Sheetlines

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for the Study of Ordnance Survey Maps

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Mark Ovenden, author of Great railway maps of the world and many other railway and map-related books, was guest speaker at the AGM in Kingston-on-Thames on 11 May (above left with chairman Gerry Zierler). For next year’s AGM Ordnance Survey have very kindly invited us to their stunning new headquarters at Explorer House, Southampton (Saturday 17 May 2014). Full details in April Sheetlines.

The 2013 visits programme has continued in fine style with events at Cambridge, Piccadilly, Feltham and Liverpool which have provided enjoyable opportunities for members to meet and chat as well as for discovering much of interest. Reports and pictures are on pages 5 and 8 and future 2013 events are listed below. Bernard Anderson has kindly agreed to help Gerry Zierler with the administration; to book your place you should contact Bernard on visits@CharlesCloseSociety.org or write to him at 1 Pulpitfield Close, Walton-on-Naze, Essex CO14 8RS

**Wednesday 11 September, 1100 till lunchtime.**
Visit to British Library, London, to see some of the earliest Board of Ordnance and Ordnance Survey maps and other treasures from the King George III Topographical Collection (‘KTop’). Courtesy of Peter Barber and Tom Harper of BL.

**Tuesday 12 November, 1100 till lunchtime.**
Visit to Butler, Tanner & Dennis Ltd, Frome, Somerset.
BTD are the printers of OS paper map products and a number of other mapping
organisations’ material. Courtesy of Steve Burry, who is both a CCS member and BTD’s operations director.

Two other organisations which hold events and activities that may be of interest to CCS members are Defence Surveyors’ Association (DSA) and Historic military mapping group of the British Cartographic Society (HMMG). DSA focuses on the history and practice of British military surveying and mapping and the present-day and future geospatial intelligence functions of the three Services. DSA invites CCS members interested to join, whether or not they have served in the armed forces. For more information contact Tony Keeley on 01635 204344 or secretary@defencesurveyors.org.uk.

Meanwhile, HMMG invites CCS members to join its visit to Lincolnshire on Tuesday 1 to Thursday 3 October to commemorate the seventieth anniversary of significant events in the Second World War involving RAF Bomber Command, most notably the Dams and Hamburg Raids. The trip includes visits to RAF Scampton (617’s old home), RAF Waddington and RAF Coningsby. Cost is £120 per person (based on two sharing) and all enquiries should be addressed to Dr John Peaty johnpeaty@aol.com

Some valuable resources for those interested in the history of Ordnance Survey are now available on the internet. Two classic publications which have been posted at www.ordnancesurvey.co.uk/oswebsite/about-us/our-history/index.html for free download are A History of the Ordnance Survey edited by WA Seymour (1980) and Map-makers to Britain since 1791 by Tim Owen and Elaine Pilbeam (1992).

Meanwhile, our own website now has a fascinating selection of articles about Ordnance Survey which were published in the Geographical Journal at the end of nineteenth century and the early years of the twentieth century (see page 50 for details). These, together with the complete archive of back numbers of Sheetlines at www.charlesclosesociety.org/SheetlinesArchive, provide easy access to a wealth of information which would not otherwise be readily available.

Enclosed with this issue of Sheetlines is the 2013 Almanack. As it is thought to be environmentally unsound and financially wasteful to repeatedly print and distribute in a booklet information which is unchanging year after year and which appears on the website, it is possible that this may not continue in its present form. If it is discontinued, updated information, such as the membership list, publication list and Sheetlines index would continue to be distributed to all members, whilst new members would receive a Welcome pack. A decision will be made by the committee; any member wishing to express a view should contact one of the officers listed inside the front cover of Sheetlines.

Finally a reminder that OS offers CCS members a generous discount at the Ordnance Survey online map shop: http://www.shop.ordnancesurveyleisure.co.uk Entering the code CC2PMGAMCM in the discount section within the basket will give you 30% discount on most OS paper maps and OS getamap.
Towards a virtual museum of the geographic production process

Rob Wheeler

The story behind this initiative starts in the 1930s. The Italians were preparing for the invasion of Ethiopia and undertook a lot of air survey to improve their maps. They used an innovative camera by Santoni which exposed four images on a single plate (port oblique, port-near-vertical, starboard-near vertical, starboard oblique), successive plates having enough overlap to allow stereo techniques.

Fast-forward to the present century, and a geographer at Ghent University, Jan Nyssen, was working on climate change in Ethiopia and was searching for old photographs showing tree-lines, etc. He heard of a store of old air photographs at the Ethiopian survey establishment and there in the basement were all these plates from the 1930s – but unlabelled. So he contacted the Belgian national mapping agency, NGI, partly because he wanted to learn how to rectify them but also because he needed to learn how aerial survey worked in order to establish how these plates might fit together. This made people realise just how scanty was knowledge of the detailed techniques used before the digital era; documentation had often been destroyed, and many of the people who knew how things were done were retired or dead. Moreover it was clear that such matters were not just a matter of curiosity but were relevant to topics like climate change and overseas development.

This led to the European Spatial Data Research Network (EuroSDR), which links national mapping agencies and research bodies, sponsoring an exploratory workshop in Brussels in May 2013 to look at what was being done to preserve knowledge of these matters and what ought to be done. I represented CCS (and, effectively, the UK) at this meeting.

The meeting concluded that there was indeed a problem. There was a faint prospect that EU money might be available in sufficient amounts to enable a group to be set up which would pursue a programme to address this on a Europe-wide basis. A more likely outcome was that the group would evolve into a body which could coordinate the efforts of different national groups involved. Coordination does not mean telling groups what to do but sharing knowledge between them. It reflects a recognition that there was much commonality between the technical processes used in different countries – the OSI representative remarked to me in the middle of an NGI presentation that the description exactly matched how they had done things – and coordination could reduce the effort needed for recording.

The question for CCS is: Should we be involved and if so how? The committee has discussed the matter by email and takes the view that the aspirations expressed by the working group accord absolutely with the aims of our Society. Of course, if OSGB was about to get involved we would not want to duplicate their efforts, but it seems highly unlikely that OSGB would feel they could devote significant resources to such a project. Moreover, by getting involved under the aegis of this working group, we can avoid recording things that other countries have already recorded adequately and we are better placed to engage in
comparative studies into how processes in this country differed from those elsewhere in Europe, and why.

What we are not proposing is any grand coherent history. There already exist projects like the International Society for the History of the Map; we would be foolish to attempt to duplicate such efforts. What we propose rather is a digital archive, except that, to avoid confusion with the Society’s archives at Cambridge, we propose to refer to it as a virtual museum. This will serve as a repository for accounts of the technical processes used in the pre-digital era. It can also include references to physical documents in our archive or in other repositories (including private collections). It can include photographs of equipment and indeed references to where surviving equipments may be found. We do not envisage it including maps: it is about the technical processes used, from geodesy through survey to the drawing and finally the printing of the maps. Although the focus is on OSGB, we would not exclude other UK mapping agencies, not least because their processes may tie in with those used in other European countries if not with OSGB’s. As for Ireland, whilst OSI and OSNI come within our Terms of Reference, OSI itself seems likely to participate, and, in any case, the vast majority of our members are based on mainland Britain.

Initially at least our coverage will be very patchy. We will maintain the collection on a ‘work-in-progress’ basis on the Society website at www.charlesclosesociety.org/virtualmuseum. The pages will not be accessible via the normal navigation links on the website but the link will be provided to the other members of the European working group.

What we need are contributions from members. Most will take the form of electronic accounts. We don’t expect them to be great literary works – if they were they would belong in Sheetlines – though we will exercise an editorial function, not least to ensure clarity. Some contributions may be scans of photographs, some may be references to where physical documents or specimens can be found. Contributors must be prepared to receive questions from ‘museum visitors’. Of course, there is no obligation to answer questions but it is hoped that useful clarification will result from them, perhaps even drawing out distinctions between how apparently similar processes operated differently in different countries.

And there is a timescale associated with this: in April 2014 the exploratory group will want to establish what progress has been made. The more progress, the greater the likelihood of some form of standing working group being set up. Our own initiative is probably worthwhile even as a stand-alone effort, but it is potentially more useful if it is done as part of this wider European initiative. So please do not procrastinate.

As for public exhibitions and indeed permanent galleries, one advantage of a virtual museum is that there is no need to move objects around. If the best example of some equipment that OS once used is on a Lithuanian website, the viewer can be despatched to Lithuania via a link, without even noticing. We envisage these coming in due course – any budding exhibition designers out there? – but the first priority has to be building the collection.
In the morning of Saturday 23 March around fifteen members met at Cambridge University Library for a ‘show & tell’ session. The maps tabled were:

Richard Oliver – whilst common to find a 1914 one-inch Aldershot District map stamped as ‘Official use only’, Richard has now found one without the stamp, implying it was available for sale, contrary to all expectations and understanding of these maps.

Malcolm McIvor – a two-sheet map of the Dinsdale estate in County Durham, one of the earliest examples of printed 25-inch OS maps. A debate ensued as to where they should be deposited (locally to the site, or nationally at CUL).

Peter Walker – the first published OS map, the one-inch of the whole of Essex from 1 April 1805, printed as a county set, combining sheets 47, 48, 1 and 2.

David Webb – a 40 feet long strip map for roads that could be hired from Road Guides Ltd, dating from 1920s.

Chris Higley – a one-inch Third edition map from June 1912 with a 1919 Ellis Martin cover; the map sheet itself is labelled Stratford-on-Avon and Worcester, whereas the cover is labelled just Worcester & District – why make the cover less comprehensive than the sheet? The same approach is seen on several other maps around this time.
Bill Batchelor – shaded relief maps, some so shaded as to be useless (eg 1908 half-inch sheet 5 of Lake District), others beautifully created (eg of North Switzerland, 1982).

Ken Hollamby – an undated AA Scottish Motoring map has a Bartholomew’s print code, which can be translated into 7 November 1935, in a print run of 3000 (see page 28 of this issue). Also a Philips map for Mex Motor Spirit Thames Valley, post 1914 but before the fuel restrictions of 1917.

Rob Wheeler – 1934 index map of Cambridgeshire, showing that the Isle of Ely had four UDCs whereas (south) Cambridgeshire had none. Also two War Office Outline sheets of the British Isles, one dated 1942 and the other 1971, using two different projections, and both looking inaccurate.

Ian Byrne – Truro & St Austell Popular Ed (c 1936) with owner’s name written on the cover: CB Rootham, St John’s Coll, Cambridge. He had composed City in the West in 1935, so connected with area of the map? Also one of his oil company maps – Shell’s Hamburg from 1937/38.

John King – an OS map issued for use in exams of the eastern side of the Isle of Wight, totally lacking in the colour brown – so white space for B roads and contour lines totally missing: this must have been a trial for the pupil who used this (without complaint) in an exam. We also saw a remarkable map for night glider landings in Normandy on D-Day.


After lunch in the Library tearoom and with snow still falling outside, Anne Taylor took the group into the Map Room. In her introduction she explained that the University Library was a ‘Legal deposit library’, entitled to a copy of every printed work published in the United Kingdom: she had well over one million maps in her care. The treasures included one of the five known sets of proof maps prepared for John Speed’s Theatre of the Empire of Great Britain, published in 1611/12.1

Anne then handed over to her colleague, Andrew Alexander, who had arranged a special display for us. This started with an impressive array of maps of Cambridge, from the earliest in the Braun and Hogenberg Atlas of 1575, through 1:500 and 1:2500 coloured OS maps to the 1989 Soviet city plan. An unusual modern commemorative souvenir also caught one’s eye: a jigsaw of the city

1 Images may be viewed at http://www.lib.cam.ac.uk/deptserv/maps/speed.html – high-quality paper copies are also available to order.
centre with aerial photography and mapping of various eras overlaid in layers to form a palimpsest.

Andrew had judged his audience well. Ordnance Survey map addicts we may be, but any CCS group is likely to contain both transport buffs and hill-walkers. His display was completed with yet more “interesting” Ordnance Survey maps and several transport maps, including large-scale railway company plans and diagrams mimicking Beck’s London Underground map. The Scottish ‘Munros’ and the Lakeland peaks or ‘Tubular Fells’ looked particularly convincing in this format.

Richard Oliver then took the floor to describe exhibits taken from the Charles Close Society’s own archives, which are housed in the Library. Ordnance Survey working records form a major part of this collection and a set of experimental printings of 1:25,000 maps was on display, together with specimens of hand lettering and copper plate engraving, publicity leaflets and instructions to surveyors in the form of the famous ‘Red Book’. Richard let us into the secret of a ‘short-cut’ used in the preparation of his Concise Guide by talking about the files of large-scale revision progress records. These provide reliable official dates for survey revision without the need to requisition every single original sheet from the library stacks.

The archive essentially started with the rescue by Yo Hodson of the OS One-inch Seventh Series job files, two examples of which were on the table. These detail the stages in the production process of every printing of each sheet in the series – or so Richard thought until a member recently came up with a printing of Sheet 101, Manchester, of which there was no hint in the official files!

Anne hoped that Society members and others would use the CCS Archives for further research (and write this up in Sheetlines). She emphasised that members of the general public could gain access to the Library by prior arrangement: there was no requirement to be a member of the University.2

Our thanks go to Anne Taylor, Andrew Alexander, Richard Oliver and Gerry Zierler for providing such a stimulating day.

[photos: David Webb and Bill Batchelor]

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2 Instructions for members wishing to acquire a reader’s ticket for the CCS Archives appear at http://www.charlesclosesociety.org/archives and in the Almanack.
Above: Pete Jones MBE (centre with lanyard), our host at the Defence Geographic Centre seen posing with CCS members during the visit to Feltham on 8 June.
[photo David Webbl]

Left: Members listening to John Henry describing some of the items in the map collection at the Geological Society, Burlington House, London during the visit on 31 May.
[photo Gerry Zierler]

Right: Searching for the benchmark indicating Colby’s 1844 Ordnance Survey mean sea level datum in the former Victoria Dock, Liverpool during the two day visit to Liverpool on 5/6 July. An illustrated report on this visit will appear in December Sheetlines.
[photo John Davies]
All being well, a third edition of my *Ordnance Survey maps: a concise guide for historians* will be issued around the beginning of October. Like the OS itself, the *Concise guide* has grown up in a rather fragmented way. It was originally conceived in about March 1991 as simply a drawing-together of some existing data on the 1:10,560 and larger-scale surveys and revisions of towns and counties, plus some brief notes on the development of each scale, and a list of abbreviations. At that time there was reason to expect that in the next few years J Brian Harley would produce a complement to his *Ordnance Survey maps: a descriptive manual* of 1975. In December 1991 Harley died suddenly, and the ‘descriptive historical manual’ went with him. It was only in the autumn of 1992, after I had begun serious work on the *Concise guide* – mostly a matter of refining the survey and revision date information for certain places – that I decided to add what was Chapter 3 in the first edition, and chapter 5 in its successors, ‘Notes on the depiction of detail’. This was based on various photocopies and notes, including of much of the material that had been used or collected for the *Descriptive manual*, and seems to be the most highly-regarded part of the book.

My original concept was a 160-page paperback of A5 size, to sell at £8.95, but I was persuaded by David Archer and others to change this to 192 pages, B5 and £12.95. Time has proved their judgement sounder than mine. We printed just over 1000 copies in May 1993, and another 2200 less than a year later; by the time the second edition was issued in March 2005 we had fewer than the odd 200 copies left. That second edition, now 256 pages and printed-paper-case, was exhausted in March 2013, and leftovers of the first edition are being offered at a reduced price as a makeshift. We intend to print 1000 copies of the third edition, of 320 pages, and hope that the stock will be exhausted within ten years.

How do the three editions differ? Given the growing length it is perhaps as well that the title decided on originally, in consultation with others, was *Concise guide* rather than *Compact guide*: compactness belonged to the 160-page concept, but a relic of it in the first edition was the scattering of the explanations of conventional signs as page-fillers in the ‘counties’ chapter. This was not popular, and the signs were duly grouped together in the second edition. One convention not explained by the OS was the herringbone-and-bushes depiction of gardens and, following queries from users, an example of this was duly included in the second edition.

There were three groups of additions to the second edition. A chapter on OS maps as historical sources sought to disentangle survey, revision and compilation, the concepts of ‘basic’ and ‘derived’ mapping, and sources of ‘error’, not least paper distortion. Some OS definitions, such as of ‘series’ and ‘edition’, ‘house
units’ and ‘ornament’ that had appeared as ‘depiction of detail’ were given a chapter of their own, and the ‘detail’ chapter was greatly expanded by a more thorough exploration of surviving OS instructions to field and drawing staff. The bibliography was also expanded.

In the third edition the ‘depiction of detail’ chapter has been further expanded, with some contributions from the OS website on recent practice; ‘recent’ it may be, but one often senses a profound continuity. What was Chapter 4 in the first edition and is Chapter 6 in its successors, on the mapping of towns, sought to include all towns mapped at 1:1250 or larger, plus a selection of others. The selection was perhaps a rather personal one, but does not seem to have been remarked on as it might. For the third edition the list of towns has been expanded to include practically everywhere that might reasonably be regarded as a ‘town’ at some time between 1500 and the 1950s, on the basis of either administrative or market status. Also included are post-1950 ‘new towns’, including Cranbrook, east of Exeter, which is still being built and is not yet to be found on OS small-scale mapping.¹ The list now also indicates towns revised for land valuation purposes in 1911-12 and not fully revised again shortly afterwards, and those recently ‘enhanced’ from 1:2500 to 1:1250 standard.

Chapter 7, the mapping of counties, has also been expanded, to incorporate the data on air photo mosaics formerly in the two-page Chapter 8 (now ‘abolished’), much more detailed information on fragmentary publication of 1:2500 first edition mapping, and lists of 1:10,560 Special Emergency Edition sheets prepared in 1938-9. This has necessitated abandoning the principle of having each county’s entry on a single page or opening, but it does greatly facilitate laying out.

The Concise guide is essentially a work of compilation and of, to be honest, short cuts. With perhaps 150,000 or more County Series sheets and perhaps 500,000 National Grid ones it could not be otherwise. One ‘short cut’ is the very brief treatment of OS surveying and reproduction methods. These need either a book, or a substantial section of the CCS website, and recent developments suggest that this will happen sooner rather than later.² A more fundamental ‘short cut’ is in assembling the data for town surveys and revisions in Chapter 6. An important source for revisions of the 1920s to the 1940s, and for some National Grid remapping of the 1960s and 1970s, is the group of revision progress diagrams in the CCS archives.³ These supplied data both for the original list, compiled in 1991-3, and for the augmented version twenty years later. Other data has been taken from 1:10,560 and 1:10,000 mapping that happened to be readily to hand: the open-access county sets at the British Library and the regional cover available in Exeter have been particularly valuable for this.

¹ The name seems to be an amalgam of Crannaforid (SY 011962) and Southbrook (SY 022963). Why could it not have been ‘Cranbrook’, to distinguish it from the well-established (eleventh century or earlier) town in Kent?
² See Rob Wheeler, ‘Towards a virtual museum of the geographic production process’, Sheetlines 96,3 [this issue].
The remaining dating for National Grid mapping has been taken from the 1:2 million scale annual progress diagram included in OS annual reports from 1954-5 to 1982-3. The changing format of this diagram over the years deserves an extended essay in itself, but all but the earliest versions record publication rather than survey dates; my assumption is that, say, publication in 1966-7 suggests a 1965 survey date. Sample-checking indicates that this is reliable within a year or so. At 1:2M a one kilometre area measures 0.5 mm square, and so the date-extraction operation is a delicate one. The method used is in principle as follows. First the extent of the relevant built-up areas are ascertained from recent 1:50,000 mapping, and plotted on millimetre-squared paper: this gives a diagram at 1:1M (figure 1). This diagram is then reduced to half-size by photocopying, and the areas of interest traced off: because of changing formats, both 100 km National Grid squares and the coastline are on the tracing (figure 2). The tracing is then overlaid on the progress diagrams in the annual reports, and as the colours change on the diagrams, so the desired dates are obtained (figure 3).

These ‘short cuts’ may disillusion some who had assumed that I have looked at every OS large-scale sheet. The challenge to critics is to provide an alternative, given that the libraries with the largest holdings at the same time restrict daily issues to a relatively modest number of sheets: a serious problem even for those with ready access to the repositories in question. Several people have suggested a ‘sheet finder’, whereby passing a cursor over a National Grid square on a screen would enable all relevant dates, of both County Series and National Grid mapping – which latterly means digital data – to pop up. The technology is certainly there: as yet the data is not. Until then, you will need the Concise guide.

Figure 1 (left) National Grid square TQ, with urban areas needing survey dates plotted on 1 cm paper. Note the faint pencil indications of names

Figure 2 (centre) Extract from trace at 1:2M, with urban areas traced from half-scale reduction from Figure 1. Note both 100 km National Grid squares and coastline

Figure 3 (right) The 1:2M trace overlaid on Plate I of the OS report for 1966-7. Red denotes areas mapped at 1:1250; green indicates areas mapped at 1:2500.
William Mudge and the General map of England

RC Wheeler

Between 1744 and 1793, four generations of the Cassini family produced an accurate map of France, to a uniform projection (Cassini on meridian of Paris) and with a regular grid of sheet lines based on that projection. Lt William Mudge, writing on 10 April 1799 as the recently-appointed head of the Ordnance Survey, had this in mind when he wrote that one of the principal objects of the Trigonometrical Survey was ‘to collect materials for making a General map of England, in some respects similar to the Carte de France’.\(^1\) The expression *in some respects* seems in part to have been inserted to avoid committing the Board of Ordnance. It serves also to remind us that the Old Series was a very imperfect reflection of the rigorous logic of France: the map of England used multiple meridians,\(^2\) had sheets that were not quite rectangular, and a few of the joins at corners were juggled slightly.\(^3\) It was nevertheless the first map on a largish scale to cover the whole country by a grid of sheets. Previously, individual counties had been covered in this way but nothing larger.

This raises the question: how long before 1799 did Mudge conceive this idea? And when did the Board of Ordnance come to accept it? I have no new archival evidence to bring to bear on the subject, but it seems to me that the choice of sheet lines for the early maps of the Survey – their *scheming* being the technical term, as Brian Adams pointed out – does allow tentative conclusions.

Let us start with the Mudge-Faden map of Kent. The genesis of this was ‘some time before 1798’,\(^4\) but because of its inclusion of so much of Essex, we must assume its scheming came after the decision in 1799\(^5\) to press ahead with the topographical survey of Essex. The map was in four sheets, 33.5 by 22.6 inches between neatlines, using plates 35.3 by 24.3 inches.\(^6\) The smaller dimension here is significant in that it was almost as large as was achievable prior to the introduction of improved roller presses about 1800.\(^7\) The east-west dimension was probably chosen to accord with standard sizes for paper or plate. The southern edge of the map clears the southernmost point of the county by just a quarter of a mile; the northern edge lies about three miles north of the Essex shore of the Thames estuary. Inclusion of this coastal fringe of Essex was clearly important to Mudge. It has sometimes been suggested that this was for military reasons. This seems implausible. A field commander dealing with an amphibious landing in

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\(^3\) Notably those to the NE of sheets 11 and 12.

\(^4\) Margary I, xxxii.

\(^5\) Margary I, xxviii.

\(^6\) Margary I, xxxvii (neatlines). Plate measurements were made by Roger Hellyer on the NLS set. His figures for dimensions within neatlines (33.4 inches by 22.7 inches) are within variability of paper shrinkage.

\(^7\) Personal communication A Cook.
Kent would need a good map of Kent; a field commander dealing with an amphibious landing in Essex would need a good map of Essex. The overall commander needed to decide how to apportion forces between the two counties and when to commit reserves; for this, a small-scale map would suffice. Only a naval commander would need a map of the whole of the estuary, and he would use a nautical chart, not a topographical map.

Why, then, did the Mudge-Faden map include this three-mile fringe of Essex? I suggest it was to satisfy purchasers from the numerous towns on the Kentish shore who might wish to identify on the map landmarks they could see across the water. To include a detailed representation of the Essex shore for no other purpose would normally be an unwarranted extravagance for a commercial map producer, but in this case the survey at least came gratis. Moreover, places like Hackney attracted prosperous merchants seeking plots for elegant residences within easy reach of the City; such men were perhaps seen as potential purchasers if their residences lay within the map.

For the western and eastern edges, there was limited flexibility. Within Surrey, topographical survey data seem to have been available only for a few square miles NE of the Camberwell to Sydenham road. The western boundary was perhaps chosen to include as much of London as possible without making this division too obvious. This placed the eastern boundary a mile or so beyond the Thanet coast.

But the most important decisions were to employ a projection based on the Greenwich meridian and to align the sheet lines with that same meridian. For a ‘General map of England’ it would have been better to use a meridian close to 2 degrees West (which is that used by the OS for current maps). In Mudge’s defence, it may be noted that, because the UK mainland spans a narrower range of longitudes than France, the distortions that would result from using the Greenwich meridian on the western fringes of the country are no greater than those that the Cassinis’ map faced on both the western and eastern fringes of France. Nevertheless, because the distortion increases more or less as the square of the distance from the prime meridian, a very minor inconvenience in Kent would have greatly moderated the problems potentially faced by Cornwall.8

All these decisions appear to have been taken in the interest of producing an excellent county map for Kent rather than one which could form the first part of a General map of England. If Mudge aspired at this date to follow the Cassinis, he was not prepared to sacrifice even the slightest current advantage for the sake of that long-term ambition.

Turning now to Essex, the first thing to note is that no attempt was made to continue the sheet lines of the Kent map. Admittedly, the size of Essex is very inconvenient for such a procedure: two rows of sheets would be needed but the

8 If we assume that Mudge had already decided that the maps should employ different meridians in their projections, this would not preclude the use of a single meridian for the sheet lines. As one moved further from the prime meridian, the angle between true north and the edge of the map would increase, but only linearly.
county would finish at the mid-line of the second row. Thus pragmatism may
have steered the decision, but it might equally be that the Board saw the Essex
sheets as another county map and had no vision, at this date, of a map of
England. However, the eastern edge of the Essex sheets is so arranged that there
is no land to the east of it, and this would make it possible for a set of Suffolk
maps to butt up to Essex. Indeed, the coastline passes so closely to the NE corner
of the Essex sheets that one is inclined to regard the arrangement as deliberate. Yet the positioning does not lend itself to the continuation of the Essex sheet
lines in a grid pattern. As we know, this is what was done in due course and it
led to a need for two sheets (67 and 49) to cover a strip of coast never wider than
7½ miles. Had the Essex sheets been moved 7½ miles eastwards, this untidiness
would not have occurred. There would have been a penalty in that a small strip
of western Essex would have been left off, but part was already covered by the
Mudge-Faden map of Kent, and the rest could be dismissed as of little military
significance. Perhaps the fact that the Tower of London would fall in this strip
was seen as critical. Nevertheless, the easiest explanation for the Essex sheet lines
is that the Board of Ordnance still thought of their product as a county map.
Mudge indeed might be planning ahead, but only within the constraints imposed
by the Board. Those constraints no doubt included a requirement to align the
map on the Greenwich meridian, with the consequences already remarked on
under Kent.

The size of the Essex sheets is 34.6 by 22.8 inches between neatlines, the
plate size 36.8 by 25.2 inches. The plate width is a little curious: 25 inches is
normally regarded as the absolute maximum prior to a step-change that resulted
from the commissioning of a new press from Boulton for the Admiralty in 1800. It
does nevertheless appear that the Essex sheets were printed on one of the new
presses and there would have been no impediment to increasing the north-south
dimension slightly. This would have meant that, when the series eventually
extended to cover Sussex, sheet 5 would not have had to be extended by 1¼
inches to include Beachy Head. This extension was made not so much by an
extrusion as by removing the southern neatline and having a bleeding edge
instead – a very inelegant solution. All this could have been avoided by a quarter-
inch increase in the north-south dimension of the new standard sheet size and by
moving the northern boundary a quarter of a mile south – which would still have
cleared the Essex/Suffolk boundary. Beachy Head was included in the primary
triangulation, so Mudge already had its position in the same Cassini coordinates
that were used for the Essex sheets. Then why did he not make provision for it?
Even if the Board had not yet embraced the concept of a map of England, the
modifications suggested above would seem easier to slip through than pushing
the eastern boundary as far as Orford Ness.

9 This point was inspired by the ‘third proof’ in Richard Oliver, “The sheet sizes and Delamere
sheet lines of the one-inch Old Series”, Sheetlines 77, 39-40, which stopped short of any
implications for the coverage of Suffolk

10 Margary I, xxxviii (for neatlines). Author’s measurements on LAO YARB 4/29/4 for plate, with
neatlines measured as 34.5 by 22.9 inches.
When were the key decisions taken on the Essex sheet lines? The topographical survey was ‘about to commence’ in April 1799. The areas assigned to surveyors match the eventual sheet lines fairly precisely, so the decision to push the sheets eastwards to include Orford Ness seems to have been taken by this date. On the other hand, the amount by which the sheets extended into Kent did not depend on any new survey, so the decision on the north-south dimension might have been taken as late as 1801, when engraving seems to have started.

The next county to be mapped was Devonshire. As Brian Adams observed, the sheet lines appear to be aligned on the meridian of 3° West. One cannot determine the exact value used, but it is clear that the alignment does not match any of the meridians used for the triangulation (of which more later) and is sufficiently close to 3 degrees to make it probable that this exact figure was used. The choice of meridian is an interesting one, it being almost at the eastern edge of the Devon sheets and a long way away from the central meridian for Cornwall, whose sheets subsequently followed the same alignment. This seems to imply some wider consideration. I suggest that Mudge had realised that using a single meridian (necessarily now Greenwich) for the sheet lines for the whole of England was not acceptable but he hoped to get away with two meridians, 0° and 3° West. If such a scheme were adopted, the obvious place for the change of meridian would be 1°30' W. However, continuing with two full-width columns west from Essex would reach 1°42½' W, enabling almost all of Hampshire to be fitted on one alignment of sheets, with Dorset on the alignment of 3° W.

A key piece of evidence for this is the choice of the northern edge of the Devonshire sheets. Seen in isolation, this is too far north: it causes part of the Glamorganshire coast to fall within the Devonshire sheet lines - although as first published the area was shown as sea. However, if one continues the northern edge eastwards (perpendicular to the meridian of 3° W) it reaches our postulated dividing line of 1°42½' W at 51°24.66' N; the southern edge of Essex so continued is at 51°24.73' N. The difference is within the accuracy to which I have been able to determine the coordinates of sheet corners.

There is, however, a problem. The space between Devonshire and the postulated Hampshire amounts to some 72 minutes of longitude, requiring two excessively narrow columns – about 25 inches between neatlines. One might suppose that Mudge would wish to alleviate this by positioning the Devonshire sheet lines as far west as practicable. There seems scope for this: as actually drawn the eastern boundary bisects a detached piece of the county, whereas the western edge severs part of the coast around Welcomb (north of Bude), which sits unhappily on sheet 29. A slight shift westwards would have avoided this without losing any of the main part of the county at the eastern edge. Once again, we see Mudge seemingly adjusting the sheet lines in some respects to prepare the way for a map of England but neglecting other actions which ought to have been equally acceptable to the Board of Ordnance. It is as though his

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11 Margary I, xxviii.
12 Margary I, xxxii.
mind was only half on the job.

As for the dating of these decisions, although authority for topographic survey had been given by the summer of 1800 at the latest, the key date in this case is the start of engraving, which is assumed to be between 1803 and 1805. The areas of the Ordnance Surveyors’ Drawings (OSDs) are curious, with those started in 1802 (OSDs 43 and 44) stopping short of the eastern sheet edge and a long thin drawing of 1806-7 (OSD 46) filling the gap. It is almost as though the sheets were shifted eastwards for some unfathomable reason between 1802 and 1806. The very northernmost drawing is difficult to date; in any case, the NE corner falls in the Bristol Channel so remained flexible until engraving started.

Thus the answer to the question of when Mudge first aspired to producing a map of England is that the maps provide no positive evidence that predates his statement of April 1799 but offer weak evidence that when Kent was schemed he had no such plans. On the other hand, they do seem to show remarkable inconstancy in the pursuit of such an aim.

As for the Board of Ordnance, the strongest negative evidence is provided by the Isle of Wight sheet, seemingly aligned on 1° East, and thus only comprehensible as a single-sheet county map (treating the Isle of Wight as a county in its own right). The approximate sheet lines are suggested by OSD 75, surveyed in 1797, but they appear to have been shifted subsequently, as the NE corner falls within OSD 83, surveyed 1805-6. It is possible that engraving started before OSD 83 had been commenced, but it seems likely that any intervening time should be short. Thus it would seem that, as late as, say, 1804, the Board was still thinking in terms of overlapping groups of sheets, each group covering a single county.

In order to understand Mudge’s inconstant pursuit of his aspiration it is worth reviewing his career. He joined the survey in 1791 as a Lieutenant; he died a General. He was evidently not lacking in ability. Those who have written about him tend to assume that this ability was manifested in running the Ordnance Survey; some tend to focus on his excellence in the trigonometric survey (regarding that as the supreme activity). It is therefore useful to note that the Board of Ordnance was quite content in 1791 to have the entire survey run by a Major who left the direction of the trigonometrical survey to Mudge as a mere Lieutenant. Sadly, the military establishment did not value technical and scientific activities as it might have. Promotion depended rather on having well-placed patrons, so, when we find Mudge in 1803 devoting his energy to the training of cadets, we should remember that his position as a kind of peripatetic headmaster provided ample opportunities to render service by helping cadets to master some inherently difficult subjects. Some at least of those cadets will have had well-placed relations, and patronage was all about conferring favours in

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13 Margary II, xvi.
14 Margary II, xxvi.
16 Margary II, xx.
recognition of past services or the anticipation of future ones.\textsuperscript{17}

Without doubt Mudge was energetic and he knew how to work the system. He was technically able and was evidently a good teacher. But I want to suggest that clarity of vision was not one of his strengths. The most damning evidence against him comes from the survey’s geodetic work. He joined an organisation whose principal achievement had been the accurate measurement of a chain of triangles in order to measure the position of Greenwich relative to Paris. Underlying this had been a desire on the part of the Royal Society to determine more accurately the shape of the earth. This spirit infused the early operations of the trigonometrical survey. ‘Running a chain of triangles’ summarises a lot of the early work.\textsuperscript{18} As later commentators noted, there was no process of adjustment other than for single triangles. By removal of spherical excess, these triangles were solved using plane trigonometry and their sides calculated. None of this required any assumption about the shape of the earth. The next stage was to run in sequence along the sides of triangles, calculating their angle to the prime meridian and hence calculating the Cassini coordinates of their vertices. This stage also avoids any assumption about the shape of the earth, but only by assuming the earth is locally flat, so it is subject to large errors if done over anything other than a narrow strip. A third stage converted these coordinates to latitude and longitude. This did require an assumption about the radii of curvature of the earth (measured in north-south and in east-west directions). However, this stage was unnecessary for production of a map. It would therefore have been quite practicable to produce a map on the Cassini projection, to add marginal figures for latitude and longitude, if desired, on the assumption that the French had got it right (or on the basis of more tentative English measurements) and then to alter those marginal figures later if better estimates for the radii of curvature became available. That said, Mudge still faced the problem that he was producing, not a triangulation of England and Wales, but a series of triangulations of narrow strips centred on the meridians of Greenwich, Beachy Head, Dunnose, Black Down, Butterton Hill and St Agnes Beacon. The triangulation along the south coast was used to determine accurately the relative positions of these points.

As these strips were extended northwards, they would converge. If one was prepared to make some assumption about the shape of the earth, one could estimate the magnitude of this convergence. But Mudge seems to have had a more pragmatic solution: if a station on the borders of (say) the Black Down and Butterton Hill strips had its position calculated in both sets of coordinates, then the Butterton Hill coordinates could be used for anything related to it when drawing a Devonshire map, whilst the Black Down coordinates could be used for anything related to it when drawing a Dorsetshire map. This had the advantage that any accumulated errors were pushed out to the joins between sheets, and


\textsuperscript{18} See eg Plan of the Principal Triangles in the Trigonometrical Survey 1795-1796, “An account of the Trigonometrical survey carried on in the years 1795, and 1796 ... “, *Phil Trans* 1797, Tab XI, p542.
specifically between sheets of different counties. After a hundred miles or so, this process would produce excessive accumulated errors, so Mudge introduced new local origins as the survey extended northwards: Clifton Beacon, Moel Rhyddlad and Burleigh Moor.¹⁹

This is horribly inelegant, but it produced maps that were perfectly adequate for the military requirements of the day (which did not include indirect artillery fire between adjacent sheets). It almost entirely avoided the need to make any assumptions about the shape of the earth. Where such an assumption was needed it was hidden in fairly dense mathematics. Thus Mudge perhaps hoped to avoid the ire of those Fellows of the Royal Society who took divergent positions on the matter. And indeed he seems to have escaped any academic invective on the subject. Meanwhile, his demonstrations of the survey’s accuracy focused on bases of verification, which confirmed the accuracy of his determination of the lengths of the sides of triangles - that first stage which required neither approximations nor assumptions about the shape of the earth. As a policy for advancement it worked splendidly: in 1809 he was appointed lieutenant-governor of the Royal Military Academy, in 1818 a commissioner of the new Board of Longitude, and in 1819 was promoted to Major-General. He died in 1820, firmly in the ranks of the Great and the Good.

As for the question posed at the start, Mudge’s aspiration to produce a map of England may have been stated as early as 1799 but it was at least five years before the Board of Ordnance was persuaded to endorse it. Even Mudge himself was liable to be deflected when he had other things on his mind, and Mudge very frequently had other things on his mind.

¹⁹ Projections and Origins, 50.
Changing the map – a brief introduction to Definitive map modification orders  
Anthony Francis-Jones

Ever wondered why rights of way (RoW) on Ordnance Survey maps (eg Explorer/Landranger series) are described as having been ‘Taken from local authority definitive maps and later amendments?’ A RoW is defined in common law as “a way over which there exists a public right of passage, that is to say a right for all of Her Majesty’s subjects at all seasons of the year freely and at their will to pass and re-pass without let or hindrance,” and if the OS map is not necessarily correct, what is? The answer is the Definitive map and statement, which has its roots back in 1949 in the National Parks and access to the countryside act and is a legal record as to which RoW exist.

After the war there was an attempt to produce a definitive map of all public rights of way; typically what most people would know as footpaths (FP) and bridleways (BW), with a new class of RoW introduced by the Natural environment and rural communities act 2006, the restricted byway (RB).

Back in the 1950s parish councils were tasked with the job of surveying their own area to produce a map of known RoW on public and private land called the Draft Definitive map. This immediately led to a number of problems. Nepotism and Nimbyism were rife and when landowners were approached and asked for information about the RoW on their land many replied, “No, definitely none on my land!” or, “Oh, that old track. It’s only used by people walking. Never seen horses on it.” This approach resulted in many omissions from the provisional Definitive map as well as the incorrect recording of the status of other routes, for example a bridleway being mapped as a footpath. Often two different parishes’ surveys would not agree and routes would stop at a parish boundary or change status at this point, turning with no warning into a footpath from a bridleway. The observant user of maps will notice many of these anomalies. So what can be done to correct the errors and omissions on the current OS and Definitive map?

County councils and Unitary authorities (Highways authorities) have a statutory requirement to keep the Definitive map under review (s.53 Wildlife and Countryside Act 1981). The accompanying statement, if it exists, can list such things as the route’s start and finish points, general direction, width, surface and location of any gates and stiles. It is estimated that over ten per cent of the RoW network is not on the Definitive map and there are many more cases of incorrect recording of the status of a route, typically bridleway recorded as footpath. With cuts to RoW departments’ staff and budgets, and general apathy, many County councils have just stuck their heads in the sand and ignored the problem. It has been left to volunteers to address some of these problems, and a formidable force they are, expert in historical research, and use of archives, as well as the highway law needed to make changes to the Definitive map.

Section 53 (5) of the Wildlife and countryside act 1981 allows anyone to apply to make a change to the Definitive map. A Definitive map modification order (DMMO) is one process that can be used by the public to amend the
Definitive map and local authorities have to action applications within a year, although this almost never happens. The scale of the problem is vast. Thousands of DMMOs are outstanding nationwide and whilst one waits more and more RoW are lost, obstructed, or quite simply built over. In law the statement, “Once a highway, always a highway” (Harvey v Truro RDC [1903]) applies but if a housing estate or supermarket has been built over a route that was not correctly recorded it is difficult to turn back the clock even if Enforcement orders are used. Often Diversion orders have not been signed and published leading to some annoying but quite amusing anomalies on OS maps (see footpath across Newdale Pool at SJ 677094, left).

The CROW act 2000 proposes to close the Definitive map and statement to the addition of rights of way that were legally in existence before 1949 in 2026 (the cut-off date), which has led to a rush in applications for DMMOs, but currently this section of the act has not been made into law even though many web sites would have you believe that it has.

The DMMO application is a complex process. It states the route in question and what change to the map should be made if the application is successful. It can be supported by various forms of evidence from users as well as that from archives and Ordnance Survey records. This might include documents such as old maps, handover records, entries in Object names books, and Survey boundary records, to name just a few. One can also use OS maps without infringing copyright rules (s.46 (1) Design and patents act 1988) though interestingly OS maps are not seen as irrefutable evidence at public enquires. Making a DMMO application is not an easy task, as it has to follow a defined process, and it may well have to stand up to the scrutiny of a public enquiry where objectors could put up a very convincing case. A planning inspector will decide the claim ‘on the balance of probabilities,’ but more often it feels like, ‘beyond reasonable doubt.’

Once the order is confirmed a series of processes take place with the result that the Definitive map and statement are updated and OS informed of the change made so it can appear on the latest versions of their maps; one of the many reasons that paper maps can go out of date very quickly for the RoW user. This updating process is vital, not only for the users of RoW, but it can also have a huge impact on planning applications on land with RoW crossing it.

You can ask your local authority to view the Definitive map and statement and some even place it online for free (Shropshire County Council for example). Don’t expect it to be ‘definitive’; after all these years there are masses of outstanding DMMOs and the map is still in the provisional form.

Whilst this is a very brief overview at the way one can change what is recorded permanently on an OS map it is a very rewarding (and frustrating) area for volunteers to work in. Why not have a go yourself? You will learn more about maps and your local history than you would ever have imagined!
Top left: SJ 787071, Definitive map not updated at Tong; bridge and motorway built but bridleway not rerouted over the bridge

Top right: SJ 612136, OS 1:25,000 at Isombridge change from bridleway to footpath mid-route (just under the power cables)

Middle left: SJ 641096, Definitive map; Wrekin Ercall, FP55 turns into RB65 and FP71 stops due to old quarrying activity and possible incorrect status of FP55 and FP71

Middle right: OS 1:25,000 Wrekin Ercall, FP55 turns into RB65 and FP71 stops due to old quarrying activity and possible incorrect status of FP55 and FP71

Lower left: SJ 601139 at Roddington, dead end footpath (continuation north missing since canal was filled in)
Struve revisited

From JR Smith

It was interesting to see mention in Sheetlines 96 of the Struve Geodetic arc. As one of those in at the start of the long journey to make it a World Heritage Monument, I would like to fill in some of the background and comment on the future.

It was at a scientific conference in Tartu, Estonia in 1993 and then at the FIG (International Federation of Surveyors) conference in Melbourne in 1994 that the first seed was sown by Seppo Harmala of Finland. He presented a paper by Aarne Verio about the Struve arc and in it asked whether it might be appropriate to try and get it recognised as a UNESCO World Heritage site. After a slow start, the FIG History group started to make contact with other interested parties and work was done to get all ten of the countries through which it passed to take an active part. In 2002, at a meeting in Tallinn, Estonia, the Finnish equivalent of the Ordnance Survey volunteered to take the preparation of the documentation under its wing. This allowed a submission to be made and at its 2005 meeting in Durban the World Heritage committee endorsed the inscription of the site on its list. No one was more surprised at this acceptance than those who put the submission together. Not only did the triangulation bear no relation at all to any other World Heritage monument (eg the Pyramids, the Taj Mahal, the Stone City of Zanzibar etc), as it was no more than 34 survey markers, but it was spread through ten countries. Strangely it was these apparent negative aspects that worked to its advantage. Until then the most countries involved in any one UNESCO site was two. Here was a site in ten countries that could well help to bring cooperation between them. A good plus point. Then the fact that it was a scientific site broke new ground and proved to be a second plus point.

So now the chain of triangulation, measured between 1816 and 1855 stretching from Hammerfest in Northern Norway to near Ismail on the Black Sea, has a representative selection of 34 points marked and maintained by the local communities.

But that is not the end of the story. FGW Struve (after whom the arc is named) was a good friend of another astronomer, David Gill, who was later to become HM Astronomer at the Cape (in Cape Town). In correspondence and technical documents they each held the dream of how scientifically useful it would be if there was an arc from northern Norway to South Africa. Gill initially took this idea on board by initiating in the late 1800s a geodetic arc from South
Africa towards Cairo which was to become known as the Arc of the 30th meridian. By the time he retired in 1906 much of the triangulation to East Africa was complete. Unfortunately during 1910 to 1930 nothing was done but then DOS (Directorate of Overseas Surveys), did a section under Hotine, and other work was done in Egypt and the Sudan such that by 1950 there was just a 600 mile gap to be completed. This was particularly difficult survey territory in Southern Sudan but the Americans came along in 1954 through their AMS (Army Map Service) and completed the chain from Port Elizabeth to Cairo.

To join up with the Struve arc there was not only triangulation required in Central Europe but also a method for crossing the Mediterranean Sea. Most of the necessary European triangulation was completed between the two World Wars, particularly by Poland which at that time had far more territory that it does today. Crossing the sea from North Africa to Crete was executed by the American Air Force in 1954 by using Hiran (high-precision electronic ranging system adapted for geodetic measurements over very long distances). Hence the 30th arc was finished in 75 years and the overall arc of 105° of latitude completed.

The unfortunate part was that the completion happened around the time that satellite technology was coming into being and with it better ways for determining the parameters of the shape and size of the world.

Work has been done in gathering together as much data about the Central European and 30th arcs as possible and there is the hope that in a few years time a case will be submitted to UNESCO for the enhancement of the existing Struve arc site to encompass the whole from Hammerfest to Port Elizabeth and realise the dreams of both Struve and Gill albeit around a hundred years after the death of Gill.
From David L Walker

Thank you for drawing our attention to the magnificent trigonometrical survey organised by Wilhelm Struve between 1816 and 1855 from the Black Sea almost to the North Cape. But your suggestion that William Roy and his successors were interested only in map-making, and not in the shape of the earth, is nicely calculated to provoke correspondence.

Certainly William Roy in 1787 admitted that, while his immediate purpose was to ascertain the relative situations of the Royal Observatories of Greenwich and Paris,¹ his ultimate objective was ‘to lay the foundation of a general survey of the British Islands’. However, his paper included a wide-ranging review of research into the shape of the earth, including the first Lapland arc, and made detailed proposals for contributing to ‘the united efforts of enlightened nations’ towards ‘the determination of the magnitude and figure of the earth’.

Then in 1803 William Mudge chose to publish his measurements of three degrees of the meridian,² from Dunnose in the Isle of Wight to Clifton in Yorkshire, which unfortunately failed to support the prevailing view that the earth’s shape was oblate (slightly flattened at the poles). Mudge (probably correctly) attributed this anomaly to the uneven gravitational attraction of neighbouring strata affecting his astronomical observations, and was much offended by the publication by the Royal Society in 1812 of Joseph Rodriguez’s paper³ which suggested the anomaly might instead be attributable to observational errors.

Perhaps it was as a result of this dispute that Thomas Colby⁴ ceased to publish his survey results, in 1813 devoted more attention to measuring Scottish latitudes than to triangulation, in 1817 indulged in a fruitless expedition to the Shetlands with the French geodesist Jean Biot, and around 1840 perceived the need to refine the primary triangulation, more to meet geodetic standards than to support the topographical survey.

Fortunately Alexander Ross Clarke emerged in the 1850s to bring this work together⁵ but the title of the paper he ghosted in 1856 for the Director-General, Henry James, ‘On the Figure, Dimensions, and Mean Specific Gravity of the Earth, as derived from the Ordnance Trigonometrical Survey of Great Britain and Ireland’ at least gave the impression that they were more concerned with the shape of the earth than with mapmaking.

² Major William Mudge, ‘An Account of the Measurement of an Arc of the Meridian etc in the Years 1800, 1801 and 1802’, Phil Trans R Soc Lond, 1803, 93
⁴ JE Portlock, Memoir of the Life of Major-General Colby, London: Seeley, Jackson & Halliday, 1869
⁵ Lieut Col Henry James, Phil Trans R Soc Lond, 1856, 146
Then in 1858 Clarke’s massive ‘Account of the Observations and Calculations of the Principal Trigonometrical Survey and of the Figure, Dimensions and Mean Specific Gravity of the Earth as derived therefrom’ devoted no less than 220 pages to geodesy. It is a tribute to nineteenth century communications and to both personalities that, even before the final compilation of all of Struve’s work, Clarke’s calculations of the earth’s shape took full account of the Russian arc of 25 degrees 20’, which he described as ‘a magnificent work calculated in a systematic and masterly manner’. In a further demonstration of the interest of the military in the shape of the earth, the Ordnance Survey with the Astronomer Royal in 1861 readily accepted an invitation from Professor Struve to collaborate in measuring 75 degrees of longitude at latitude 52 degrees from the Urals to the west of Ireland.

From Barbara Jones

I was interested to see the piece about the Struve arc in Sheetlines 96. My husband and I were sailing in Norway in June 2005 and came upon the memorial at the north end of the arc in Hammerfest. We also went up Lille-Raipas, 287m, near Alta, the site of one the stations further south (below and opposite). Possibly the rock cairn is the original Struve Arc one? Plaques at both sites read “Inscribed upon the UNESCO World Heritage List, 15 July 2005. The arc from the Black Sea to the Arctic Ocean has been used to determine the size and shape of the earth. The survey, carried out 1816 to 1855 was pioneering scientific work of outstanding universal value, deserving protection for the benefit of all humanity.” Incidentally, on the Hammerfest memorial the dates are given as 1816 to 1852 (see picture on page 23).

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6 Alexander Ross Clarke, [title as above], London: Ordnance Survey, 1858, p752
Barbara Jones raises a query about the date of completion. Struve in his report divided the whole exercise into four periods: 1812-1830, 1830-1844, 1844-1851 and ‘after 1851’. The basic project was completed by the end of 1851 but there were still some tasks to be completed. Final details reached Struve in 1855. So the date on the Hammerfest monument was possibly given as 1852 as being the end of the main work in that area. The report is not very specific about dates. The monument itself has had a varied existence including disappearing at one stage when the area was threatened by invasion, only to re-appear later (if I remember correctly), in Trondheim.

Lille-Raipas takes a while to reach but well worth the climb. I was at the unveiling of that plaque (and the one in Hammerfest). As suggested, the pile of rocks could well have been raised by Struve. However in 1896 a new cairn was built at the same place. Today there is no cairn but an iron marker indicates the position of the Struve point of 1846. The report reads as though Struve’s assistant, M Klouman could well have done the observations at this station. It should also be mentioned that as well as Struve there was General Carl Tenner. In effect the whole Arc was observed in two parts, Struve starting from the vicinity of Dorpat (Tartu) and going northwards, Tenner starting from south of Livonia and working south on his own initiative and for some while, unbeknown to Struve. So theoretically it might have been better called the Struve-Tenner Arc.

_Above: Struve and the 30th meridian; from Hammerfest to Port Elizabeth_  
_Right: Lille-Raipas summit cairn_  
_{photos opposite and right Barbara Jones_}
The AA Touring map of Scotland

Ken Hollamby

This article started as what I thought was a simple request to Christ Fleet, Senior Map Curator, at the National Library of Scotland. I had purchased a copy of The Automobile Association Touring map of Scotland printed and published by John Bartholomew & Son Ltd. of Edinburgh. As Bartholomew maps do not carry dates I was interested in dating the map. Chris replied that it could be 1927 or 1936 and to look for a print code such as B36 which would date it to July-December 1936. The print code on my map is 1221 so back to the drawing board. The National Library of Scotland holds the Bartholomew archive including the Bartholomew’s printing register and from that I learnt that copies of the map were printed in 1927, May 1930, August 1932, September 1933, August 1934, August 1935 and finally, 7 November 1935, the date of my map.

Chris then asked Karla Baker the Bartholomew Archive curator to look further into their archives and the rest of this article is from the long and informative email that I received from her.

The story of the first edition of this map appears to go back to 1910, when the Automobile Association published the first edition of their title Scotland for the motorist. This title is basically a guide book. It includes information about the AA, about destinations in Scotland and an assortment of maps and illustrations. In the back of this book there is a section map of Scotland, produced by Bartholomew, on the scale of twelve inches to the mile – the same scale as the Automobile Association Touring map of Scotland. There were several subsequent editions of this book but the crucial edition is the one for 1927.

By August 1926, the AA wrote to Bartholomew about Scotland for the motorist regarding updating the section map. Up to this point, this map had appeared in the back of the guide book in atlas form, but by 1926, the AA had decided to produce a stand-alone flat sheet version too. The first reference that the archive has of this comes via a letter to Bartholomew from AD Allen, touring manager of the AA, dated 26 November 1926. He writes:

‘...it would be informative if we could have a progress report and some idea of when the mounted, folded, dissected edition is likely to be published’

This ‘mounted, folded, dissected edition’ is The Automobile Association Touring map of Scotland. Throughout early December 1926, letters fly back and forth between the two firms particularly focusing on the way the new map was to be folded. On 1 December 1926 one of Bartholomew’s directors, GS Robinson writes to Allen:

‘I have had a rough proof of this map in black pulled from the stone and had some dissected, mounted and folded to what I consider would be the most suitable size for this new map, and am sending this herewith in order that you may give consideration to the special covers that you would require for your own edition’.
On 10 December 1926, Allen replies:
‘...we should have liked something rather larger than the model fold you submitted. This errs on the small side. The result of our experiments, however, shews the great difficulty in providing an alternative and the folded tracing I am sending you is our best effort. This though has the material disadvantage that Glasgow comes near the fold. Unless, therefore, while keeping within the size of the England and Wales map, you can improve on our trial, you may take it that we will adopt your sample’.

On 13 December 1926, Robinson replies:
‘With regard to the folding, I have had two sheets folded to different sizes and send these herewith, along with the original folding suggested, as well as your rough tracing. Personally, I am inclined to the smaller size as originally sent you, but this is a matter for you to decide, and we can arrange for the map being dissected and folded to whichever size you prefer’.

Finally, on 15 December Allen replies to say:
‘I appreciate the trouble you have taken in sending alternative foldings but on considering these we come back to the fact that your original small fold – which I now return – seems to do better justice to the map itself and, for this first edition at least, we will adopt it’.

At the same time these discussions were occurring, the two firms were also considering the cover for this new map. The first reference crops up in a letter to Robinson from Allen on 10 December 1926:
‘If you have an artist who could submit a sketch based on the pictorial cover of our England & Wales would you care to let me have your suggestions?’

Bartholomew waited until the fold issue had been resolved (as this would affect the size of the cover) before contacting an external company, John Swain & Son, Ltd (based in Glasgow) to produce a sketch of the cover artwork. There followed correspondence about the detailed design of the artwork resulting in final approval on 9 March 1927.

In terms of printing statistics, the AA ordered 2000 copies of the first edition on 17 December 1926. They stipulated 1750 copies to be mounted (ie linen backed), dissected etc with covers, 200 copies printed on paper and left as a flat sheet and 50 copies mounted on cloth and left as a flat sheet. They subsequently ordered an extra 250 copies in black and white only. These copies were to be sold to AA members but also distributed amongst their patrol vehicles for their own use. At the same time, Bartholomew printed 6000 copies which they sold directly to the public – with the permission of the AA. The only difference was that AA members could buy their copies cheaper than the public could buy from Bartholomew’s.

The next printing of this map was ordered on 30 July 1929. 6000 copies were printed on 8 January 1930. By this time, Bartholomew’s records refer to this title
as a ‘publication’ which means they printed and published it themselves – or in other words, it was never reissued by the AA. Indeed, after the 1930 edition the print run was slashed to 2000 copies in 1932; 3000 copies were printed in 1933; 3000 in 1934 and 3000 in 1935.

My thanks to Chris Fleet and Karla Baker of the National Library of Scotland for turning what seemed, at the time, a simple question, into an interesting piece of cartographic history.

left: Annotated proof of the cover of The Automobile Association Touring Map of England & Wales sent as an example to John Swain & Son Ltd in Glasgow on 16 December 1926

centre: The cover proof of The Automobile Association Touring Map of Scotland sent by John Swain & Son Ltd to the Automobile Association on 21 December 1926

right: The final published cover design of The Automobile Association Touring Map of Scotland. This example is from the 1935 reprint

all images © permission of Collins Bartholomew, reproduced by permission of the National Library of Scotland.
John Davies’ article in *Sheetlines* 95 highlighted the range of free London 2012 maps available. This short update is about additional maps, some of which bear the distinctive Olympic pink branding, most of which were produced by Transport for London.

In regard to the *Why not walk it?* maps, these became available from early May 2012, and were part of the TfL Walking plan for London. Many of these maps are still available at main line London stations. Although I have not personally seen them, three more maps are referred to on the mappinglondon blog site. These are Elephant & Castle, Kensington, and Olympia. The Olympia map may be the walking map issued in 2011 as was an earlier version of Waterloo. The latter map carries the Network Rail logo and that of South West Trains.

Besides the *Why not walk it?* maps, there were also some special Olympic A5 sized foldout bus/street maps produced by London Buses (eg Euston and Victoria) available at mainline termini. In addition, Underground *Continuing your journey from…. A5 sized foldout maps were also issued with*

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1 Described by Graham Bird in *Sheetlines* 96, 44
2 There were even earlier versions of the walking map (pre-Olympics) entitled *A new perspective to London* – one *Waterloo to the City* and one *Euston and King’s Cross to the West End*. Infuriatingly neither is dated (but are before 2008 since they mention Nicky Gavron as Deputy Mayor of London) nor do they indicate the source of the mapping; however they are entirely 3D as opposed to the Summer 2012 maps which show only important buildings in 3D.
Olympic branding for certain stations and some of these are still available for collection.\(^3\)

TfL also issued a special London cycling guide: *Olympic Park and surrounding area, Summer 2012 edition*. This map (*above centre left*) was not numbered as part of the series of 14 London cycle guide maps; however it does incorporate part of maps 4, 5, 7 and 8 from that series. The reverse includes a large scale map of the Stratford area with key Olympic buildings in 3D.

The TfL/National Rail *London’s rail & tube services* folder was also re-issued with Olympic branding and shows the main sports venues clearly marked.

The London Borough of Newham produced a very good tourist leaflet (*above centre right*) which included maps of both the Stratford and ExCel sites, appearing to make use of the TfL mapping. Significantly these were available at Underground stations in East London alongside the range of other free maps.

Weymouth and Portland also had an Olympic Games map, a small 18-panel folded card covered map, although the source of the mapping was not indicated.

John Davies’ article indicates that maps of the locality for each venue were also distributed and published by LOCOG. Interestingly one map of the main Olympic Park was issued to the AQA Examination Board sometime in 2011 for use in the Summer 2012 GCSE Geography examination.

Unfortunately this map showed West Ham Station having London Overground services instead of Docklands Light Railway services, and also Stratford International having Underground services instead of DLR! Before LOCOG had the opportunity to withdraw the map, it had been printed in a resource booklet and issued to schools. The locality maps actually issued for public use last summer did not have these mistakes.

The range of maps begs the question whether, besides LOCOG locality maps, any maps were issued for the other Olympic sites eg rowing at Dorney Lake, white water in the Lea Valley and the football competition stadiums around the country.

For the sake of completeness, two earlier maps should be mentioned, issued in 2005, available at Underground stations in the East London area and both 12 panel foldout leaflets: *Walk the Bid: a guide to the Olympic sites* (*above right*) was issued before the Games had been awarded to London and *Walk the Olympic Park* issued after the bid was won in July 2005. As to be expected, they are slightly different from each other in terms of details and mapping. The source and publisher of both of these is not immediately clear but featured on the back panel (*below*) are the logos of the five London Olympic boroughs and, surprisingly, the NHS.

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\(^3\) John King is preparing an article on this map series.
I would be grateful if anyone could help me by identifying some features that I have found on Popular Edition maps. In the bottom right hand corner of sheet 106 Watford of 1920 (above) there are three spots that are annotated Shooting Tower, two near Brent Reservoir and one at Perivale. These are in squares G13, H13 and J11; there is also Shooting Towers below the words Golf Course in square G12. They are also present on the London (Country Round London) tourist map of 1921. They are absent from the Third Edition and from the Fifth Edition, so they seem to have had a short existence, perhaps resulting from some military activity during the First World War.

I have not been able to find out what these were, but a clue may be found on the three-inch London (NW section) map of 1933 which does not show the towers, but has Shooting Ground just north of the Brent Reservoir on the site of one of the towers. Curiously, the Fifth Edition 106 does introduce a new shooting tower two miles west of Barnet, and this is carried forward onto the New Popular 160 at TQ 215970, but it does not survive on the Seventh Series. Can anyone shed any light on these, or perhaps find a photograph of them?
The other question is about the odd features that are found at the site of Farnborough Aerodrome that can be found on Popular Edition 114 Windsor of 1920 (my copy 5000/23) in square J2 (opposite, upper). This consists of a straight Speed Track and a kidney-shaped Flying Track, adjoining the group of buildings that are served by a railway link, and annotated Ryl. Aircraft Establ. This can also be found on the earlier Aldershot District North of 1914, but without annotation or railway connection. But on Fifth (Relief) Edition Aldershot District North of 1932 the whole thing is swept away, and the site reverts to its Third Edition form, except for a railway connection that ends in a piece of rough ground, and a small area entitled Aerodrome. And even that disappears from the New Popular and early Seventh Series, although the rail connection remains. It is not until the last printings of the Seventh Series (my copy B/*) that the full extent of the Royal Aircraft Establishment is revealed (opposite, lower). So what were these tracks, where they for road vehicles or aeroplanes, and if so why did they need tracks for aeroplanes?

Bill Riley found this letter written by OGS Crawford in 1926 tucked inside a copy of Crawford’s autobiography Said and Done, published in 1955
Sheet 33 for me!

Graham Wilson

I have, on occasion, been asked to nominate my favourite map – if, from the array that line my shelves, I could keep only one, (my Desert Island luxury so to speak) which would it be? This would not be easy, but if forced to decide, I would first narrow down my choice. It would have to show part of Britain with an air of remoteness and a combination of hill and sea, but above all it would have to be inspirational. Captain Cook, on discovering the Aboriginal maps, judged them of little purpose as they seemed to have neither an understandable scale nor proper orientation. What the explorer had not realized was that they were maps of “Dreamtime” before the World was created and the landmarks depicted, though actual, were also symbolic in that they offered an understanding of life and the inspiration that governed their social and cultural behaviour. As with the Aboriginal maps, my choice of Landranger 33 Loch Alsh & Glen Shiel is because it as important for what it doesn’t show as for what it does.

Beyond each of its four margins lies an area that defines this map’s existence. To the east, a line of forts, William, Augustus and Inverness that once defended the Lowlands from Highland invasion, now stand guard over the mountain treasures that lie beyond the Great Glen. To the north, at point 839274, the A890 leaves the road to the Isles to weave its tortuous way through the Torridon giants to Ullapool and the gateway to the hills of Sutherland where Suilven, Stac Pollaidh and Ben Mor Coigach trip across the imagination. To the west, the edges of Skye hint at rocky spines that plot their route over the Minch and Atlantic to the isles of St Kilda. To the south, lies the god-given railway from Fort William to Mallag where passengers rubbing the London sleeper from their eyes realize they are no longer on the 7.45 commute from Dorking to Victoria.

Even within its bounds, my ultimate choice more than holds its own. Maps to the north might proclaim Liathach and An Teallach over Sgurr na Ciche and Ladhar Bheinn. The brooding cliffs that line Glencoe might be reasonably thought more impressive than the swoop from the Cluanie Inn to Shiel Bridge. The mass of the Cairngorm is more vast than the fractured yet hospitable glens and ridges of Kintail. Others may win the battles yet, in my view, sheet 33 wins the war. There is no stravaig more varied than leaving the train at Glenfinnan before slipping between Stread and Sgurr Thuilm into Glen Dessary and crossing the rough bounds of Knoydart to Barrisdale. As well as the sweep there is the detail. No sea loch rivals Loch Hourn. No coastal road is more revealing than the one from Shiel Bridge to Glenuig, boasting brochs and otters at every twist and turn. For those wishing garnish, blend in the genesis of the John Muir Trust with a drizzle of Jacobite nostalgia.

Not all will agree. Other Pelicans may cry, with some justification, from the wilderness of Cumbria and Snowdon. Even as my finger slides along each title of my maps, I know the choice is invidious. So many are old friends, dog-eared with creaking joints and fading notes jotted in the margins, a shadow of their former selves that once refolded to lie as neat and crisp as a new deck of cards. But if a cull had to be made, I would always hang on to sheet 33.

Opposite: ‘..remoteness ..a combination of hill and sea ..above all, inspirational’, detail of the head of Loch Hourn from sheet 33

1 The author has recently joined the Society. This is an edited excerpt from Over the Hill (Millrace Books, 2011, £14.95, ISBN 978 1 902173 337)
Hunting with dogs and the Ordnance Survey

Aidan de la Mare

There are two links between the sport of hunting with dogs and the Ordnance Survey. There are specially prepared Hunt maps, usually, perhaps exclusively, at one-inch scale, that are often cut-and-paste assemblies by such firms as Stanfords. And there is the presence of the word Kennels on one-inch and larger-scale maps, that may, and often does, represent hunt kennels. It is worth mentioning that a foxhunting pack may be made up of sixty to eighty adult dogs that need significant buildings to house them, although other hunts may have many fewer. I began this study some years ago by noting kennels on Fifth Edition maps while searching for garages, but as I had an incomplete set of maps then, I did not pursue it. But I have picked up the subject again now that I have better coverage of maps and a copy of the essential reference book for hunts. This is the annual publication Baily’s Hunting Directory, I have the 1953-54 edition, a 650 page book then in its forty-eighth year. I bought this as it matches quite well with my set of New Popular maps, the earliest that I have at one-inch scale that covers all of England and Wales.

Hunt maps must have been quite plentiful, but they are now difficult to find and expensive to buy – even with the delights of eBay at one’s disposal; I have only managed to find nine. The earliest is the most interesting; Pytchley hunt map (Northamptonshire) dating from about 1908 (opposite). It is assembled by Stanfords from parts of three sheets of the New Series in Colour, 170, 171 and 186, and from three Third Edition, Small Sheets 185, 202 and 203 (this is because, by chance, the map falls on the northern limit of the latter). The map is dissected and folded into a red book cover, and the map itself has seen quite a lot of wear and some exposure to wet, presumably in the field. The hunt boundary is coloured in shaded red and the hunt territory has a very thin pink wash, and the big estates are coloured by hand in green as are the woods on the New Series maps that were not printed in green. There are circles in increments of one mile centred, not on the Hunt kennels, but on the village of Long Buckby near the western boundary, which suggests that the map was assembled specially for the owner who lived there. It would be interesting to know if any other Pytchley maps survive, and compare them.

The Cotswold hunt map2 is, as far as I know, the only hunt map that was printed by OS, my copy is the Second Edition of 1912 made up of four Third Edition Small Sheets in the outline and sienna roads format. The Hunt boundary and meet places are boldly printed in red, and there are black circles at two mile increments centred on the kennels that were then at Cheltenham. Although interesting as OS history it lacks the star quality of the Pytchley hunt map.

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1 Sheetlines 60, 36-39.
Extracts from Pytchley hunt map of 1908, showing (below) the joint between New Series and Third Edition mapping.
I have two copies of the *Crawley and Horsham hunt* map, assembled from parts of four Popular Edition maps of Sussex. One is slightly earlier than the other and they show different hunt boundaries, which are coloured red by hand, but no other information is supplied. One is in Stanfords’ usual sectioned format in a red book cover probably about 1935. The other is a very neat double-sided sectioned map with panels only 3¼ by 3¾ inches, with no margins, hinged card covers and probably of about 1928 (below), a real pocket map. It has seen a lot of action, with meets and other additional information marked by pen, that is concentrated around Wisborough Green at the western edge of the map, suggesting that the owner lived there.

*Crawley and Horsham hunt map, c1928*
Essex and Suffolk, Essex side is a standard-sectioned Popular sheet 98, (3000/29) with the red hunt boundary in the usual Stanfords’ red book cover, and has seen very little use. Atherstone hunt, incorrectly titled Atheston on the cover, is a compilation by Sifton Praed of parts of four Popular Maps of about 1936 centred on Nuneaton in Warwickshire, there is no margin or hunt boundary.

Also by Sifton Praed is an enormous sectioned map measuring 40 by 45 inches covering a large area to the west of London for the Garth hunt (left) but also including the South Berkshire hunt territory, and is made up from the whole of Popular Edition 112 and 114 with parts of 105, 106, 123 and 124. It has no additional markings, it has parts of the map margins stuck on all the way round, these however are inexpertly or carelessly applied. The titles of the two maps on the top margin have been transposed, and the alphanumeric marking in the margins do not line up with those on the map. It also illustrates the dubious benefit of including map margins where the road destination notes do not match the roads, and sometimes indicate places that are already on the map.

The Verderer’s map of the Beaufort hunt, as it is entitled, is a curiosity. It was published by W Bennet of Bristol and acknowledges that it was ‘Reproduced from OS by permission.’. It is a rather poor outline reproduction of parts of Popular sheets 103, 104, 111 and 114 with hunt boundary, meet places underlined and marked with spots and additional topographical detail all in red. There are also two panels of information about meet places, but somehow one would have expected a rather more stylish effort for the very up-market Beaufort hunt in the south Cotswolds. The latest hunt map that I have is the South Oxford hunt assembled from parts of New Popular sheets 145, 146, 158 and 159, all of 1946 except 158 which is 1945. It is a dissected map with a thick inserted neat line and plain margins, but with the legend from sheet 147 across the bottom. It has the hunt boundary marked by hand in pale pink with the rather strange convention of marking the outside of the boundary on the north and east sides, and the inside for the west and south sides. It was all done very neatly by Stanfords and is in almost perfect, unused condition. These nine are an entertaining set of
novelties, and probably only a glimpse of the variety of others that must exist.

**Kennels**

The matter of the kennels marked on one-inch maps is more problematic. The task of comprehensively searching each map of each series is beyond my patience and unlikely to provide information of any great value. So the original search of the Fifth Edition for kennels was superseded by an approach from the other end, beginning with the hunts in *Baily's directory* and trying to identify the kennels on the New Popular Maps. This produced 100 hunt kennels out of the total of 197 foxhunts in England and Wales mentioned in the 1953-54 Directory. There were a further 120 other hunts, but as only seven appeared on the maps out of the first 56 that I looked at, so I gave up the tedious task and went back to the foxhunts on other series of maps. It is not worth, I think, including tabulated results as I am not by any means sure of the accuracy or comprehensiveness of my results.

A study of the Seventh Series revealed that the number of foxhunt kennels had fallen to 64 plus four for those of other hunts, and in a few cases they are on the A printing but absent from the last printing, and vice versa. These numbers have been further reduced to 47 on the *Landranger* maps dated a year or so either side of the millennium, but interestingly include four that appear there for the first time. Going backwards from my starting point, the Fifth Edition includes 50 hunt kennels. A further 16 appear in the area that was redrawn in Fifth Edition style but published as New Popular. These represent all those that I had already found and suggest that a serious attempt was made to include them in that Edition. The remaining 34 up to the Scottish Border are found on the New Popular Provisionals, therefore derived directly from the Popular Edition.

As I only have Third Edition and Popular Edition maps of approximately the same area as the Fifth Edition, I can only compare the numbers in a limited area. This area, which includes Kent and East Sussex, should have 59 kennels, but only 46 are on the equivalent Popular Edition Maps, and 32 on the Third Edition. I cannot draw any satisfactory conclusions from this rise from about 1900 to peak in about 1930 and fall away again by 2000. I can guess that OS found, or deemed, that the one-inch map was suitable for those who hunted with dogs, and that it was an adequate reason for including hunt kennels on the maps, because most kennels are not particularly distinctive topographical features, although they do have a more audible presence than many more prominent features that might have been included.

Probably for reasons of space, the unadorned word *Kennels* is almost always used, although in a few cases *The Kennels* is to be found. The only exceptions that I have found at the one-inch scale being *Ascott Kennels* at Leighton Buzzard for the Whaddon Chase hunt, and *Cheshire Kennels* at Sandiway for the Cheshire
Cheshire Kennels named on New Popular sheet 109, 1947

hunt (above). There is also a small number (not counted) of kennels marked on the Fifth Edition that do not belong to a hunt, so presumably are boarding or breeding kennels. One of these, on the A20 near Farningham in Kent, briefly got its name Lincoln Kennels on the Seventh Series map, but lost its name completely on the Landranger, even though it is still there in business as a boarding kennel.

Not surprisingly some kennels also appear on the 1:25,000 maps, but my collection of these is very limited, so I cannot make a useful assessment of them. But such as I have of different series do seem to show more detail than is normal for the one-inch scale. The now defunct Cowdray hunt kennels at Midhurst in Sussex is described on the Explorer map as Kennels Dairy although the whole building now seems to be derelict. And at Ivybridge in South Devon the hunt managed to get its kennels correctly called Dartmoor Hunt Kennels in full on the Regular Edition SX65, but the kennels have since been moved a couple of miles, and although still active are not mentioned on the Explorer map. But I suppose that much more information will be found on larger scale maps.

The ban on hunting with dogs in 2004/5 seems to have caused little alteration to the overall number of hunts that are still active, there being a small rise between 1953 and 2013, although there was a small fall in the number of foxhunts, due to amalgamations particularly among old hunts in areas where urban expansion has been densest. But now, having spent quite a lot of time looking at this subject, I wonder if it was worth it. Perhaps I can view it as an introduction to a byway of CCS study that might be taken further by someone more competent at some time in the future.
Surveying in Swindon 1953

A fascinating set of Ordnance Survey photographs of sixty years ago has recently been posted online by Swindon Libraries. The collection of about 800 pictures of surveyors identifying specific locations around the town was discovered in a series of booklets lodged in the library archives. Local historian Andy Binks has written and lectured about these under the title ‘Man with a stick’ and generated much interest locally. The lead librarian for local studies, Darryl Moody, contacted Ordnance Survey who gave permission for the photographs to be reproduced in the Swindon history gallery but were unable to provide any further information.

In fact, the photos were taken to record the position of ‘revision points’, which were to provide control for survey at 1:1250 and for its revision. By the early 1960s revision points had been superseded by other methods.¹

To view the collection go to www.flickr.com/swindonlocal then select Sets then Swindon: the 1950s).

¹ There is more on revision points in John Cole, ‘The early years of the National Grid fifty-inch map’, Sheetlines 67 (2003), 26-31 (this can be downloaded from the Sheetlines archive at www.charlesclosesociety.org/SheetlinesArchive).
During the Second World War, the RAF had more than 80 stations in Lincolnshire.\(^1\) A large proportion of these were not the permanent stations so familiar now, but temporary affairs, whose buildings lay in scattered groups where it had been convenient to requisition land. It is well known that the OS was prevented from showing airfields on their maps in the immediate post-war period. However, the prohibition seems not to have applied to domestic sites that were separated by a public road from the airfield proper.\(^2\) The Provisional Edition of the gridded six-inch, which came out in Lincolnshire about 1950, was well timed to record these scattered domestic sites before too many of them had been demolished.\(^3\)

Figure 1 (above left) shows as an example an extract from Sheet 86NE (Revision of 1904 with additions in 1947 and 1948), at TF 018 593. The unfilled rectangles are buildings added to the previous (1904) revision and show

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\(^1\) Stewart Bennett & Nicholas Bennett (eds), *An Historical Atlas of Lincolnshire*, University of Hull Press, 1993, 131.

\(^2\) Following discussion with Richard Oliver, I believe that the OS was provided with a list of features not to be shown which, in this case, would merely be ‘airfield’ with a grid reference. The OS would suppress anything of a military nature not separated from the reference point by a public road and anything that was evidently part of the airfield (like aircraft dispersals) extending beyond such a road; any groups of huts visible on air photographs which were separated from the reference point by a road, even if they looked like barrack huts, were deemed not to be covered by the prohibition. In view of the propensity for former RAF buildings to become camps for displaced persons, hostels for agricultural workers, and such like, this was probably a practical and acceptable solution to the problems arising from updating maps from air photographs rather than a matter of policy.

\(^3\) On the basis of a random transect I reckon that about one sheet in four shows RAF buildings.
Dispersed Sites 1 and 2 of RAF Coleby Grange, a Fighter Command station of 1940. The aircraft operating surfaces lay to the west of the A15 and are, of course, not shown. The definitive source for the infrastructure of stations at this date are the drawings made by the Air Ministry Works Department (AMWD); conveniently their drawings 4173 to 4175/49 are almost contemporary with the six-inch map. For each structure, a building plan is referenced, and this tells us that all the structures on these two sites are of 1940 or 1941, so we do not face any problems from buildings having been added or moved at the time the map was being revised.

A comparison of the six-inch against the AMWD drawings shows that all the barrack huts have been shown but smaller buildings – latrines, picket posts, etc, have been omitted. This seems to follow the 16 square metre rule noted in the Concise Guide. Figure 2 (opposite right) plots the barrack huts as shown in the AMWD drawings, overlain on the six-inch: a blue fill has been used so that the reader can distinguish them. It is clear that one source or the other is lacking in planimetric accuracy. The AMWD had drawn on a tracing of the OS 1:2500. Presumably the originals were at that scale. That, together with a consideration of the uses to which they might be put – laying services, adding further structures, etc – incline one to suppose them reasonably trustworthy. In contrast, whoever prepared the Provisional six-inch sheets had perhaps reverted to the standards of the Special Emergency Edition in an attempt to meet ambitious targets.

For most potential users, who have, let us say, discovered foundations in a copse, this does not diminish the value of the maps. The absence of fill shows the buildings to be an addition; the irregular orientations seem to be characteristic of Air Ministry practice, and from inspection of a later one-inch it is normally apparent to what airfield they belonged. That is as much as most people will want to know, If they do want details of building function, or their exact position, then they will need to track down the AMWD drawings.

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4 I am grateful to Aviation Heritage Lincolnshire for the loan of copies.
Ha-has – the last laugh?

David Andrews and Paul Bishop reach a happy conclusion

David: I should have mentioned before\(^1\) that the specification for the depiction of slopes is that they are only mapped when they are associated with other topographical features (eg railway, road, embankments, coastal cliffs, etc). If this were not the case then every steep hillside in the country would have to be depicted by slope hachures.

With regard to the Hopetoun House example, whilst the vertical height of the slope shown appears to be almost two metres, and the horizontal extent appears to be possibly more than five metres, the gradient in my judgement is not steep enough to meet the ‘rule of thumb’ I previously referred to as ‘too steep to walk down easily’. If I had been the surveyor in this example I would certainly not have mapped the slope, only the wall.

I accept that there appear to be inconsistencies in the mapping of ha-has, and it is probably due to the lack of definitive instructions to the surveyors on the way in which these features should be depicted. The surveyors’ instructions contained specifications for mapping walls, hedges, fences, banks, baulks and slopes but no specification expressly for ha-has. The surveyors therefore had to fall back on the depiction of a ha-ha treating the wall and the slope as separate features, and relying on the specification for each of these in isolation. The lack of a precise instruction on the degree of gradient at which normal ground becomes a ‘slope’ meant that the somewhat subjective judgement of the individual surveyor in each case was relied upon.

If you want an even better example of inconsistency in OS large scale mapping then look no further that the mapping of complex multi-level structures such as the Highcross shopping centre in Leicester or the Eagle Centre in Derby. The rule is that the mapping should show the features on the ‘Upper Level of Surface Communication’. Next time you are in your local ‘mall’ you try to work out what the surveyor should be depicting!

Paul: The new Bill Bignell book on windmills\(^2\) has made me think a little more about this. It struck me that the ha-ha (a ditch with sunken wall opposite the slope of the ditch) is an entity and ideally would have been mapped as such. To separate out the wall from the slope breaks that ‘unity’ and following the individual rules for mapping walls and for mapping slopes does not make sense in terms of the unity of that entity. Bill Bignell’s discussion demonstrates that the OS did at times recognise slopes as part of other entities, when he notes (p.37) the continued mapping of a mill mound after the windmill had disappeared (ie the continued mapping of the slopes, the key point we made about the ha-ha slope \textit{per se} – not that the ha-ha disappears, but that the slope is mapped when identifiable as an element of some larger entity).

\(^1\)Sheetlines 96, 31

\(^2\)Bill Bignell, \textit{Mapping the windmill}, Charles Close Society, 2013
David: The slope around the demolished windmill would still be shown because it was originally surveyed at the same time as the windmill. When the actual windmill had been demolished it would have been deleted from the map in the course of revision. However another rule then comes into play and the slopes would not be deleted because features shown on the map and still in existence at the time of the revision were not to be deleted. If you understand the logic of that, please explain it to me!

Paul: This is a real minefield and really pretty illogical, as you yourself indicate, David. But I still don’t get it: if this latest rule you have invoked applied, why was the mapping of the slope of the Dougalston doocot ha-ha then deleted from the second edition six-inch map (compare figures 7 and 9 in our original paper)? I suppose there might be another rule to be invoked here? Remembering as well, of course, that you are assuming that the practice you knew and are invoking is what pertained in the mid-nineteenth century (but maybe it did).

David: The (possibly unwritten) rule I mentioned applied to 1:2500 and 1:1250 scale revisions. There may have been different ‘rules’ for the revised six-inch mapping which was derived from the 1:2500 survey sheets. This was an office based exercise, and as a field surveyor I was never involved in it. My experience was mainly in 1:1250 and 1:10,000 scale resurveys and 1:1250 and 1:2500 scale revisions. You are correct in stating that I am assuming that my rule pertained in earlier eras, but as far as I am aware most of the general principles for survey of large scale mapping stayed relatively unchanged except when new features (multi storey shopping malls for example) had to be mapped and new rules had to be written to incorporate them. The other explanation for the anomalies is of course, different surveyors applying the rules in different ways. For instance, the ‘rule of thumb’ I quoted applying to how steep a slope had to be to be depicted on the mapping was a ruling by a North Region controller in the 1970s. It is possible that other Regions devised different rules of thumb.

I do remember that the North Region controller’s rulings sparked an article along the following lines in the Region newsletter:

Note found on the body of a field surveyor in a disused quarry

To Whom it may concern.

On surveying this disused quarry I was uncertain about how to depict the outer limits at this point.

If I recall my Region controller's recent comment on the depiction of slopes and cliffs correctly:

A cliff is a slope that is high and precipitous.
A precipitous slope is one that is too steep to walk down without slipping.
A high slope is one which, if slipped down, would result in injury or death, and in this case it should be depicted by cliff symbol.

Since you are reading this note please ensure that the slope which I am lying at the foot of is depicted by a cliff symbol on the published map.
OS in GJ on CCS www

The Society website has recently benefited from two major enhancements which provide valuable information on the history of Ordnance Survey and the online display of more map series.

Thirty two articles (spanning some two hundred pages) of Ordnance Survey relevance, originally published in Geographical Journal in the period 1896 to 1934, have been uploaded to www.charlesclosesociety.org/GJ. These include several major contributions by Charles Close, HSL Winterbotham, JEE Crater and JG Withycombe which give a unique insight into the politics and practices, strategy and objectives of the organisation. Withycombe’s 1929 contribution Lettering on maps, for example, was the basis for Richard Oliver’s recent article on the subject. In addition, shorter unsigned items include announcements or reviews of new publications and other topical features which bring the period to life.

The project to collect and publish these extracts was initiated by the Society in the early 1980s and the work to compile and prepare the items for printing continued for several years. By 1992, however, the Publications sub-committee decided the costs of printing and distribution outweighed the likely revenue from sales. The project was put on ice and the pages put in storage. Now, happily, with the advances in technology and the advent of the website, the costs of scanning, uploading and web-hosting have become trivial and the articles are now freely available for the enjoyment and edification of all.

The second development has been achieved in co-operation with National Library of Scotland and provides the online display in the Sheetfinder page of many more original OS maps than previously. Series now available for display for any chosen location include One-inch New Popular (England & Wales), One-inch Seventh Series, One-inch of Scotland 1st, 2nd, 3rd and Popular Editions and, for Scotland, England and Wales, the 1: 25,000 Provisional series.

For all other One-inch map series, including all of Ireland, and for Six-inch County series, the map sheet names and numbers for the selected location are listed, but the maps themselves are not yet available for display.

Typical set of results in Sheetfinder, listing the map sheets applicable to the selected location. Results in green provide a link to the online display of the map itself

1 Richard Oliver, ‘A few notes on map lettering’, Sheetlines 95,33
2 http://www.charlesclosesociety.org/CCS-sheetfinder
Kerry musings
David Archer

It was not exactly *déjà vu*, but at the AGM in May I did have the feeling that forces were working to return the society to its early years. Having arrived and unpacked, we went for coffee and sat with friends, all of whom know a lot about Ordnance Survey maps. At one point, my neighbour referred to needing some ‘fourths’. This really knocked me back, as I have not heard that word used in the given context for many years. He was referring to one-inch *Popular Edition* maps of England and Wales, which most people call ‘Pops’ or ‘Populars’. Event number two was during the AGM, when it was suggested that we do away with the *Almanack*, and revert to having the component parts inconveniently scattered, as they were many years ago. And finally, after lunch, I saw a marker on a stall for ‘Fourth Edition, Populars’ or something similar. Twice in one day. In this day and age. I felt in my pocket for a copy of the morning’s agenda to check that I had not just attended the 1992 AGM, when Yo was Chairman and I was Secretary. No, I am happy to confirm that the year is 2013, but that strange things do happen at our AGMs.

Does it matter what we call maps and map series? Should we demand a sort of political correctness, despite being able to live with a variety of names for the same thing? I knew what was meant by ‘fourths’ and ‘Fourth Edition’, so why worry? I suppose that it all depends on who we are trying to communicate with, and how clear we want to be. When the society was founded, there was no stigma to referring to ‘fourths’, it is what they were called amongst members, and even by the OS in years past. But since 1982, when Richard Oliver wrote ‘This 4th edition is a distinct generation, belonging neither to the Third Edition, nor to the Popular Edition’, we have tried to call a Pop a Pop. What puzzles me, is where a knowledgeable person picked up a term that was already archaic and shunned when he joined the society.

As in any area of life, we have preferred and common usage terms, but the important thing is that we all know a preferred or official term exists, and use it when appropriate. We should never use inaccurate terms, even in common usage. For England and Wales, there are seven small black and white maps of Kent, that say *Fourth Edition* in the top left corner; a term that never appears on a large coloured map with ‘Popular Edition’ in the map heading. Since Richard’s article, Roger Hellyer has investigated the whole question of map edition and series titles, and many believe that his offerings should be used as standard terms.\(^1\)

Shortening a proper title can be dangerous. OK, in conversation, we can usually ditch the ‘one-inch’ and ‘of England and Wales’ bit, but ‘Do you have a Second Edition map’, could mean any of many series and scales, whereas ‘Do you have a Sixth Edition map’ is a possibility. Safely having dropped the boring bits, care is still needed, as *Revised New Series* cannot be shortened to *New Series*, which is a name of an entirely different beast. However, shortening *Third Edition, Large Sheet Series* to the very brief ‘Thirds’, does work, and most people think of the large sheet maps for England and Wales, even though there is a coloured small sheet series as well as Irish and Scottish Thirds. *Revised New Series* and *Seventh Series* are unambiguous, even without a scale

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being mentioned. Sometimes a little sub-title or explanation is advisable, as when I describe the ‘1:10,000’, as the metric six-inch. That is, six inches to one mile. Mention the quarter-inch and most people envisage a sequence starting with the Third Edition, Fourth Edition, Fifth Series and then the Routemasters and Travelmasters. Despite the fact that the last three were a metric quarter-inch at 1:250,000, not 1:253,440. This is where I believe we must be accurate with descriptions and need to say ‘metric quarter-inch’ and not describe the Routemasters as ‘quarter-inch’ maps. Similarly for the ten-mile maps at 1:633,600 and metric 1:625,000. The concept of a metric quarter-inch or ten mile map is a neat description of the scale, where the mixture of terms is easily understood, just as in Welsh butchers, one can hear ‘Dau lamb chops’ being requested.

If you think about it, most of us have always been a little sloppy by not questioning common usage; the 1:500 are known as the ten-foot plans, but at 126.7 inches or 10.558 feet, are slightly nearer eleven than ten feet to the mile; 1:2500, which we call twenty-five inch maps are actually 25.344 inches, whilst the 1:25,000, two and a half inch are in fact 2.5344 inches to one mile. Do we favour the terms ten-foot plans, twenty five inch and two and a half inch maps rather than 1:500, 1:2500 and 1:25,000 because the metric system is so, dare I say it, European? Have we always aspired to being an imperial Imperial nation? Still, the terms one, half and six inch need no apologies.

But, as I say, it all depends on who is trying to communicate with whom. A few years ago, I started getting requests for Ordnance Survey maps of the first or second epoch. Absolutely meaningless to me. After making enquiries, it appeared that a well known commercial website used this term. I have just tried to see if it is still used, but the site is impossible to use. My memory is that they only talked about epochs, the period during which a particular edition was current, emphasising the word epoch, which the general public thought important and used when requesting maps from me. For edition, read epoch. Which is a bit like deciding to abandon the word newspaper, and use chipwrapper instead, ‘I was looking at the chipwrappers yesterday, and noticed a report in the Times ....’.

When I talk to someone new to collecting Ordnance Survey maps, I am careful to refer to ‘Populaters’ rather than ‘Pops’, and to the Third Edition, rather than ‘Thirds’. But even this is assuming they know I am not talking about Irish or Scottish maps, when ‘Scottish Thirds’, ‘Scottish Populaters’ and ‘Scottish Populaters with the National Grid’ would be used. The later term, is sometimes inaccurately replaced by ‘Scottish sixths’. God forbid. Amongst friends, I refer to ‘one to fifties’, ‘seventh’ and ‘Scottish post-war’, with no other explanation, and am understood, whilst to others, I mention ‘one to fifty thousand’ or ‘Landrangers’. Less common maps need a little more, ‘Half-inch MOT’, ‘Half-inch Second Series’, whilst the Two-inch map of London and the Three-inch Map of Guernsey are usually given in full. It is certainly the case that less common maps, even amongst the keen, elicit ‘Have you got any of those .....’ and then a brief description, with no attempt at a title.

I have an impression that anyone who has worked for the technical side of the Ordnance Survey thinks and talks in terms of scales, referring to ‘1:2500’ maps when most CCS members would say ‘twenty-five inch maps’. Whenever possible, I keep away from the dreaded representative fraction. A single zero makes a lot of difference and can cause problems. The area shown on a 1:2500 map is far less than on a 1:25,000 map. One needs 39 of the former and only 4 of the latter to cover Kerry Parish. My experience is that it is much safer to discuss the difference in detail shown on twenty five inch versus two and a half inch maps, and possibly save a lot of work. When
talking about post-1945 large scale Ordnance Survey maps, everyone tends to talk in terms of scales and not words. One seldom hears of a 1960s twenty five inch map, rather a 1:2500, which is a spot-on description. Scale is always used to arrange lists of map series. Roger’s book starts with the one-inch, then half-inch, quarter-inch and eventually the 1:4,000,000; whilst Chapter two of Richard Oliver’s Concise guide (to use two words of the sub-title) is also arranged largest down to the smallest, a convention again favoured by Chris Higley. Ever deviant, our catalogues started with the ten-mile and progressed to the one-inch.

Using a numerical description is certainly clear, providing everyone knows what is being discussed. There can be no confusion between a map at 1:126,720 and another at 1:31,680. The figures look so different. The only problem is that they do not bring to everyone’s mind maps at the half-inch and two inch scale. Whenever these two scales are found together, we should insist on the representative fraction, as confusion is almost guaranteed. Flicking through a run of pre-WW1 maps in white covers, two miles to the inch and two inches to the mile are often assumed to be the same thing. Yes, we all know two miles to the inch are half-inch maps, but so many people pass over the other series as being the same. Open a two inch to the mile map and one is bound to find something very special, except perhaps for the London Passenger Transport Board maps, which are exceedingly dull by comparison with any other at this scale. Revision time: Re-arrange the following, putting the most detailed first, Half-inch, two inches to the mile, 1:126,720, two miles to the inch, 1:31,680.

The marker ‘Fourth Edition, Populairs’, shows that old habits die hard. For all of us. In the early years of the society, we knew of a map called Forth and Clyde in Roman Times, but it was Roger who corrected us, noting that the map title was Scotland in Roman Times, but so many, myself included, still slip into Forth and Clyde mode. Slap on the wrist, which is also frowned upon, nay outlawed. Though life is now so complicated, things are still evolving. During the map market, someone told me they had some unwanted LRM s in their car. This threw me for a moment, not having heard nor seen the term before, but the meaning was clear, especially as I could see a boxful of the said pinkies on a table. A useful term, LRM, but not one to be emulated by the adoption of OIPE, HIMOBG or QIMOS, causing us to sound like the inmates of Feltham.

Where does all this get us? Basically, it is rare that we mention anything like a full title of a map series in conversation, relying on brief ‘identifiers’ depending on the present company. Two or three words are usually enough, with numerals being favoured for large scales by ex-OS employees. A few inaccurate descriptions are occasionally encountered, ‘First Edition one-inch map’ or the ultimate in ignorance, ‘First Series one-inch map’, when everyone else uses Old Series, as indeed did the Ordnance Survey; but members are more than willing to be corrected and fall into line. A couple of days after the AGM, I received an email from my ‘fourths’ friend, headed ‘Populars’, with a list of Popular Edition maps he still needed. Which made me even more determined to try and follow his example and refer to Scotland in Roman Times, but please do not try and catch me out when we next meet, as I have only just mastered referring to Forth Clyde and Tay, the largest text on the cover.

This week’s quiz: on which Ordnance Survey publications can the words Old Series be found, referring to the one-inch map?
Letters

Being an addictive book collector as well as a railway enthusiast, I was fascinated to read Rob Wheeler’s review of *The Times: Mapping the Railways*.¹

I have a copy of the book on my shelves and like any extensive work it does have the odd error and inconsistency, not least the section on the Festiniog Railway (as it was named at incorporation) where the Welsh and anglicised place names get totally muddled.

Where I must take issue with Rob is where he states ‘Here we have a detailed representation of what was almost a standard design for 1840s Midland Railway termini’. The nearest that the Midland railway got to York was Leeds. The Midland Railway was absorbed into the London Midland and Scottish Railway (LMS) in the 1923 grouping, whereas York was firmly London & North Eastern Railway (LNER) territory. The map in question refers to the York & North Midland Railway authorized on 21 June 1836 and which became a constituent of the North Eastern Railway on 31 July 1854. The North Eastern Railway was ultimately absorbed into the LNER in the grouping of 1923.

However, the main problem which Rob has overlooked in his review is the very poor standard of the index. Whilst many subjects are correctly listed there are very many serious errors. For example I quote from three subjects that are of specific interest to me:

1. Page 146 is shown in the index for no less than 17 minor or narrow gauge railways, whereas page 146 actually shows a tile map for the North Eastern Railway.
2. Page 151 is shown in the index as the Ironbridge Gorge Museum Trust but page 151 actually deals with Swansea Docks.
3. The index for page 167 shows twelve Welsh railways whereas page 167 is actually the Light Railways of Scotland 1919.

Considering the work that has gone into the preparation of this 304 page volume there is absolutely no excuse for the poor quality of the indexing.

Bill Mason

Rob Wheeler replies: I had taken some interest in the Midland stations at Nottingham and Lincoln but did not feel able to comment on the general practice of other railways at this date. Any similarity between York station and contemporary Midland practice might perhaps be attributable to George Hudson – or perhaps the features of York station to which I alluded pre-date that link. It is another topographic aspect of railway history which could usefully be explored and has not been.

If I get really stuck with a geological map problem, I take it to John Henry, who knows far more about the subject than most people, but when it comes to our publication *Ordnance Survey small scale maps: indexes 1801-1998*, by Roger Hellyer, I can find things that elude others. Hence, when John wrote in the last

¹ *Sheetlines* 96, 46
issue of *Sheetlines* that he could not find *Index to the Geological maps of Cornwall, Devon and West Somerset*, 1839 listed in Roger's book, I found that he needed to glance a little further down page 189 to item 8 and bingo, there it is.

John is not the first person to suggest that something is lacking from this work, and in every other instance, the item in question was shown to be there. This is one of two books that I wished existed when I became interested in Ordnance Survey maps, and as it did not exist, I asked Roger to do something about it. Over several years, his text grew and grew, until the final publication of 264 pages and a lengthy 24 pages of introduction.

In the other book that I would have loved in my early OS years, *Old Series to Explorer: a field guide to the Ordnance map*, Chris Higley has written about our publication ‘Behind the unpromising title lies an invaluable resource; a directory of every series of maps at 1:50,000 or smaller scale published by the Ordnance Survey of Great Britain and its successor organisations in Ireland’.

I agree totally. The title is a stumbling block. Yes, it has over 130 index diagrams for maps or series of maps, but it also has details not only of all the series that used each diagram, but also of the publication history of each series: which sheets were issued, when and in what style, survey dates and projection used. Consider Section 10, *One-inch Popular Edition Map of England and Wales*, where an index diagram is followed by seven pages of listings, detailing which sheets appeared in the coloured, outline, outline with blue water, and experimental coloured issues. Included, are details of the four versions of the *London Passenger Transport Map*, details of which sheets each of the nine printers of the *Land Utilisation Survey of Britain* produced and full lists of the District, Tourist and Special sheets associated with the *Popular Edition*; plus full coverage of the *War and Second War Revision*. All with dates of issue and locations of where scarce items can be seen.

The various appendices are invaluable, and the index detailed. The geological map mentioned at the start of this letter appears on page 189, with index entries pointing to it from Cornwall, Devon, Geological maps/District maps, Geological maps/index maps, Geological Surveys/Great Britain, Index maps/Geological, and West Somerset.

Until about a year ago, I used this book about two or three times a week in the course of daily mapselling. As we are now trying to scale back our business, we would like to offer this work to members of the Charles Close Society at a special price of £22 postage included, instead of the listed bookshop price of £40. Contact details: The Pentre, Kerry, Newtown, Montgomeryshire, SY16 4PD. Tel : 01686 670382. Email : david@david-archer-maps.co.uk

*David Archer*

Subtitled *the tumultuous career and surprising legacy of John Randel Jr, cartographer, surveyor, inventor* this book is the story of a flamboyant and eccentric genius (1787-1865) whose work established the grid pattern of modern American cities and facilitated the development of canals and railways in USA. A vivid sense of his character and achievements may be gleaned from some of the entries in the index under his name: Albany lawsuit of, canal projects of, Chesapeake & Delaware lawsuits of, eccentricity of, financial problems of, mechanical ingenuity of, as meticulous record keeper, New York City elevated railway designs, New York City sewer system, obsessiveness of, as perfectionist, surveying instruments designed by, topographical sensitivity of, as urban planner as visionary, Wright's enmity toward, Wright sued by.

Randel was tasked with setting out the proposed street plan of the then undeveloped island of Manhattan. A stickler for accuracy, he designed his own surveying equipment, based, at least partly, on William Roy’s account of his famous 1784 measurement of the Hounslow Heath base line. Holloway says ‘...this was the kind of document that would have consumed and delighted Randel. One hundred and thirty pages of particulars about chains, metals, woods, glass rods, repeated experiments and measurements down to 498 one-thousandths of an inch. Music to the ears of a similarly exacting, similarly obsessive mind.’

This book is a thoroughly enjoyable read, a story well-researched and well told. It will appeal to anyone interested in surveying, cartography, the history of USA or the psychology of the driven personality. The only disappointment is that the copious illustrations of map extracts and surveying instruments are in hard-to-decipher shades of grey rather than the full colour they deserve.

*John Davies*

CCS members are entitled to 30% discount on this book by logging on to www.wwnorton.co.uk/book.html?id=3323 and entering the promotion code WN238.

*Were there undocumented Struve arcs (see page 23) intersecting in North Devon?*

*This signpost encountered on the South West coast path pointing to Russia, Iceland, America and New Zealand seems to suggest so. Or maybe not.*

[photo John Davies]