival resources relating to UK military mapping and survey activity. The other two are the record set of War Office printed cartographic product, comprising the IDWO/GSGS numbered maps and smaller sequences mainly created in connection with the Second World War and its aftermath (referred to as the ‘MOD Archive’ for convenience), and secondly, the deposit of material from the War Office Trignometrical, later Geodetic Library, comprising original surveyors’ records of field observations from boundary surveys in East Africa and the Middle East. The MOD Archive is catalogued and publicly accessible at the British Library.

A resource worth noting is the ‘DMO Secret’ archive. This comprises 388 reports etc, many including maps, bound into 14 volumes, originally kept in the private office of the Director of Military Intelligence, later Military Operations. Covering the years 1879 to 1905, the reports and correspondence provide a strategic intelligence context for the War Office cartographic activity during the period; in addition a number of the maps in the reports fill gaps in the IDWO/GSGS record set mentioned above. The DMO Secret archive is fully catalogued and available through the British Library Archives and Manuscripts catalogue.

_We are delighted that Ordnance Survey has extended for another year the special CCS members’ offer of a generous 30% discount on purchases of paper maps, custom made maps and getamap subscriptions from the OS online shop at https://www.ordnancesurvey.co.uk/shop/

To take advantage of the offer, enter the code CC2PMGAMCM at checkout, valid until 31 December 2015._
**Provisional perplexity**

*John Cole*

In *Sheetlines* 88, inspired by Bogus Bognor (*Sheetlines* 86), I briefly compared the 1946 Provisional 1:25,000 maps 20/47, 20/54 and 20/56 with the experimental Regular editions of ten years later – mainly to establish the amount of obsolete detail appearing on the 1946 map. At a later date I was able to find 20/45 and have since been able to compare the other seven maps involved thanks to the National Library of Scotland online collection.

The revision dates of the six-inch maps from which the Provisionals were derived were 1904-1932 for 20/45 and 20/55 and 1904-1905 for the remainder.

The World War II bomb-damaged areas of Plymouth on 20/45, in at least the city centre, were clearly shown by roads less shading for roofed areas. Devonport, which also suffered badly was similarly treated. Defunct railway stations/halts shown were the ocean terminal at Stonehouse, Mutley, Millbay and Linson Halt. Extant halts not shown were Dockyard and Lucas Terrace though in fact these were missed on Regular SX45. A curiosity was ferry treatment. According to the 1925 legend (as plate 12 of *Popular maps*) a single line of pecks and F for foot ferry; double line of pecks and V for vehicular. On 20/45 the foot ferry to Turnchapel and Oreston is correctly shown as a single pecked line (but not annotated). A probably defunct foot ferry from Devonport (North Corner) to Torpoint is shown whilst the more important North Corner to Millbrook has not appeared on any map (it is now defunct). The Torpoint and Saltash vehicular ferries are shown as double pecks and annotated (Floating Bridge). Also shown as double pecks is the ferry between Stonehouse and Cremyll. It is not described but wrongly shown as vehicular on both the Popular and Fifth Edition one-inch map which it has never been (corrected to F on SX45).

Under the title ‘Another late running railway’ (*Sheetlines* 63) the Callington branch was shown as under construction on 20/46, even though it had opened in 1908. It joined and largely absorbed the ‘East Cornwall Railway’ (such annotation appearing on 20/46 alongside the old incline of the former mineral railway) just over the 20/47 edge. Although the line is correctly annotated S.R. (Southern Railway) it is effectively the old E.C.M.R. and as a consequence Gunnislake station, Chilsworthy and Latchley halts are all missing. As incidentally, Whitchurch Down platform on the Great Western Plymouth to Launceston line similarly missed on SX47.

The shortcomings of 20/56 were described in *Sheetlines* 88. One of the problem features was the Plymouth and Dartmoor Tramway (gone in 1916). This also appears on 20/55 but rather oddly terminates at 510577 just north of its junction with the Lee Moor Tramway.

On 20/57 no detail appears inside the wall of Princetown prison. This was shown on SX57 before disappearing again on the B edition of 1959. Although name losses, gains and alterations were numerous on all eleven maps, 20/45-

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20/67, two serious mistakes Rendlestone (a hamlet and adjoining tor name) and Mistor Pan a moorland feature were not corrected until the advent of OLM28 in 1984. A pair of long defunct arsenic and tin mines are shown at Mary Tavy both having reopened circa 1900s.

Although low water lines were predictably out-of-date at the mouths of the Rivers Avon and Erme, the only absentee of consequence on 20/64 was the famous hotel established on Burgh Island in the 1930s. Long gone had been the rifle range in the Erme estuary.

20/65 might well be the most satisfactory for up-to-datedness when compared with the Regulars but not, surprisingly, the all-moorland 20/66. On SX66 two tracks of old tramways are shown from 6466 to 6560 and 6763. The latter and much older example is shown on 20/66 but not annotated. The former, though often referred to as a tramway, was in fact a narrow gauge railway which existed from 1911 to 1932, as did the china clay works it served, and thus not shown at all on 20/66.

And finally 20/67 which like 20/65 has no real differences with SX67 other than an alteration (taking out an awkward bend) to the main road at 6075. This is thought to have been mid-1930s and may have been rather inaccurately depicted on the 1936 printing of the Fifth Edition one-inch.

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**Dating maps**

A question posed from time to time by map collectors: how can I establish the publication date of a map if it’s not printed in the marginalia? Commercial publishers often concealed the date to extend the ‘shelf life’ of maps. They did so by printing an alphabetic code instead of a recognisable date.

Knowing the code, it’s easy to turn the letters into numbers. Here are three such codes:

- CUMBERLAND – used by Bartholomew; C=1, U=2, M=3 ... N=9, D=0
- JIHGFEDCBA – used by Geographers’ A-Z; J=1, I=2, H=3 ... B=9, A=0
- HAGSTROMCX – used by Hagstrom; H=1, A=2, G=3 ... C=9, X=0

In each case the code gives the month and year, so, for example, the code HH-ST on a Hagstrom map would represent 11-45, ie November 1945.

You can read more about dating Bartholomew, Geographers’ and Hagstrom maps at these sites respectively:

- [http://digital.nls.uk/bartholomew/resources.html](http://digital.nls.uk/bartholomew/resources.html)
- [http://en.wikipedia.org/wiki/Geographers%27_A%E2%80%93Z_Street_Atlas#Dating_old_maps](http://en.wikipedia.org/wiki/Geographers%27_A%E2%80%93Z_Street_Atlas# Dating_old_maps)
Kerry musings

David Archer

Ask me to rank my favourite subjects whilst a student (the current term for anyone in education aged 5 to 21), and I would probably choose Economics, then Biology (especially the rude bits) and Economic History. The last, despite the annoying way it was written in those days, and might still be. A few events with dates would be given, then some about 75 years later, followed by a few about 30 years before this, and then the author would say, ‘during this period, output increased’, or whatever. Said in such a way that you had no idea whether the whole 75 year period or the final 30 year era was meant. Annoyingly vague, but a useful technique when writing essays if, like me, you cannot remember dates.

I have had a similar feeling when reading accounts of the early history of the Ordnance Survey. Things are not nailed down but left floating in the air. And then in the twentieth century, word meanings change. For example, when was the Ordnance Survey founded? The debate continues. The OS voted for 1791, so that they could cash in on a bi-centenary as soon as possible in 1991, and not have to wait until the first map they were associated with was 200 years old, ten years later. Here we have one of the main things that upsets me, the use of the two words Ordnance Survey before the word founded. The OS was never founded, not as the Charles Close Society was; it emerged, developed, as did early life in the swamp, with an embryonic existence long before a name appeared. And in my book, when a name did appear, it was the Ordnance survey, one capital letter. The survey carried out by the Ordnance, short for the Board of Ordnance, short for the little mentioned Honourable Board of Ordnance. During this early period, only two words ever appeared before ‘survey’, trigonometrical and topographic. Ordnance came later. I know that I will be sticking my neck out for the rest of this piece, but please remember it is a musing, I am pondering, not writing a scholarly article, merely giving the scholars something to correct, or hopefully dispute (meaning less wrong) in the next issue.

It can be argued that the foundation of the OS had already occurred by 1791, when the staff of the Drawing Room at the Tower included a Chief Draftsman, a Chief Surveying Draftsman and a survey party, to which were added Ramsden’s theodolite, Mudge, more men and eventually Colby. If this group formed a recognised unit, did it have a name? Dalby and Richard Oliver both refer to ‘the service’, and if anyone spoke of ‘the survey’, it could mean one of several, a trigonometrical or several topographical surveys, all being undertaken by the Ordnance. I noted above that mention of the ‘Ordnance’ is short for the Board of Ordnance, but no historian of the OS has confirmed this in writing, and just as our accountant always refers to the Revenue, it is assumed we know what is meant.

Richard is not over keen on the 1791 foundation date, and suggests ‘the direct

1 So no bibliography or references, and certainly no footnotes of any sort.
history of the Ordnance Survey is best traced to the year 1717’ (my italics). Without a positive act of foundation, why not use 1717? I prefer 1805 as being the take-off moment, not a foundation date: ‘As well as being the first maps produced wholly using the Ordnance’s own resources, the Essex sheets also demonstrated a particular ‘Ordnance style’.

Suggesting that if a distinctive style only appeared in 1805, including anything earlier, ie Mudge, is a fudge. No, the name Ordnance Survey, as opposed to the task Ordnance survey, was built, starting with the phrase ‘the Ordnance map’, which was quickly adopted for the early maps, including the Mudge, and remained in use throughout the nineteenth century and well into the next.

‘The Ordnance map’ was not a shorthand for Ordnance Survey maps, but a name for the maps produced by the small unit within the Board of Ordnance. Writing of this period, authors of the time or modern commentators all use the term, as did the general public, despite, in later years, the Board of Ordnance having been abolished a good while previously. Ignoring bad publicity at various times, government backed ‘Ordnance maps’ implied quality and accuracy, and, it was believed, would eventually show the whole country to the same high standard. In evidence to the 1892 Dornington Committee, Edward Stanford believed the term ‘Ordnance map’ was an indication of quality which should be protected by refusing use of the term ‘reduced Ordnance map’ (the same but smaller) to commercial publishers, whilst allowing ‘reduced from the Ordnance map’ (modified). And the name persisted. In literature of the 1920s and 30s, one still meets characters ‘consulting the ordnance map’. Our society’s namesake used it in the title, dedication and text of The map of England or about England with an ordnance map, published in 1932.

When we moved to Kerry in 1982, an elderly neighbour told us that her son-in-law worked in the ordnance office in town, “Do you mean the Ordnance Survey?”, “Yes”. It therefore follows that for possibly the greater part of the nineteenth century, one would have been said to collect Ordnance maps, rather than Ordnance Survey maps. Certainly not OS maps.

When did the maps become Ordnance Survey maps and why? Did the national mapping organisation get fed up of everyone calling their products after a body that had been abolished? As the initial survey finished, were there discussions about corporate identity, with the realisation that ‘the Ordnance Survey’, with a very capital ‘S’ could now be taken to mean an organisation, rather than a task? Whatever prompted events, the series of descriptive booklets that started to appear from 1888, led the way by having ‘Ordnance Survey maps’ or similar, in their titles. I have never been told to consult the Ordnance Survey map, only an Ordnance Survey map. ‘The Ordnance map’ is now a term of the past.

2 Richard Oliver, The Ordnance Survey in the nineteenth century: Maps, money and the growth of government. 2014. I have used this magnificent work extensively for this piece, which Richard has kindly read, corrected and does not necessarily agree with. Comments on Richard’s writings are observations, not criticisms. An interested reader should be able to find the other sources. If not, please let me know.
If ‘the Ordnance survey’ was a task that became an organisation, how was the map making body referred to before Ordnance Survey became the norm? Until it was abolished in 1855, the Board of Ordnance had responsibility for conducting the surveys in various parts of the realm, with the actual work being undertaken by a small, but expanding body of men who get little credit, let alone a name, as everything appears to be done in the name of the Ordnance. A lack of clarity sometimes emerges as to whether the larger or smaller unit is referred to: when Richard writes ‘the Ordnance ordered Colby’, is this the opposite of Close’s ‘Colby laid down that the Ordnance should’? Writing in 1855, Sir Henry James favours ‘the Ordnance’ as the name of the body that got things done, even if it did not do them itself: ‘the Ordnance, .... were directed [by the Treasury] to lay down and draw the counties of’ and ‘the Ordnance has had to resurvey large districts’. Surely the Treasury would never lower itself to communicate directly with the survey chappies? So how about the Ordnance were directed to see that counties were drawn, and had to see that large districts were resurveyed? The work being undertaken by the smaller nameless unit.

Therefore, if until after mid-century, responsibility for producing the maps was with a unit known as ‘the Ordnance’, not the Ordnance Survey, what, I repeat, was the smaller map making unit called before supervision of the Ordnance survey was transferred to the War Office in 1855? Richard refers to the Drawing Room as an organisation, and soon the Map Office at the Tower takes over. We know that the September 1841 fire in the Tower damaged the Map Office which moved to Southampton in 1842. The name of the accommodation, as appears on letter headings? Yes, but also of the unit it housed, which undertook the surveys and published maps? Probably not, as The Ordnance Map Office, and Southampton Map Office appear in the literature, as well as Ordnance Survey Office followed by various town names. That Ordnance Survey Office, Southampton or Dublin is dominant on engraved maps, implies a location or address.

Elusive it might be, but surely the cheery band who went forth with their little theodolites, chains and field books had an umbrella name to keep them dry? The Department appears quite often, but is it short for something or similar to one of us referring to the office? An Ordnance Department crops up, with ‘the Ordnance Office’ used in Colby’s time, and mentioned by Stanford as late as 1892. My money goes on the progression from ‘The Officers of the Survey Department’, noted in The Times in November 1841, and by Palmer in 1873, to the ‘the Ordnance Survey Department’, the term favoured almost exclusively by the Dorington Report. The Ordnance Survey Department sounds convincing, and although I have never heard anyone refer to the modern OS as ‘the Survey’, this was a favoured term at one time, especially by those who worked for it later in our period, with Close using it all the time in his chapter 2. The Ordnance Survey Department’s work was the Ordnance survey?

It would be useful to have an agreed term for the period before 1855, so why not use ‘the Survey’, following John Andrews’ usage: ‘A capital ‘S’ for ‘Survey’ implies a reference to the Ordnance Survey department; ‘survey’ in lower case
refers either to some other survey ..., or to the actual operation of surveying’.

Note: Survey would not be short for Ordnance Survey.

I am always uncomfortable when someone uses Ordnance Survey, the organisation, for activities much before 1855. It is akin to the Mormons retrospectively baptising whole family trees of new members. To me, it is wrong, the term was virtually never used and is a convenience for historians of the OS in the absence of a known name for the goings on during this period. Brain Harley used ‘Ordnance Survey’ all the time, usually making sense if one reads ‘Ordnance survey’ in the right places, but frequently he baptises unsuspecting groups. In his book but not elsewhere, Richard Oliver appears reluctant to follow, favouring ‘the Ordnance’ until the mid-1850s.

The change from task to organisation was gradual, but the name change from Ordnance survey to Ordnance Survey was given impetus by events. Of the early 1840s Richard writes ‘to organisations such as the Ordnance Survey’ (premature baptism?) and ‘At the same time the Ordnance Survey had an increasing identity by that name, rather than being referred to by misleading or inexact euphemisms, notably ‘the Trigonometrical Survey’. After the demise of the Board of Ordnance, the beast that was transferred between different departmental parents was always known as the Ordnance Survey, whether it needed a capital S or not. By the time I was born, the initial Ordnance survey as a task to be completed was long finished, and had been revised several times, so that I have only ever known the Ordnance Survey to mean an organisation producing Ordnance Survey maps. In both instances, Ordnance Survey can be replaced by OS.

Which brings us to this week’s puzzle, names of OS headquarters. The Ordnance Survey of England and Wales had The Tower and London Road, the Ordnance Survey of Ireland had Mountjoy, the Ordnance Survey of Northern Ireland has Colby House, what did the Ordnance Survey of Scotland have?

Two clues: 1. John Andrews might help you. 2. The first known coupling of the words Ordnance and Survey appear in the heading of Old Series Sheet 10, dated 1810: Ordnance Survey of the Isle of Wight and Part of Hampshire, which of course never had a headquarters as such.

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If you are willing to be included in such a list, please send an email to info@CharlesCloseSociety.org, with your membership number in the Subject line. No other text is necessary.

The British Museum achieved great success with Neil MacGregor's A history of the world in 100 objects, broadcast on Radio 4 as well as in book form, so it is perhaps not surprising that the British Library has mimicked the format.

The secret of success, of course, is to create a selection with a satisfying balance of familiar and unusual, serious and frivolous, military and civil, obvious and obscure, secret and open, real landscapes and fantasy. In fact it would make a good party game to nominate your own such list – and to see how many, if any, coincide with the authors' choices. To ensure variety and an element of surprise, they have not confined themselves to printed, folded maps but have included an eclectic range of maps from board games, advertising fliers, posters, artistic works, aerial photography, newspapers and even tapestry. The choices span the world (and elsewhere, such as the moon, Pooh’s Hundred Acre Wood, Tolkein’s Middle Earth and the Guardian’s San Serriffe) but the emphasis is on maps of Britain or places of British military or colonial interest.

The result is a fascinating and intriguing mix. CCS members would, no doubt, choose rather more Ordnance Survey-related items than we find here, but there are enough to fairly represent OS and its associated organisations, not all of which will be familiar to readers. Examples include, among others, 1916 trench map of the Somme, 1926 ‘secret' map London for contingency planning for the general strike, 1927 Eclipse map, 1944 GSGS map of Caen for D-Day landings, 1957 1:25,000 sheet SU41 overprinted with the supposed effects of a nuclear explosion over Southampton, 1967 planning map for proposed new town of Milton Keynes and 1991 1:1,000,000 Escape and Evasion map for use in the Gulf War. Each map illustration is accompanied by an informative narrative.

It is heartening to find Sheetlines quoted and cited in this sumptuous volume, even if it is in respect of Soviet mapping rather than our normal focus of Ordnance Survey!

John Davies
New series or designs of topographic mapping are not frequent in any country, and thus the appearance of a new 1:25,000 series in Ireland, even if it only aspires to cover limited areas, is bound to be of interest.

Until recently, the 1:25,000 and similar scales have not figured largely in Ireland. In the 1930s the Ordnance Survey of Ireland (OSI) produced a group of six 1:20,000 sheets in the south of the country, apparently for military training purposes, and another of Dublin, which has metamorphosed into a double-sided street map, without contours and therefore not really qualifying as topographic. In 1940-41 the British War Office produced cover of the whole of Ireland at 1:25,000 by direct photo-reduction from 1:10,560 mapping. This series – GSGS 3906 – is remarkable for covering both Britain and Ireland; it seems to be very little known in Ireland, and I suspect that copies are more likely to be found in British university map libraries. A 1:20,000 series covering Northern Ireland was produced for military purposes in the 1970s or 1980s, once again by photo-reduction, this time from 1:10,000 material. Several 1:25,000 maps of areas of tourist interest have since been produced by both the Irish Ordnance Surveys: proportionate to their modest numbers there has been disproportionate variety, but in general those produced by Ordnance Survey of Northern Ireland (OSNI) have tended to resemble those produced by Ordnance Survey of Great Britain (OSGB), in including field boundaries, whereas those produced by OSI have been evident derivatives from the 1:50,000 Discovery series: that is, generally they have not shown the boundaries of enclosures, though several have shown what appear to be prominent walls or banks in upland areas. A feature common to most Irish 1:25,000s, and thus very different from their British counterparts, is that they have hypsometric tints: ‘layer colours’.

OSI have now produced a 1:25,000 map, MacGillycuddy’s Reeks and Killarney National Park, of ‘field boundary’ type: it is the first of an ‘Adventure Series’ and has been issued in a ‘Preliminary Edition’, with a view to eliciting comments that

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might influence the development of the series. A note inside says that it is intended that the Adventure Series will cover ‘those areas where a wide variety of outdoor activity or adventure tourism takes place’, including ‘mountaineers, hillwalkers and users of the Irish countryside’. For a long time production of such mapping by OSI was inhibited by a lack of comprehensive up-to-date larger-scale rural survey data, but the position was changed radically between 1992 and 2003 with a new survey of all twenty-six counties at 1:5000 – including field boundaries. The Republic of Ireland is now on the same footing as Northern Ireland and Britain, and so comparison is inevitably with three separate groups of maps: earlier OSI 1:25,000 offerings, recent OSNI 1:25,000s, and current OSGB Explorer mapping. A point that needs to be made before going further: in any country that has good 1:50,000 mapping a 1:25,000 series is only justified on the score of substantial extra detail, and in landscapes such as those of Ireland and Britain that means field boundaries.

The map is printed double-sided on a sheet trimmed to 100 by 70 cm, with a total map area of 30 by 20 km, less an inset enlargement to 1:12,500 of the neighbourhood of Carrauntoohil: approximately international B1 size, as has been standard OSI practice for many years. This compares with 123.5 by 93 cm for the larger of the two OSGB standard paper sizes. Folding is ‘semi-Bender’, so that a ‘normal’ opening exposes eight panels, which is inconveniently large both in the open air with anything more than a breeze, and in a car; on the other hand any part of the map can be viewed without having to open the whole, unlike with OSGB and OSNI 1:25,000 offerings. The general colour scheme of the map is similar to that of the OSI 1:50,000 Discovery series: notable differences are townland names in ‘lilac’ and buildings and field boundaries in ‘grey’. There is new surface-cover data: moraine fields (light green ‘hummocks’), natural bog (a mix of abstract symbol and ‘wetland’ pictogram) and cut bog (abstract), both ‘brown’, and scree (dark grey). The hypsometric tints are far less assertive than on the Discovery series; indeed, I do not recall such subtle layer-changes since the OSGB 1:63,360 Fifth (Relief) Edition of 1931-6, though it may be questioned whether, in both cases, hypsometric tinting is really worth the trouble, even when computer-generated. Roads are cased black, to conventionalised widths, and they and paths and railways stand out from both the field boundaries and surface-cover and land-use information; the effect is of data derived from the 1:50,000 superimposed on that of the 1:5000. Landmarks on the mountains are indicated prominently in red: a lesson here for OSGB. There is the usual range of tourist symbols, and as usual they emphasise the extent to which ‘ordinary’ buildings and land-use are background features. Cycle routes and indicated by purple pecks that run alongside roads: as a cyclist, I have to say they look rather intrusive.

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3 Maps and ‘B1’ paper are a separate study, to which I hope to return in a future issue of *Sheetlines*.
The overall effect of the new map is rather more ‘subdued’ than on any of the three groups used for comparison: the OSNI 1:25,000s tend to look particularly ‘solid’. This is an advantage when the hypsometric tinting is concerned, but is more questionable for some of the information evidently derived from 1:5000 and larger-scale data, where the effect tends to be more of a background and less of an equal: it would be interesting to see the effect of substituting dark grey for the road-casings, and of removing the grey infill of the lowest-class roads.\(^4\) The fault is particularly serious in the depiction of buildings. There is no difficulty with the town of Killarney, but elsewhere on the map there are hardly any nucleated settlements, and whilst the more lowland parts show the characteristic Irish pattern of isolated buildings every few hundred metres, the map also includes some very empty areas, where any sort of a building is an important landmark. On the 1:50,000 \textit{Discovery} isolated buildings are shown in black and stand out immediately: a decided advantage. But perhaps one should not complain too much: the generalisation of built-up areas on the OSNI 1:25,000s would look crude at 1:125,000. It must be added that OSNI uses screened black, which seems to me a much more satisfactory infilling than the ‘orange-brown’ effect long favoured by OSGB, and which probably says more about the limitations of printing technology in the 1960s and 1970s than it does about effective depiction.

\(^4\) It is understood that the grey infill was originally used for technical reasons: it is difficult to believe that such considerations still apply.
One of the big problems with the map is drawn attention to in a note, but is not of OSI’s making: ‘Access: The representation on this map on this map of a Road, Track or Footpath does not mean that there is a public right of way or that the landowner has granted permission to recreational users. Participants in recreation activities should be aware that there is no legal right of access to the Irish countryside. Tracks indicated on this map may not always be well defined.’ It is to be hoped that, at any rate in tourist areas such as that covered by MacGillycuddy’s Reeks and Killarney National Park, the Irish government will seek to put access on a more formal footing, that can be properly mapped: the present situation is in the interests neither of land owners or occupiers or of visitors.

With the significant exception of the treatment of buildings, and the lesser one of the cycle routes, the overall effect of the map is good, and this reviewer looks forward to further Adventure Series issues. The land-cover information will provide plenty of fascinating reading for armchair students; outdoor users are distinctly better off than they were before.

**Also noted:**

*Dublin 1847: City of the Ordnance Survey*, by Frank Cullen, Published by the Irish Historic Towns Atlas, Royal Irish Academy in association with Dublin City Council.

This book examines the multi-faceted nature of mid-nineteenth-century Dublin as depicted on the large-scale Ordnance Survey town plan of the city, published in 1847 at a scale of five feet to one mile. The map, as described in the *Nation* newspaper on 13 July 1844, ‘represents the shape and space occupied by every house, garden, yard and pump in Dublin’. Price €15
No more ‘quarter-inch’...

Philip Fry

Last autumn I decided to take a trip to Scotland. Checking maps for this journey, I found that I needed an updated edition of my 1:250,000 Central Scotland. However to my great dismay, I discovered that OS had discontinued publication. Had I known, I would have obtained a full set of the final editions. To me this scale was of immense value, the main benefit being that for rural areas every surfaced public highway was clearly shown. Also, only eight were needed to cover the whole of the UK and all, apart from the one, Western Isles, which has transverse folds across it, were perfect to handle.

A fresh edition used to be published annually, but there has been really no need for this, our road network not being changed as much as in past times. I doubt future alteration would necessitate much revision either. Enquiries at Stanfords indicate there to be no realistic replacements for this excellent series. I suppose now that virtually everyone who travels by road uses in-car navigation, people think they no longer require paper maps. In my experience of meeting some who rely on this form of navigation, this really is unwise. It is so much easier, in working out alternative routes, to peruse a paper map. I really would be “lost” without one in my vehicle.

Having obtained a complete set of 1:50,000 for my laptop, I find that maps viewed on-screen are particularly difficult to use; OK for checking a really small area, of just a few square miles, but paper maps are required for placing districts in context.

... but a great app

Even so, digital mapping should not entirely be dismissed; there is one little marvel that I have found to be immensely useful; this being Maps.Me, an app on my smartphone, which displays maps from OpenStreetMap.org.

One of the great benefits of these maps is that they can be pre-loaded onto the device, country by country, for use offline and accessible when there is no signal and without incurring roaming charges. Another benefit is the astonishing amount of detail included, visible as one zooms in (see the examples opposite). Just about every building and feature likely to be of interest to the traveller is named, together with a wealth of transport information. In most cities at home and abroad the quality and quantity of the data is impressive. This, together with the device’s in-built GPS provides almost foolproof urban navigation. The detail in rural areas is more patchy, but generally includes paths, tracks and features not shown on Google maps. No field boundaries or topography, though! And bright sunlight can make the screen hard to read, whilst battery fade is disastrous!

The app and the maps are free of charge and are available in both Android and IoS versions.
Examples of OpenStreetMap depictions as provided in Maps.Me, showing some of the wealth of detail not found on OS or Google mapping.

Top: Stratford International station, London, showing platform numbers, identification of railway lines (High Speed One, CTRL Up, Diamond crossover) and Docklands Light Railway in green.

Middle: Central Manchester, showing bus stop codes (SH, SZ), post code of letter box (M4 5AA), tram line in red, level crossing, barrier gate (top right), taxi ranks, phone box.

Bottom: Rural East Sussex, near Polegate, showing tracks, road numbers of C class roads and naming the Lewes – Eastbourne railway as East Coastway line.

The editor reports that he has just returned from a successful long walk through remote Spanish countryside following paths and tracks navigating (as an experiment) entirely using Maps.Me on his smartphone.
The future is digital? A review of two mapping apps

Jack Kirby

In an age when so many familiar features of life – from newspapers to music – are becoming digital-first or even digital only in format, it is reasonable to ask whether paper mapping might be going the same way. Already the rise of the satnav means that paper road maps and atlases are in probably terminal decline, while large scale plans have been printed on demand from digital databases for decades. Small scale mapping at (in the UK) 1:50,000 and 1:25,000 has seemed more durable in its traditional paper format, with sales stabilising.¹ Ordnance Survey’s output has of course been available digitally via websites and desktop PC software (including Memory Map and Anquet) for many years, but the advent of smartphones and tablets has now given rise to new ways of presenting the existing mapping to a mass audience that, perhaps for the first time, start to suggest that a different future may be within sight.

In January 2013, OS launched its own ‘app’ for (initially) Apple devices, OS MapFinder.² This was not as much of an innovation as it might have seemed, for commercial apps utilising OS mapping had been available for some time previously. Arising from a recent conversation on the ordnancemaps email discussion group,³ the purpose of this article is to thoroughly compare OS’s own offering with arguably the leading commercial competitor reusing OS’s own offering with arguably the leading commercial competitor reusing OS data, ViewRanger, produced by Cambridge-based company Augmentra. (Other apps are available, notably Memory Map, but not reviewed here).

New technologies and their benefits

Before getting to the products themselves, it is worth defining some of the terms used, for those less familiar with the technologies involved. An app is an application, the equivalent of a program on a desktop or laptop computer: a piece of software for a specific purpose. A handheld device is a handheld piece of electronic equipment, which may (for our purposes) be a smartphone or a tablet. Both smartphones and tablets are essentially small portable computers operated principally by touching their built-in screens. Smartphones are smaller (with screens of typically three to five inches, measured diagonally) and have telephone functions built in. Tablets are larger, with screens above seven inches in size, and telephone functions are optional.

Different devices run particular operating systems, in the same way that we are familiar with the difference between Microsoft’s Windows and Apple’s OS X on desktop computers and laptops. For handheld devices, Microsoft’s Windows Mobile has not proved as popular as Apple’s iOS, which is instead rivalled by Google’s Android. OS MapFinder and ViewRanger are now both available for recent versions of iOS (which runs on Apple’s iPhone smartphones and iPad tablets) and Android (which runs on a variety of smartphones and tablets made by multiple manufacturers). Neither app is currently available for Windows Mobile devices, although ViewRanger is also available for some other devices.

³ https://uk.groups.yahoo.com/neo/groups/ordnancemaps/conversations/topics/5200

I am indebted to all who contributed to the conversation, particularly Richard Oliver and Steve Braim.
Just to complicate matters a little further, Amazon produces the Kindle Fire, a tablet version of its Kindle e-book reader. The original Kindle e-book reader is distinguished by using black and white electronic paper and cannot be used to run mapping apps. The Kindle Fire has a colour LCD screen, uses a customised version of Android as its operating system, and will run both OS MapFinder and ViewRanger.

Having digested the definitions above, one key point about tablets for mapping is that they allow a much larger section of a map to be viewed at a time than has hitherto been possible on a handheld device. The area covered on the screen of a tablet is still, depending on device size, generally slightly smaller than a single panel of a folded OS map, but it is sufficient in area that a decent amount of map is viewable at a glance, and the need to scroll around the map is much reduced compared to a smartphone.

A second significant factor is that tablets and smartphones have built-in GPS receivers, meaning that at a stroke the apps under review turn a device into a GPS unit suitable for location and navigation purposes, and often of surprisingly good quality, even if compared to a dedicated GPS. The apps also store maps on the devices, enabling them to be used whether or not there is an internet connection, which is inevitably an advantage when using a device for the sorts of outdoor activities for which paper maps are traditionally used.

This review is based on using the apps on Android devices, principally a Google Nexus 9 tablet, manufactured for Google by HTC, with an 8.9 inch screen. ViewRanger was also used on a Motorola Moto G smartphone with a 4.5 inch screen.

**Buying the maps**

Both OS MapFinder and ViewRanger are free to install via the App Store on iOS, Google Play on Android, or Amazon Apps on Kindle Fire. Use of OS mapping requires purchases, most easily available through in-app purchases via the source of installation. ViewRanger however can be used additionally with freely available online mapping, by default the crowd-sourced OpenCycleMap, with OpenStreetMap also available along with Bing aerial imagery. Portions of the OpenStreetMap data can be saved in advance for use when out of reach of an internet connection. ViewRanger also offers the OS 1:250,000 map of Great Britain as a free download, which is not a scale available in OS MapFinder.

The two apps offer very different options for purchasing OS mapping. OS MapFinder is based on 10x10km tiles, derived straight from the National Grid and costing 69p each for 1:50,000 tiles and £1.99 for 1:25,000 tiles. For example, I bought 1:50,000 tile SO24, which covers Hay-on-Wye and the area to the north-east. An irritation is that tiles can only be selected and purchased one at a time. To my mind, the tile-based system ignores the potential of digital delivery and just imposes a different set of sheet-lines to the paper maps. The mildly tedious repeat purchasing arrangement is a disincentive to buy large areas.

The makers of ViewRanger, by contrast, have given a lot of thought to how typical users might want to purchase mapping. Its in-app store (some slightly different products are offered by its website shop) offers various options for buying popular areas: 1:50,000 mapping of GB National Parks is split into three groups, with North England and North Wales available at £3.99, South England and South Wales at £2.99, and Scotland and Northumberland at £2.99. For these prices, the entire Landranger coverage for the relevant national parks is supplied, at a fraction of the price it would cost in OS MapFinder. Regional 1:50,000 maps are available at £7.49 each, with the actual coverage depending on area and popularity: Devon and Cornwall are the same price as the
whole of the West Midlands. The whole of Great Britain at 1:50,000 is available for £89.99. In one of ViewRanger’s occasional sales, I purchased this at a bargain £70, which I consider to be excellent value for my purposes, compared to buying 204 paper Landranger maps.

ViewRanger also offers purchases of tiles, each covering a very slightly larger area than OS MapFinder for 1:50,000 (104.9sq km), and a smaller area for 1:25,000 (26.2sq km). The logic of the different areas is not immediately evident, but like OS MapFinder, selection is via an overview map. Tiles are purchased using a credits system: 1:50,000 maps cost 7.1 credits per tile, while 1:25,000 maps cost 20 credits per tile. Credit packs cost from £5.99 for 400 credits, and all work out at just below 1.5p per credit. It can therefore be seen that a 1:50,000 tile costs just under 11p in ViewRanger, albeit with a higher initial outlay.

Where OS MapFinder scores over ViewRanger, however, is in the quality of the map images. OS MapFinder images are advertised as being at 660dpi (dots per inch), and it is possible to zoom smoothly some way into the maps before there is any significant pixilation. ViewRanger does not state the resolution of its tiles, but it is clearly slightly lower, and the zoom function is less smooth. Therefore while OS MapFinder maps are more expensive, it is a slightly better quality map – although for my own purposes, I haven’t found any occasions when the resolution in ViewRanger has been an issue – zoom in too far, and it’s generally an indication that one really needs a larger scale map.

It is also important to be aware that high resolution means large file sizes. Each OS MapFinder 1:50,000 tile takes up about 2.5MB of storage, on top of a large initial download. The regional ViewRanger files are around 250MB in size. Many budget devices have limited storage and sometimes no potential for expansion, and anybody intending to install either app should ensure that their device has sufficient space available.

It will have been noticed from the OS MapFinder example that 1:25,000 maps are considerably more expensive to buy digitally. ViewRanger again offers maps for popular areas, broadly those covered by Explorer Outdoor Leisure sheets on paper, but with some additional popular areas such as Cornwall and the National Trails. The 1:25,000 prices are much more comparable with buying paper Explorers, ranging from the Cairngorms at £54.99 down to £7.99 for the New Forest, and a bargain £3.99 for the Isle of Wight. One inference that can be drawn is that OS may be selling and licensing digital 1:25,000 mapping at prices that seek to avoid jeopardising its income from paper map sales and the costs of maintaining the 403 sheet paper Explorer series.

A further advantage of ViewRanger is that it can be used with maps of over twenty other countries, produced by both state and commercial cartographers. Of particular interest to CCS members will be maps produced by OS Northern Ireland and Ordnance Survey Ireland, and the 1:25,000 map produced by the Isle of Man Survey. In contrast OS MapFinder is solely for OSGB mapping.

Using the maps
At their most basic, the two apps provide a way of viewing maps. They have broadly similar features, including zooming in and out via both buttons and the intuitive ‘pinch and zoom’ technique familiar to users of handheld devices. Each has a button that will centre the map on the user’s location, as identified by the device. I find this particularly useful when I want to check I’m on the correct path, or make a quick check on my position in remote areas – it’s faster than identifying features and taking bearings with map and compass.
One result of zooming is that the scale will alter from the scale of the published map. As a result each app automatically adjusts the scale bar. OS MapFinder has a short scale bar that adjusts to display both metric and imperial units, for example 200 metres and 200 yards. ViewRanger has a longer scale bar that can be set to either metric or imperial via the app settings. Annoyingly whatever the length it represents, the bar is always divided into five sections, which is not always intuitive when displaying imperial distances such as two miles. With National Grid lines present, it is however easy for experienced map users to judge distances in both apps.

Searching in both apps will locate places and postcodes, but OS MapFinder has a more detailed gazetteer database that includes street names. This is a mixed blessing: obviously beneficial if a street address is all that is known, but making it harder to search some common names, particularly as only the first ten results are displayed. An unadvertised feature is that OS MapFinder returns the ten results closest to the user’s current location: ideal for identifying locally relevant results, but less so for armchair trip planning. A little experimentation shows that the desired result can still be returned by entering more details to narrow the search, for example ‘Fleet Street, London’ instead of just ‘Fleet Street’.

OS MapFinder will locate four- and six-digit National Grid references through its search bar. ViewRanger permits searching of a range of coordinate types through an Enter Coordinates option: formats include six-, eight-, and ten-digit National Grid, three Lat/Long options, ITM, UTM WGS84, and UTM NAD27. ViewRanger will also display the coordinates of the centre of the map at the top of the screen in whichever available format is preferred.

**Tracks and trails**

Common to both apps is the ability to plan and record routes, for example the route of a walk. OS MapFinder calls both planned and recorded routes ‘trails’, while ViewRanger calls them ‘routes’ when they are planned, and ‘tracks’ when they are recorded. Planning involves entering waypoints on the map. The route can then be followed, with an arrow on screen indicating the direction to the next waypoint. This is one feature that I personally don’t use, as I prefer to plan on a paper map and navigate with paper map and compass, so my observations are not informed by a lot of experience. However, as with most other features in the two apps, OS MapFinder is simpler, while ViewRanger offers more options.

It is also possible to import routes in the common GPX format into both apps. GPX files can be found on walking websites, sometimes free of charge, and ViewRanger also offers both free routes from its community of users, along with routes to purchase, using credits, from Walkingworld and other publishers. One glaringly obvious omission in OS MapFinder is direct integration with the OS getamap website and the routes that it offers, I suspect because the two products are independent in technical terms. OS getamap relies on Microsoft’s now obsolete Silverlight browser plugin, which will not work on handheld devices operating systems.

A feature that I use on every walk is the ability to create a trail/track tracing the route that I’ve taken. I do this on my smartphone rather than tablet, as it’s easier to carry. Simple record, pause and stop buttons operate the tracking, which produces a line on the map and some additional data including duration and speed (figures 1 and 2). ViewRanger also produces nice graphs showing speed and height, though the accuracy of altitude readings from the device’s GPS is not wholly reliable (figure 3). (Occasionally a rogue trough in the graph will appear to suggest that I have done a
bungee jump off a cliff edge then resumed walking.) I have not installed an optional file to apply a mean sea level correction which may also account for some of the differences seen.

Figure 1 (top): A 14.2 miles walk from Hay-on-Wye, tracked in ViewRanger. The position of the North arrow indicates the orientation of the tablet at the time the screenshot was taken, rather than the orientation of the map.

Figure 2 (centre): The same walk, imported as a trail into OS MapFinder.

Figure 3. (bottom): ViewRanger’s graph of the altitude on the walk, showing both map height (downloaded as an optional altitude file, and stated by Augmentra to be based on a ninety metre grid) and the height recorded by the GPS in a smartphone.

Overall, I find the tracks a good way of logging the distance I’ve walked, and they build up into a record of walks. OS MapFinder also allows an image to be saved to identify the walk, if desired. Routes can be exported from both apps as GPX files and used elsewhere, including importing into OS getamap. ViewRanger also allows sharing of tracks via its website, including links via social media and BuddyBeacon, enabling realtime sharing of location: useful for groups that may become separated. Most of these extra features seem a bit unnecessary to me, but from the amount of community-generated ViewRanger content clearly some people are making use of them.
Some conclusions and predictions

It should be clear from the comparison that ViewRanger is a much more sophisticated product than OS MapFinder. If one wanted a very simple tool to use in a limited geographical area, then OS MapFinder might fit the bill. ViewRanger does take a bit of getting used to – it’s one of the more complex apps that I use – and benefits from exploring and customising the various settings it offers to set it up as desired (I found a few of the default settings, such as automatically starting tracking, annoying). While I wouldn’t necessarily recommend it to novice users of handheld devices, there is very good documentation available online with a user manual in the form of a wiki for each operating system.4

Overall, I really like ViewRanger, and within a matter of months it has become a highly valued companion on my walks. Even on a smartphone, the area of 1:50,000 map visible is good; on a tablet, while it can’t compete with the majesty and ability to read a large area of landscape offered by a whole unfolded paper map sheet, it does a very good job and has advantages over the two panels that will fit (folded) in a typical map case, in that scrolling rather than refolding is all that is required to see the adjacent area. The standard disadvantages of using electronic devices outdoors obviously remain. I have a waterproof case for my smartphone when walking, but would require a considerably more robust and waterproof case for my tablet if I was planning on using it in the field regularly.

Returning to the issues raised at the start of the review, to what extent are the apps a replacement for paper maps? The OS MapFinder FAQ answers the question “Can I throw out all my paper maps now?” by warning, “No. We don’t recommend that at all. Ordnance Survey recommends that users of this app, and any mapping apps, also carry a paper map with them as a back-up when out and about, in case the device runs out of power.”5

Cynics might say that users therefore need to purchase the same map twice, once electronically and once in paper format. However, the British Mountaineering Council has a good online article that quotes Simon Steer, a mountain rescue team leader summing it up nicely by saying, “Advances in technology are a great addition to the range of navigational aids, [but] they do not remove the two key requirements to travel safely in the mountains, which are the ability to navigate using traditional map and compass, and the need to go to the hills properly equipped for mountain weather.”6 This is sound advice. A short-to-medium length walk on a summer’s day in reasonably populated parts of lowland England could be undertaken using only maps on an app on a reliable, fully charged device with only minimal additional risk. Yet I would not set foot in any serious walking terrain without my paper map and compass (and a lot of other essentials besides).

Personally, I enjoy practising my navigation skills using map and compass, but it is also reassuring to have the ViewRanger app in order to check my position if in doubt, particularly in terrain such as largely featureless moorland. It has occasionally come in use for other purposes, such as one walk where (for reasons too complicated to explain) I deliberately deviated off the originally intended route and indeed a few

4 http://www.viewranger.com/en-gb/support/support/manuals
5 https://www.ordnancesurvey.co.uk/shop/mapfinder/mapfinder-android-faq.html
kilometres off the paper Explorer sheet I was carrying; I was able to use the Landranger mapping in the app to navigate to a railway station where I finished the walk.

From an armchair point of view, ViewRanger offers a quick and easy way of looking up a location for which I don’t own a paper map (not being an active collector, more of a passive accumulator). I wouldn’t shell out for the Explorer mapping, given the much higher price, but having access to all the Landranger maps in such a compact format is more than adequate for most purposes.

For casual leisure purposes, a smartphone is now a reasonable alternative to a dedicated GPS device. I haven’t used a dedicated GPS myself, but it appears that GPS devices are currently converging with smartphones, as a number of handheld GPS devices are now running Android. The advantage of a dedicated GPS (whether traditional or running Android) is that the GPS is better quality than a smartphone or tablet, and the device is more rugged for outdoor use. The disadvantages that I perceive with GPS devices running Android is are that they are considerably more expensive than a reasonable Android phone, the screen size remains smaller than a tablet/Kindle, and one still needs to carry a separate phone for communications if using out in the field. That said, if I was actually navigating by GPS rather than with map and compass I might still consider a dedicated GPS.

There are signs that OS MapFinder is merely a first step into the new market by Ordnance Survey. In the small print on the OS website is a note that “tile uploads [biannual updates of purchased map tiles] will be free for the life of the application or until 31 March 2016 (whichever is longer).” This does not suggest a strong commitment to update the app for years to come.

Moreover, a recent article on technology news website The Register reports that OS is developing a next generation app that goes beyond the current apps’ use of existing raster mapping to use OS data in a new way. Ben Scott-Robinson, OS Head of Interactive Experience, is quoted as saying “We’re tying together the new slippy map (web style)... and the UI [user interface] itself.” What this means in practice remains to be seen. Images in the article imply use of vector mapping, yet do not suggest anything as attractive as the existing Landranger or Explorer cartography.

Ultimately, the future for OS mapping may well be entirely digital, but the apps under review are merely a staging post on the route to a wholly digital future. (As a side note anybody purchasing digital maps now may yet need to repurchase them in the future – they are tied to the apps of today). Devices continue to advance, and the tracking functions of ViewRanger (but not the maps) are now available on certain smart watches. Significant advances in device battery life, reliability, and durability will be required before digital maps can replace paper entirely, and it is likely that both devices and software will continue to develop new features. I’d recommend ViewRanger to walkers like myself, but mass market paper maps will still be around – and essential – for a while yet.

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7 [https://www.ordnancesurvey.co.uk/shop/mapfinder](https://www.ordnancesurvey.co.uk/shop/mapfinder)
8 Andrew Orlowski, ‘First look: Ordnance Survey lifts kimono on next-gen map app’, [http://www.theregister.co.uk/2015/02/05/exclusive_os_lifts_kimono_on_nextgen_map_app](http://www.theregister.co.uk/2015/02/05/exclusive_os_lifts_kimono_on_nextgen_map_app), 5 February 2015.
Letters

A Close encounter

The name is not unusual but the existence of an approximate contemporary of Sir Charles who was a cartographer is an intriguing coincidence. Albert Close (active 1910s-1950s) was a Canadian, long settled in UK, whose early cartographic interests originated in a sea-faring background. His most commercially successful publications were a series of charts intended for use by the fishing fleet and an atlas of coastal and harbour charts, all sold by Stanford. This aspect of his career met with disfavour from the Admiralty who were irked by Close’s reckless attitude to copyright.

Close’s maps and charts of 1914-18 land and sea campaigns reflect his patriotism, which was extreme, even by the standards of the time. An ultra in everything, his other active interest was anti-Catholicism. This found expression in pamphlets with alarming titles produced for the Protestant Truth Society, which included maps illustrating historic Catholic aggression. They were not sold by Stanford.

As far as I can tell, nothing has appeared in Sheetlines about Albert Close and it would be good if someone is able to fill in more of the details of his life and publications. My information has come from The mapmakers, a history of Stanfords, Peter Whitfield, 2004. A quick web trawl reveals that The National Archive holds a copyright application in respect of the use of Admiralty charts,¹ National Maritime Museum holds two of his charts² and that two of his charts were recently sold by auction.³

Peter Warburton

During a 1998 recording of Desert Island Discs, available as a BBC podcast,⁴ the wonderful Dame Judi Dench said she was ‘mad about maps’ and would take ‘an Ordnance Survey map of the world, as her extra book, shipped out on a tanker’.

David Brock

The CEO of a National Mapping Agency was travelling in a hot-air balloon and was lost. He reduced altitude and spotted a man on the ground below.

‘Excuse me’, he shouted. ‘Can you help me? I promised to meet a friend an hour ago, but I am lost’.

The man on the ground replied, ‘You are at an elevation of 9.3 metres above ground level, 67.3 metres above mean sea level, (Ordnance Datum Newlyn), at Ordnance Survey National Grid reference SK606l509074.

¹ TNA STAT 14/85.
⁴ www.bbc.co.uk/programmes/p00943dl
You may have satellite positioning equipment in your basket which will show your position as latitude N52°49′33.5″, longitude W01°06′17.6″ and altitude 64.3 metres on the WGS84 Geoid.

The man in the balloon replied, ‘You must be an Ordnance Survey surveyor!’ ‘Yes, I am’ said the man on the ground. ‘How did you know?’ ‘Well’, said the man in the balloon, ‘everything you have told me is technically correct and no doubt extremely accurate. However, I have no idea what to make of your information, and the fact is that I am still lost. Frankly, you have been no use to me whatsoever!’

The man on the ground responded, ‘You must be in management!’ ‘I am’, said the man in the balloon, ‘but how did you know that?’ ‘Well,’ said the man on the ground, ‘you don’t know where you are, how you got here or where you are going. You have risen to where you are due to a large quantity of hot air. You have made an unattainable promise which you have no idea how to keep, and you expect those below you to solve your problems. The fact is that you are in exactly the same position as you were before we met, but somehow it’s now all my fault!’

David Andrews

The chart Folkestone Harbour (1:4860) was published by The Admiralty in 1874 with street plan and railway added ‘from the Ordnance survey’. It is a very conveniently sized town reference for the 1870s. Was this survey a one-off for the packet stations or was it not unusual to combine the two types of information for certain coastal localities? In this case there was a third party in the person of Mr A.Wyld, Geographer to Her Majesty, (‘one door down from Trafalgar Square’) who sold the map.

John Middleton

A curious sad coincidence

Earlier this month I received a copy of The Measure of the World by Denis Guedj, late Professor of the History of Science at Paris Viii University. For those unfamiliar with the book it is a novel relating the story of Méchain and Delambre, and the measurement of the Dunkirk – Barcelona meridian between 1792 and 1799.

In June 1792 Méchain headed south from Paris towards Barcelona, while Delambre headed north towards Dunkirk. Their task was to measure the meridian accurately. Subsequently the definition of the metre was derived from this endeavour. Delambre’s first stop on leaving Paris was the small town of Dammartin-en-Goële, where it was intended to use the church steeple as a triangulation point.

As I was reading Chapter 2 of the novel this afternoon, after having finished the Observer, the coincidence suddenly dawned. The two terrorists responsible for the ‘Charie Hebdo’ killings had, themselves, been killed in a print warehouse in Dammartin-en-Goële; Delambre’s first stop 223 years earlier.

Paul Horbury

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