Sheetlines

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The 2020 AGM is on Saturday 9 May in Lincoln. As well as the formal business and the ever-popular map market, the main attraction is David I Walker, who will give a talk on ‘The Hydrographic Service and the Ordnance 1795-1855’. For the benefit of people staying over, there will be a Sunday afternoon talk at the Society for Lincolnshire History & Archaeology. Full details, booking form for Saturday lunch and special book offers are on the flyer enclosed with this issue of Sheetlines. Please return your reply slip by 23 April.

Events have been arranged to ‘Walk the Walbrook’ on Saturday 4 April (starting Angel tube station) and to visit the Scott Polar Research Institute Library, Cambridge, on Thursday 23 April and the Mercer’s Company Archive, City of London, on Wednesday 13 May. The Institute holds a range of maps at different scales covering the Polar Regions, including areas of Alaska, Antarctica, Canada, Greenland, Iceland, the Russian North and Svalbard. The latter visit will feature estate plans and other maps in this Livery Company’s archives. Its estate includes areas around Covent Garden, such as present location of Stanford’s.

Meanwhile local meetings continue to be popular. A report of the recent London meet appears overleaf, the latest Hertfordshire meeting was being held as we went to press and the next Staffordshire meeting is on Wednesday 13 May.

For details and booking for all events, contact Bernard Anderson (details opposite). News of events is posted on the website at www.charlesclosesociety.org/latest, generally before notice appears in Sheetlines.

Our website is now over twelve years old and contains a vast collection of valuable resources, such as the map cover collection, the Sheetlines archive, the digital archive, cartobibliographies and histories, Sheetfinder, our online book shop and much else.

We are currently renewing the site design to make it easier to find what you want – and to discover good things you didn’t even know to look for. We invite you to view the site and let us have your feedback at info@charlesclosesociety.org.
London Show and Tell February 2020

Twenty participants showing over a hundred maps covering more than 200 years of London’s history – that was the winning formula for the recent Notting Hill meeting. Members displayed and described their maps, representing a wide spectrum of interests; some of the highlights included:

- Transport: TfL geographic tube maps and track layout plans (not in the public domain), as well as railway, tube, bus and Green Line coach maps from the 1850s to the latest ‘Rail & Tube’ which has a particular anomaly
- Open spaces: historic and modern maps of the Royal Parks, Regent’s Park, Primrose Hill, Hampstead Heath, 2012 Olympic park and Epping Forest
- Geology: solid and drift maps of 1870s, based on one-inch Old Series maps
- Motorists maps, street plans and atlases: including Phillips (1887), Lightning (1933) and Falk, Shell and Foldex maps, such as 1951 Festival of Britain edition
- Silk maps: two examples, including unusual depiction of tube network, in English, French and German, printed on silk by Canadian company Microsoie
- OS specials and one-offs: such as City Ward map, ‘3-inch map’ (1933), 1:12,500 (1941), experimental scales maps (1970), ‘How Green is our Space’ (2007)
- District maps: from Patersons (1791) to MOT (1923) and OS ‘M25’ (1986)
- Amongst other maps were those portraying docks and wharfs, bomb damage and air defences, ‘secret’ 1926 General Strike map and London’s airfields.

The next such meeting will be on Saturday 14 November.

John Davies

1 see Ron Blake, ‘Mystery airfields map’ on page 48 of this edition of Sheetlines
Luftwaffe air photos and the OS Special Emergency Edition

Rob Wheeler

Chris Higley’s stimulating article in August’s Sheetlines drew attention to the updating of German reproductions of OS six-inch plans, based on Luftwaffe air photographs. These air photographs were in many cases later than the programme of ARP revision. Accordingly, the German maps might offer a better depiction of British towns at the beginning of the Second World War than the Ordnance Survey’s own product. I shall argue here that they do at least complement the Special Emergency Edition (SEE). For avoidance of confusion, it is worth stating that both the German product and the SEE were normally based on what the OS termed the sales edition, the last pre-War edition of the six-inch placed on public sale.

In the case of Cardiff (Sheet BB32c = Glamorgan 47NE) reproduced by Chris, the German depiction of Queen Alexandra Dock (figure 1) is rather more instructive than the housing development shown in the August issue. Here, on the northern side, are shown a large number of identical buildings placed transversely. They look as though they might be a barracks. This is completely wrong. The SEE (at least in its post-war manifestation as a Provisional) shows three massive transit sheds. One of these survives and can be viewed on Google satellite images. It has transverse roof-lights running almost all the way across the shed. The Germans must have mistaken these roof-lights for separate buildings.

Fig 1: Queen Alexandra Dock from German 1:10,000

1 Chris Higley, ‘Cardiff: revision for defence - and attack’. Sheetlines 115, 23. I am most grateful to Chris for his assistance with this article.
One deduction we can draw is that the images used must have been of poor quality. This is not a matter of cloud or reaction to hostile fire. The photographs must have been taken from a much greater height than the camera was designed for; perhaps they were even high-altitude obliques. This perhaps explains why there seem to be no other updates to the sheet apart from some landfill east of Roath Dock and the housing development shown in August, and why the depiction of that housing development was so poor.

The revision note on the Cardiff sheet is *Berichtigt nach Luftbildauswertungen vom Januar 1941* and this seems to be the standard form (with variable date, of course). My understanding of the expression is that the cartographers were working from interpreted air photos, that is, to say the Luftwaffe photo-interpreters had annotated the photos with whatever they regarded as of significance, and supplied prints with these annotations. A few streets of new housing were probably of no interest to them, but Queen Alexandra Dock was something to which they really ought to have paid attention. Britain’s imports across the Atlantic were being diverted to west-coast ports to save shipping and avoid the dangers of a Channel passage. Here at Cardiff, what had been a timber dock (with a small transit shed) had been converted so that it was wholly devoted to general imports. It was a prime economic target, and the photo-interpreters failed to spot it.

If Cardiff was typical, then these German 1:10,000 sheets might tell us something about German intelligence; but they can tell us almost nothing about UK urban topography. However, inspection of one of the Birmingham sheets (BB23e = Staffs 72NW, covering Oldbury) shows a sheet largely redrawn - the sales edition dated from before WW1 - and with certain advantages over the SEE as well as disadvantages. The whole area had benefited from full revision at 1:2500 in 1937, but these sheets were only published after the war. That revision of course eased the job of compiling the SEE; it also provides a useful expansion of what the SEE was attempting to show.

**Weaknesses of 1:10,000**

1. Being compiled from air photos alone, the additions to the German maps have no names of streets or buildings, nor even any descriptions.
2. Things can be missed. *Figure 2* shows a brickworks south of Rowley Regis station. At least, it was a brick works in 1913; it had vanished by 1937. As an *Objekt* of military significance, it can scarcely have been overlooked; this may be an example of cloud denying coverage.
3. *Generic drawing*, as I shall term it, is detail which is not to be taken literally - like field boundaries on the Mudge map of Kent. Whereas generalisation omits detail and simplifies linework in the interest of legibility, generic drawing provides fictional detail to show the ‘sort of thing’ that is present. The last OS use of this was garden ornament on mid-19th-century six-inch sheets; in the twentieth century, OS mapping had a clear distinction between surveyed linework and ornament. *Figure 3* shows an example to the south of Thimblemill Road, an area now occupied by Thimblemill Cemetery. Here, the small size of the fields and the
way they are drawn, with the north-south lines slightly stepped, suggest they are
generic rather than plotted boundaries. Checking against the 1937 1:2500 shows
that the area in fact consisted of allotments. It is not a bad way of showing
allotments, but the user does need to recognise it as generic drawing. There is a
similar area north of Thimbledown Road, where Hales Crescent was later built.

Regularity is perhaps to be expected from cartographers working with imperfect
images. If a straight road disappears behind cloud and then reappears on the
same line, it is reasonable to assume it continues under the cloud. If the road is
flanked by semi-detached houses, then it is reasonable - but riskier - to assume
that they continue likewise. It is certainly better for the intended user (as opposed
to the historian) to do that rather than leave a gap. If there is something a little
different but the cartographer can't make out quite what it is, it might have been
better for the user to admit as much, but I have not seen such annotations and I
suspect that regularity was allowed to take its course unless there was strong
evidence against it. This is particularly apparent on the new estates. For example,
Central Avenue in Blackheath (excluding the corners) had been laid out on each
side as $2\ 2\ 4\ 2\ 4\ 2\ 2\ 2$, where '$2'$ indicates a pair of semis, '$4'$ a terrace of four, and
underlining indicates houses set back further from the road.\footnote{This description ignores the corner blocks. Each of these seems to have consisted of a house fronting one road linked to a house fronting the other - a challenge for any generalised depiction.} The German
cartographer renders this as $2\ 2\ 2\ 2\ 2\ 2$ on the north side, and $2\ 2\ 2\ 2\ 2\ 2$ on the
south. This liking for semis, and a tendency to fit in slightly fewer houses than
there really were, are found across the whole map. A more straightforward
example of regularity is on Abbey Road, just north of Warley Woods, where a line
of semis continues to the edge of the map, despite Rounds Green Methodist
Church having already been there in 1937. Regularity could work in the opposite
direction too. Opposite the church in St Alban's Road Smethwick, was a yard -
possibly a builder's yard being used for the development of the suburb but
permanent enough for the OS to map it in 1913. By that date, houses had reached
within a few yards of it; by 1937 they had extended across where it had been.
The German cartographers left the yard in place showing houses right up to it but
stopping at its fence. The principle seems to have been: if in doubt, leave existing detail.

**Strengths of 1:10,000**
1 German revision continued to a later date than the ARP exercise. The revision date for this sheet is September 1940. It would be dangerous to assume that photographic coverage of that month was available for the entire sheet, but one can certainly find housing development (e.g., Sandford Avenue, Brook Road) not recorded by the OS, along with roads laid out where building had not started (St Matthews Road, adjoining Brook Road).³

2 The 1:10,000 offers an alternative depiction of large complexes. It may not be better, but the date is different and the errors are different, so the two sources together sometimes tell us more than either does alone. *Figures 4 to 6* show what are now the Devonshire Academies, from the SEE (actually the 1944 Provisional), the German 1:10,000 and the 1937 1:2500. On the SEE, one reads each school as a spine with three wings coming off it, though the picture is confused by field boundaries and a narrow building associated with the demolished Smethwick Hall remaining on the map;⁴ the 1937 map confirms that the German cartographers were correct in removing these. That one school is a mirror-image of the other is not clear from the SEE alone, but one might well take this view looking at both SEE and the German map. The German map suggests a mix of double-height buildings and lower structures; one of the wings carries on into the ‘spine’, having a separate transverse double-height structure at its end; the ‘spine’ consists of a double-height building (an assembly hall?) adjoining the middle wing, the rest being lower (and omitted by the Germans). The German map definitely shows the site entrance to be from the north (confirmed by the 1937 map) and shows nine additional buildings (temporary classrooms?) built on the playing field. The explanation of the German depiction of a broken ‘spine’ as being caused by their picking out higher structures is rather speculative, but it is striking that mirror-symmetry seems to emerge from the German map rather than being something imposed by the cartographer.

³ Of course these names do not appear on the German map, nor are they on the 6-inch: I have relied on Google maps for naming.
⁴ I have observed in a Lincolnshire context that features deleted from the SEE sometimes reappear on the post-war Provisional, so this might be an unfair criticism of the SEE proper.
A different example, where the value added by the German map is more doubtful, is given in Figures 7 to 9. Here, on the SEE, the regularly-spaced square buildings to the east look as though they might be explosives stores. The German photo-interpreters seem not to have thought so: the objekt symbol indicates ‘factory of unknown type’. The German cartographers have added fences so that each little building sits in the SW corner of its own tiny field: are they for livestock? The 1937 map tells us the factory is an electrical engineering works; the ‘fences’ are actually roads, and the little buildings are not all identical. What purposes they served remains a mystery.

Whereas ARP revision was supposed to be limited to roads and buildings, the German cartographers appear to have had time for all categories of revision. In practice, the benefits of this are modest.

**Railways** The cartographers have had time to remove redundant railways. For example, in Figure 1, the tracks that went through the area now occupied by the new buildings have been carefully deleted, while leaving unchanged those tracks that passed around them. Given that the photographs did not allow the sheds themselves to be seen properly, we can be fairly confident that the cartographers could not see whether railway tracks had been taken up: they are just making the map tidy. Likewise, on Staffs 72NW, the railway serving the Cakemore Colliery and Brickworks has been deleted: the colliery had gone, and the line had been cut by a new road, so it was an easy call. (Interestingly the words TRAMWAY and Incline were left; presumably there was some doubt as to whether they might refer to something other than the industrial railway.) On the other hand, Figure 9 shows a rail connection to the new factory, whereas Figure 8 omits it. If the cartographers could not spot a railway serving an ‘object of interest’, it seems probable that even their Staffs imagery was too poor to show railway tracks.

**Field Boundaries** Depiction of allotments has already been mentioned. By 1940, none of the area of Staffs 72NW was occupied by normal farms (though there may still have been active smallholdings). The largest area of green space was around Brand Hall, which by 1937 was a golf course. In this area a number of field boundaries have been correctly deleted by the German cartographers; others remain, even though they had gone by 1937. Hence the German map is
useful as an indicator that changes were taking place but does not by any means capture all of the changes.

Water and Earthworks The landfill at Cardiff has already been mentioned. This extended to about 30 hectares. Its outline was shown in a very generalised manner. The German map is nevertheless the only depiction known prior to 1947. Turning now to the Staffs sheet, the large clay pit that had served the Cakemoor brickworks had filled with water by 1937, an area of about 2.3 ha. This is duly shown by the German cartographers. Smaller changes are generally disregarded: for example, the pond south of Brand Hall had become marsh by 1937 but is still shown as water on the 1:10,000. Generally, earthworks remain as on the sales edition, but at the top of the map, NW of Ivyhouse Farm, single lines of hachures attempt to show what were new spoil heaps. Thus the maps do often show large changes, even though their depiction may be weak.

So what?
Interpreted with care, German maps of the standard of BB23e can add usefully to our understanding of the topographical development of built-up areas in the later 1930s and early 1940s.

But is revision of this standard common, or is Cardiff more typical? As a test I looked at the extracts of city centres published by the Bodleian Library a few years ago. Of 12 extracts (excluding London, which used a different base map) only one, of Bristol, appeared to have been updated. Here the only change was that the massive new Goods shed next to Temple Meads station had been added. The cattle market east of the station was still shown as a military object even though it had closed, a multi-storey building had been erected on part of its site, and the ‘through’ part of Temple Meads station had expanded to take up the rest of its site. The Bristol revision seems more akin to that of Cardiff. Evidently there is scope for further investigation looking at more of the original sheets. However, it is not something that can be done in the course of a quick library visit: it is necessary to investigate what was actually present on the ground, and that often takes time.

Those interested in using the German 1:10,000 as a source might do better to investigate the air photos directly rather than rely on the cartographers’ interpretation of them.

I conclude with an exercise for the reader: use the air photo at [www.warhistoryonline.com/wp-content/uploads/2018/06/00-lonblitz.jpg](http://www.warhistoryonline.com/wp-content/uploads/2018/06/00-lonblitz.jpg) to update Surrey Commercial Docks (to the right of the aircraft’s tail) on the ‘sales edition’ of London sheet K (revised 1913-14) available at [https://maps.nls.uk/view/102345864](https://maps.nls.uk/view/102345864). Don’t look at the post-war Provisional - [https://maps.nls.uk/view/102345861](https://maps.nls.uk/view/102345861) - until you’ve at least made an attempt. It may provide an insight into the challenges faced by the German cartographers.

- All maps except German 1:10,000 courtesy of National Library of Scotland

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5 German Invasion Plans for the British Isles, 2007.
6 To see how very prominent it was from the air, see [www.britainfromabove.org.uk/image/epw060120](http://www.britainfromabove.org.uk/image/epw060120)
A fresh look at the initial Ordnance triangulation of 1795-1811

David L Walker

The series of papers published on behalf of the Ordnance from 1795 until 1811 recorded the triangulation of Great Britain (including only southern Scotland) in impressive detail. These papers, accessible on the Royal Society website, provide very readable accounts of the surveyors’ journeys, their observations and their calculations.

Although the triangulation was observed as an interconnected network, its vertices or stations were generally related to one of nine chains of triangles, each referred to the meridian of a station designated as an origin (figure 1). The siting of stations, the observations made from them, and the calculation from the Ordnance baselines of the sides of the triangles, are well described in the papers.

However, there is less explanation of the outputs from this work, that is the calculations of the position of each station in terms of co-ordinates ‘from the parallels and perpendiculars to their respective meridians’ for use by topographic surveyors (table 1), and the conversion of these co-ordinates into latitudes and longitudes for use by hydrographic surveyors (table 2).

Table 1
Co-ordinates

(Extract from Art. XXV, Royal Society 1800, 643)

<table>
<thead>
<tr>
<th>Station</th>
<th>Meridian of St. Agnes Beacon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hensbarrow</td>
<td>73 4 13 N E</td>
</tr>
<tr>
<td>Deadman</td>
<td>72 24 27 S E</td>
</tr>
<tr>
<td>Karnboullis</td>
<td>3 27 27 S W</td>
</tr>
<tr>
<td>Karminnis</td>
<td>61 13 58 S W</td>
</tr>
<tr>
<td>Bedwin</td>
<td>37 30 45 N E</td>
</tr>
<tr>
<td>Lonsdale</td>
<td>75 29 51 S E</td>
</tr>
<tr>
<td>St. Burtian</td>
<td>67 20 59 S W</td>
</tr>
<tr>
<td>Pertinney</td>
<td>39 25 32 S W</td>
</tr>
<tr>
<td>Sennen</td>
<td>49 50 18 S W</td>
</tr>
</tbody>
</table>

Table 2
Latitudes and Longitudes

(Extract from Art. XXVI, Royal Society 1800, 644)

<table>
<thead>
<tr>
<th>Meridian of St. Agnes</th>
<th>Latitude</th>
<th>From merid. of St. Agnes</th>
<th>Longitude west of Greenwich</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lonsdale</td>
<td>50 20 25.7</td>
<td>0 39 10.3 E</td>
<td>4 32 45.7</td>
</tr>
<tr>
<td>Bedmin Down</td>
<td>50 29 11.6</td>
<td>0 31 15.9 E</td>
<td>4 40 39.8</td>
</tr>
<tr>
<td>Deadman</td>
<td>50 13 10.0</td>
<td>0 44 51.3 E</td>
<td>4 47 4.4</td>
</tr>
<tr>
<td>Karnboullis</td>
<td>50 10 59.4</td>
<td>0 42 0.0 W</td>
<td>5 12 37.7</td>
</tr>
<tr>
<td>Karminnis</td>
<td>50 11 43.8</td>
<td>0 18 56.2 W</td>
<td>5 30 51.9</td>
</tr>
<tr>
<td>St. Burtian</td>
<td>50 4 37.9</td>
<td>0 24 9.2 W</td>
<td>5 36 4.9</td>
</tr>
<tr>
<td>Pertinney</td>
<td>50 6 27.0</td>
<td>0 25 36.2 W</td>
<td>5 37 31.0</td>
</tr>
<tr>
<td>Sennen</td>
<td>50 3 55.6</td>
<td>0 28 67.6 W</td>
<td>5 40 52.4</td>
</tr>
</tbody>
</table>

1 These papers, published by the Royal Society in 1795, 1797, 1800 and 1803 and by William Faden in 1811, are referred to below by years of publication, with details listed in the Appendix.

The Royal Society papers may be accessed at https://royalsocietypublishing.org/journal
Figure 1: Ordnance stations related to meridians used for the initial triangulation (based upon plate I of vol III of An Account of the Trigonometrical Survey, published by Faden, 1811)
The considerable work of the late Brian Adams and others has shown that the use by the Ordnance of co-ordinates (as in table 1) to project the sheet-lines of their early maps was in several respects inconsistent. This article is concerned with previous stages of this process, concerned with calculating the co-ordinates of each station and their conversion into latitudes and longitudes.

The calculation of station co-ordinates

‘Great triangles’, normally observed from a primary station at each vertex, are shown in figure 1. ‘Intersected stations’ observed from only two vertices were known as secondary stations. Triangles were observed as if spherical triangles, but calculated as plane triangles. Hence the calculated sides of these triangles were chords, not arcs, of the spheroidal earth (and calculated as if on a sphere).

The co-ordinates of each station were measured in feet (a) on the great circle passing through the station that was perpendicular to the meridian passing through its related origin, between station and meridian; and (b) on this meridian, between the point of intersection of the great circle and the origin. It has been pointed out that this projection, initially known as ‘projection by rectangular spheroidal co-ordinates’, corresponded with the ‘Cassini projection’ used by the Ordnance in later years. For those of us who find it difficult to visualise Cassini’s projection, a chocolate orange on its side provides a useful aide-memoire:

Figure 2: Illustration of Cassini’s projection

Chocolate segments show great circles of the earth (those on a plane through the earth’s centre). Parallels of latitude are shown in light blue. Cassini axes are shown in yellow.

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3 The inaccuracy arising from the difference between the length of an arc and the length of its chord was limited by aggregating the length of the co-ordinates step by step from one vertex to the next. For sides of (typically) 100,000 feet the difference between arc and chord is little more than an inch. But for longer sides the difference increases as the cube of the length.


5 RC Wheeler, ‘William Mudge and the General map of England’, *Sheetlines* 97, 18. This article considered several of the issues discussed here and stimulated these supplementary investigations.
Co-ordinates were calculated as follows, taking two stations measured from the origin of St Agnes Beacon as an example. Figure 3 exaggerates the scale of the triangles compared with the earth to clarify observed chords (solid lines) and co-ordinates of these stations (dotted) on a great circle grid.  

(i) The meridian at St Agnes was observed from elongations of the pole star at morning and evening, and the observed bearing of Karnbonellis (K) from St Agnes was measured by reference to this meridian.

(ii) The distance of K from St Agnes was taken from the calculation of this great triangle. From bearing (i) and distance (ii), calculated as a plane triangle, the co-ordinates of K from St Agnes were measured as if on the meridian of St Agnes and on the great circle perpendicular to it.

(iii) At K, the bearing of St Burian (by reference to the meridian of St Agnes, not the meridian of K) was determined from the angle observed at K between St Agnes and St Burian.

(iv) The distance of St Burian from K was taken from the calculation of this great triangle. From bearing (iii) and distance (iv), calculated as a plane triangle, the co-ordinates of St Burian from K were measured as if on the meridian of St Agnes and on the great circle perpendicular to it.

(v) Co-ordinates (ii) were added to co-ordinates (iv) to determine the co-ordinates of St Burian from the origin (St Agnes).

The bearing used to calculate each co-ordinate was shown in the list of co-ordinates (as in table 1) but the distance had to be found from the calculations of the sides of triangles shown previously, usually in the same paper. For meridians other than St Agnes, two bearings were generally used rather than one, and the chain of triangles was much longer.

When, for mapping purposes, the co-ordinates were plotted or projected on a plane rectangular grid, its grid lines were not exactly north/south, not exactly east/west, and not exactly to scale (except on the meridian of the origin).  

The horizontals of the grid represented great circles, not parallels of latitude, and the verticals did not exactly represent meridians (except on the origin). The ‘rectangular’ grids for the various meridians were at a slight angle to each other, according to the convergence of the meridians, as shown in figure 1.

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6 The triangulation in figure 3 is from Royal Society 1797 at Tab XI, and angles and distances on pages 446-447 and 461 of the same paper were used by the writer to verify the calculation of co-ordinates listed in Royal Society 1800 page 635 and Art XXV (and used in table 3 below).

7 Importantly, the plane triangles used to calculate co-ordinates were not on the same plane, but formed the edges of part of an irregular polyhedron having vertices on the spheroid.
As well as for primary stations, tables of co-ordinates were listed for secondary stations such as church spires, windmills, lighthouses and other landmarks (about a thousand in total). Immediately following each table of co-ordinates, the Ordnance provided a table of latitudes and longitudes (as table 2). There was no explanation of the conversion process. As discussed below, this required assumptions (not always stated) as to the lengths of a degree on and perpendicular to the meridian. For calculations of longitude, the difference between lengths of the arcs of the parallel and the great circle appears to have been treated as insignificant. But calculations of latitude needed to be adjusted.

**Latitude adjustment of Ordnance co-ordinates**
The latitude of a point Q on the meridian of the origin O may be calculated by dividing its north co-ordinate OQ by the assumed length of a degree on this meridian (and adding this to the latitude of the origin). However, the latitude L of points P and S, with the same north co-ordinate as Q, but offset from this meridian, is slightly less, as shown in Figure 4.

![Diagram illustrating latitude adjustment of Ordnance co-ordinates](image)

**Conversion of Ordnance co-ordinates to Latitudes and Longitudes**
Crucially, this conversion process required assumptions as to ‘the figure of the earth’. In the early nineteenth century, there was nearly agreement that the shape of the earth could be represented by an oblate spheroid (i.e., a sphere squashed at the poles). However, the dimensions of this figure were still being investigated on the ground and debated in scientific journals.

For the conversion of co-ordinates to latitudes and longitudes, the ‘figure of the earth’ was used as a shorthand for the assumed lengths of a degree on the meridian and perpendicular to it, both figures having regard to latitude.

By making assumptions of the lengths of a degree, on and perpendicular to the meridian, and using a latitude adjustment as outlined above, a process for

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8 For an arc of one degree at 60 deg N, arc parallel/arc great circle = 2*arcsin(x/r)/arcsin(2x/r) and the difference between this arc on the great circle and on the parallel is 0.14 seconds.
converting co-ordinates into latitudes and longitudes may be re-constructed. Table 3 applies this to data published in 1800 for stations related to the meridian of St Agnes Beacon. This example was chosen because, in this case, the figures assumed for fathoms (of six feet) per degree were made clear by the Ordnance.

Table 3: Calculation of Latitudes and Longitudes from St Agnes Beacon

Col. C shows Ordnance co-ordinates on the meridian (‘N’) and perpendicular to it (‘E’). Col. D takes the Ordnance latitude and longitude of the origin from the table heading. Col. E converts col. C from feet into angular distances, using the conversion factors (fathoms/degree) shown in the heading. Radians on the meridian convert directly, and radians perpendicular to the meridian are scaled by the cosine of the adjusted latitude. Cols. F and G show latitudes and longitudes calculated as the sum of cols D and E. Col. H calculates the latitude adjustment, from the formula derived above, using latitude L from col. F, distance x from col. C, radius r from fathoms/degree on the perpendicular. In cols. J and K, latitudes shown in cols. F and G are adjusted by deducting col. H. Col. L shows latitudes and longitudes calculated and reported by the Ordnance.

After (and only after) making the latitude adjustment, the calculations shown in table 3 demonstrate a good match with the Ordnance results. With a very few exceptions, similar matches were achieved for stations measured from the meridians of Butterton Hill, Black Down, Dunnose and Greenwich, as reported in and before 1800. This suggests that the Ordnance process for converting co-ordinates into latitudes and longitudes made use of this or a similar latitude adjustment9 (and also disregarded the small difference between calculations made on a sphere or a spheroid).

9 In contemporary papers, this seems to be discussed only once, at Royal Society 1795, 520.
However, analysis of latitudes and longitudes published in 1811\(^{10}\) seems to reveal inconsistent assumptions. In that lengthy report, the assumed conversion factor adopted for fathoms to degrees on the meridian is not stated, although its preface refers to the factor of 60823 fathoms/degree calculated in 1803 between Dunnose and Burleigh Moor. As calculations (shown in table 4) based on 60823 fathoms per degree do not provide a very good match, these were repeated using the Admiralty convention of 6080 feet per nautical mile (60800 fathoms per degree). For stations measured from the meridian of Delamere this (in table 4) provides a remarkably good match. Moreover, this conversion factor of 60800 was found also to provide good matches for stations measured in 1811 from the meridians of Burleigh Moor, Clifton Beacon and Moel Rhyddlad.

<table>
<thead>
<tr>
<th>Meridian of Delamere Forest</th>
<th>deg min secs</th>
<th>radians</th>
<th>fathoms per degree</th>
</tr>
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<tbody>
<tr>
<td>Delamere Latitude N</td>
<td>53 13 20.8</td>
<td>0.9289</td>
<td>perpendicular to</td>
</tr>
<tr>
<td>Delamere Longitude E</td>
<td>-240 -30.8</td>
<td>-0.0467</td>
<td>the meridian = 6 1182</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Co-ordinates</th>
<th>Common Data</th>
<th>Calculated Latitude&amp; Longitude including latitude adjustment</th>
<th>L&amp;L reported</th>
<th>Calculated Latitude&amp; Longitude including latitude adjustment</th>
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<tr>
<td>1811 vol III</td>
<td>1103315</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pp 374-381</td>
<td>-108882</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>feet</td>
<td>radians</td>
<td>deduc secs lat</td>
<td>radians</td>
<td>calc'd deg min secs</td>
</tr>
<tr>
<td>East Lomond</td>
<td>'N'</td>
<td>9.289</td>
<td>4.1</td>
<td>0.0528</td>
</tr>
<tr>
<td>(Firth of Forth)</td>
<td>'E'</td>
<td>-0.0467</td>
<td></td>
<td>-0.0093</td>
</tr>
<tr>
<td>The Chevrot</td>
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<td>4.3</td>
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<tr>
<td></td>
<td>'E'</td>
<td>-0.0467</td>
<td></td>
<td>-0.0094</td>
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<td>'N'</td>
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<td>9.6</td>
<td>0.0056</td>
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<td></td>
<td>'E'</td>
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<td>Flatholme</td>
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<tr>
<td></td>
<td>'E'</td>
<td>-0.0467</td>
<td></td>
<td>-0.0075</td>
</tr>
</tbody>
</table>

### Table 4: Calculation of Latitudes and Longitudes from Delamere Forest

**Why in 1811 was a shorter degree adopted in the north than in the south?**

So why was it that the tables of latitudes and longitudes published for the Ordnance were in 1811 based on lengths of a degree on the meridian that were assumed to be less where measured from origins in the north than where measured from origins in the south?

Given the general agreement between geodesists of different countries, and even between the Admiralty and the Ordnance, that the figure of the earth approximated to an oblate spheroid, the length of a degree in feet was expected to increase from the equator to the pole. Indeed, the Ordnance made its calculations from origins in southern England using lengths of a degree on the meridian calculated on this basis.\(^{11}\)

\(^{10}\) An Alphabetical List of the Latitudes and Longitudes of the principal stations, together with several Church Steeples, Lighthouses, and other remarkable objects, 374-382, vol III, Wm Faden, 1811.

\(^{11}\) Royal Soc 1795, 537: 60851 fathoms at latitude 50’ 41’, 60859 at 51’ 5’ and 60868 at 51’ 28’ 40’.
Thus it was surprising that Major William Mudge, as he then was, had the confidence in 1803, having deduced that the length of a degree on the meridian was greater between Dunnose and Arbury Hill than it was on the more northerly arc between Arbury Hill and Clifton Beacon, to declare himself ‘perfectly convinced of the general accuracy of the whole’. He had perhaps been carried away by the potential of Ramsden’s zenith sector, rebuilt in 1801, to improve the accuracy of stellar observations, and thereby the measurement of degrees.

However, Mudge’s findings were inconsistent with the figure of the earth well documented by French geodesists and were fiercely criticised in a paper by Don Rodriguez, a Spaniard of their school, published by the Royal Society in 1812. Although these criticisms were soon disputed, it was also soon accepted that Mudge’s stellar observations had been distorted by the effect on the sector’s plumb bob of underlying differences in the density of the earth.

Rob Wheeler’s article makes the significant point that the desire of the Royal Society to determine more accurately the shape of the earth infused the early operations of the trigonometrical survey. He suggests that Mudge perhaps hid his assumptions to avoid the ire of Fellows who held divergent views about the shape of the earth. In 1803, hastening to improve on the work of the French geodesists, Mudge may have failed to seek a second opinion on his own work.

By 1811 Mudge was probably nervous of the storm Don Rodriguez was about to unloose. The perfectionist Thomas Colby had largely taken charge of day to day operations, and it is not impossible that the Ordnance computers, originally trained by Isaac Dalby and impatient of waiting for Colby’s instructions, pressed ahead by adopting the familiar figure of 6080 feet per minute of latitude.

Mudge and Colby must have been mortified by the Royal Society’s willingness to publish the challenge to their cherished trigonometrical survey. The atmosphere could hardly have been improved by the Society’s appointment in 1816 of Captain Henry Kater FRS to conduct gravitational experiments over the length of the Ordnance arc, or by Kater’s constructive criticism of their assumed lengths of degrees of latitude. Apparently no-one suspected that ten years later the Ordnance would also have to reconsider the lengths of degrees of longitude.

Nevertheless, the three volume Account of the Trigonometrical Survey completed in 1811 was very open and informative, and it published useful latitudes and longitudes for perhaps a thousand stations over most of England and Wales and southern Scotland. Although Colby was unwilling until 1846 to

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12 Royal Soc 1803, 488-89: mid-point figures of 60864 fathoms at 51˚ 35' 18.2" (Dunnose to Arbury Hill) and 60766 fathoms at mid-point 52˚ 50' 29.8"(Arbury Hill to Clifton Beacon).
show latitudes and longitudes on Ordnance maps (and at first only on six inch maps), they were readily adopted by other topographical surveyors and by hydrographers.

**Topographical Surveys**

For the county mapmakers of the early nineteenth century, capable in topographical survey but only in local triangulation, even a few Ordnance positions must have been invaluable in providing reliable baselines. Christopher Greenwood lost no time in taking advantage of the Ordnance figures. Of his numerous maps in the British Library catalogue, that of the county of Yorkshire in 1817 was said to be ‘made on the basis of triangles in the county determined by Lt. Col. W Mudge and Capt. Thos. Colby’.

Greenwood’s county maps in the National Archives (only two of them) show marginal latitude and longitude graticules. The absence of topographical detail

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18 Maps in 3 sheets of the County Palatine of Lancaster, taken from a survey made by C Greenwood, Wakefield. Scale: 1 inch to 1 mile, The National Archives (TNA), MR 1/972, 1818; County of Southampton: map from an actual survey made in 1825 and 1826 by C and J Greenwood and NL Kentish, TNA, F 25/3, 1826.
for the Wirral, on the map of Lancashire, reveals three Ordnance stations from the list published in 1811 (Leasowes LH, Bidston LH and Bebington Spire), at the corresponding latitudes and longitudes (figure 5).

In Scotland, where the Ordnance list of latitudes of longitudes extended only slightly north of the Firth of Forth, county maps of southern Scotland by Greenwood and colleagues were ‘made on the basis of the Trigonometrical Survey of Scotland’. These maps also show marginal latitude and longitude graticules, and several trigonometrical stations on each sheet are shown at the positions tabulated by the Ordnance in 1811. In Berwickshire, Dulau Signal Staff and Lumsdane Hill stations are marked with the appropriate symbol (figure 6).

**Hydrographic Surveys**

As Admiralty charts normally adopted the Mercator projection, the Ordnance from 1795 onwards calculated and reported latitudes and longitudes intended for the Admiralty, and this information was used to update Admiralty charts for much of the south coast. 20

The Ordnance papers completed by William Faden in 1811 were known by working hydrographers as ‘the three volumes’, and were drawn upon by them in a variety of ways. For example, as early as 1813, George Thomas pinpointed fourteen of the secondary stations listed in 1811 on his chart of the Mersey. 21 By observing two angles between these stations from his brig using a sextant, he could plot his position at sea using a ‘station pointer’, as illustrated in figure 7.

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20 David L Walker and Adrian Webb, ‘Some collaboration between the Ordnance Survey and the Hydrographic Office in the Nineteenth Century’, *Sheetlines* 102, 7.

21 George Thomas, Master RN, *Survey of the Harbour of Liverpool*, UKHO, 684a Dg, 1815.
Lt EJ Johnson in 1817 used Ordnance co-ordinates listed in 1811 to define the baseline for his freelance survey of the Farne Islands, as in figure 8. In 1824 Thomas made an impressive survey of the Gabbard shoals (off Suffolk) which he positioned by reference to the latitude and longitude of Orford Church as published in the Royal Society paper of 1803.

In 1828 Lt Michael Slater was despatched by the Admiralty to the Northumberland coast. Like George Thomas, he was an accomplished surveyor who occasionally corrected the Ordnance, and liked to make his own triangulation of coastal stations between two positions provided by the Ordnance. Slightly grudgingly, he wrote that most of the definite objects used by them have long since been removed. I have however assumed their distance between Beadnel Spire and Sunderland Mill, as deduced from two sides and the included angle, as a scale for my triangulation, deeming such to be, although only intersections, much more accurate than any baseline which I could measure with my present means …

Nevertheless, Slater enjoyed a productive relationship with officers of the Ordnance that saw the survey of the east coast of Scotland almost completed in the 1830s. Over the same period, triangles extended by the Ordnance from its initial triangulation provided baselines for Admiralty surveys of Orkney and Shetland and from the Solway to the Clyde.

**New assumptions for the figure of the earth**

Very significantly, Lt Hastings Murphy of the Ordnance in 1830 provided the Admiralty Hydrographer with corrected positions for five stations on the Northumberland coast and three stations near the Scottish border. The latter differed by about 10 seconds (south) in latitude and nearly 30 seconds (west) in

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22 Lt EJ Johnson, *Chart of the coast of Northumberland [etc] and Farn Islands*, UKHO, E268 Df, 1819.
23 Mr George Thomas RN, *A survey of part of the coast of Suffolk [and Gabbard shoals]*, UK Hydrographic Office (UKHO), MP 98, 1824; Royal Society 1803, 506.
24 David L Walker and Adrian Webb, ‘Some collaboration [etc]’, *Sheetlines* 102, 11-14.
25 Lt Hastings Murphy RE, UKHO, MP 98, 16 Jan 1830 & 2 April 1830.
longitude from those listed in 1811. It seems that these arose not from new surveys, but from a correction of Mudge’s over-estimate of the length of a degree perpendicular to the meridian that is identified in the ‘official’ history. It is at first unclear whether Murphy’s revised assumptions for the lengths of degrees on and perpendicular to the meridian came from the appendix to William Lambton’s paper published in 1818 or advice from Professor Airy in advance of the paper he published later in 1830. This is clarified by a contemporary letter from Murphy apologising for an error in positions on the Lincolnshire coast he correctly computed from the local meridian ‘on the spheroid of Lambton & Delambre’ but displaced by an error in the position of Clifton Beacon.

Lambton’s figure of the earth, apparently ignored for years, was easy for others to use as he tabulated his conclusions as lengths of degrees calculated on and perpendicular to the meridian at three-degree intervals of latitude. It was also adopted by Lt Denham RN in April 1830 in making a comparison for four stations in Pembrokeshire between latitudes and longitudes published in 1811 and figures ‘as recomputed on the spheroid of Delambre & Lambton’. In 1834 Murphy provided corrected positions for additional stations in eastern Scotland. Figure 9 shows how these latitudes and longitudes, recalculated by Murphy from the initial triangulation, are impressively close (for the only two stations in both surveys) to those reported in the twentieth century retriangulation. At Kellie Law both differences are less than one second and at Brimmond less than two seconds.

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28 GB Airy, *The Figure of the Earth*, Encyclopaedia Metropolitana, 1830, reprinted in vol V, 165-239, 1848.
29 Lt Hastings Murphy RE to Capt Francis Beaufort RN, UKHO, LP1857 M, 557, 4 Jan 1830.
30 Lt HW Denham RN, *Differences in Longitudes, Caernarvon Bay*, UKHO, MP 98, 3 April 1830.
31 Lt MA Slater RN to Capt Beaufort RN, *Latitudes & longitudes from Lt Murphy*, UKHO, SL 6a, 6 Dec 1834.
The need for latitude corrections is understandable by reference to the problems arising from the measurement of the arc between Dunnose and Clifton Beacon. The longitude corrections, which were actually greater, appear to correct Mudge’s over-estimate, mentioned above, of the length of a degree perpendicular to the meridian.

Murphy’s letter of 4 January 1830 implies that Captain Alexander Robe was at least aware of his use of Lambton’s figure of the earth to correct latitudes and longitudes supplied to the Admiralty. However, the corrected latitudes and longitudes (including figures not reported here) that he and others supplied to the Admiralty from 1834 onwards appear to be based on Airy’s figure of the earth.

**Conclusions**

This article illustrates the method used by the Ordnance to calculate the co-ordinates of stations observed in its initial triangulation of Great Britain. The illustration remedies the over-simplified statement in the ‘official’ history that computations were made ‘on the assumption that the Earth’s surface was plane’.33 Worked examples of a ‘latitude adjustment’ reconstruct a feasible process for the conversion of these co-ordinates into latitudes and longitudes.34

A reminder is included that, although the initial Ordnance triangulation provided a useful basis for the mapping of England and Wales, it was less successful in measuring the shape of the earth. This perhaps explains why the Ordnance for decades lost its confidence in geodesy, failed to engage in outside discussion and delayed the disclosure of its work.

Although the comprehensive tables of latitudes and longitudes provided in its published papers were not used by the Ordnance itself, these were seized upon by some independent mapmakers. The provision of corrected figures to the Admiralty Hydrographer unexpectedly reveals the unofficial adoption of Lambton’s figure of the earth in 1830. Further advice from the Ordnance, based on extensions of the initial triangulation and apparently using Airy’s figure of the earth, provided a sound basis for the hydrographic survey of the Scottish coast.

A comparison of latitudes and longitudes supplied by the Ordnance in the 1830s with the 20th century re-triangulation suggests that the initial triangulation may be regarded as vindicated by its projection on Airy’s figure of the earth.

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34 Although this conversion process does not appear to be explained in the Royal Society papers, or Faden 1811, AR Clarke’s method for converting rectangular spheroidal co-ordinates to latitude and longitude is explained in AJ Wolff, *Mathematical Basis of the Ordnance Maps of the United Kingdom*, Southampton, 1919, 11-12. As a first approximation ‘which generally suffices’ this results in the same latitude adjustment as that derived above.
Acknowledgements
The writer is most grateful for constructive criticism and encouragement from Rob Wheeler and also, over the years, for sound advice and ready support from Adrian Webb of the UK Hydrographic Office and Chris Fleet of the National Library of Scotland.

Appendix
The following papers published on behalf of the Ordnance are referred to above by the years of publication. The Royal Society papers can be down-loaded from its website and were reprinted (with different pagination) by Faden as vol. I (in 1799) and vol. II (in 1801) of An account of the Trigonometrical Survey etc.

Lt Col Edward Williams, Capt William Mudge of the Royal Artillery and Mr Isaac Dalby, An Account of the Trigonometrical Survey carried on in the years 1791, 1792, 1793, and 1794, by Order of His Grace the Duke of Richmond, Late Master General of the Ordnance. Phil. Trans. Roy. Soc. Lond., vol 85, 414-591, 1795.

Col Edward Williams, Capt William Mudge and Mr Isaac Dalby, An Account of the Trigonometrical Survey carried on in the years 1795 and 1796 etc, Phil. Trans. Roy. Soc. Lond., vol 87, 432 -541, 1797.

Capt William Mudge, of the Royal Artillery, An Account of the Trigonometrical Survey carried on in the years 1797, 1798, and 1799 etc, Phil. Trans. Roy. Soc. Lond., vol 90, 539-728, 1800.

Major William Mudge, of the Royal Artillery, FRS., An account of the measurement of an arc of the Meridian, extending from Dunnose, in the Isle of Wight, latitude 50° 37' 8", to Clifton, in Yorkshire, latitude 53° 27' 31" in the course of the operations carried on for the trigonometrical survey of England, in the years 1800, 1801, and 1802, Phil. Trans. Roy. Soc. Lond., vol 93, 383-508, 1803.

Lt Col William Mudge RA., FRS and Capt Thomas Colby RE, Account of the Trigonometrical Survey etc carried on in the years 1800 [to] 1809, Vol.III, sold by W Faden, Geographer to His Majesty, 1811. This can be found in a Google search.
The mountains of the Fisherfield Forest
Peter Haigh

Sheetlines 116 included a report of the Society's visit to the Glasgow University map library. One of the items displayed in the library was a map of Beinn a’ Chlaidheimh, and its survey was discussed. This hill forms but a small part of the area, and this article considers the hill and the surrounding district more fully, correcting some information previously given.

The Fisherfield Forest lies in Wester Ross. At its heart is the mountain A’ Mhaighdean, The Maiden, which is generally acknowledged as the most remote mountain in Scotland, that is, the most distant from any public road. This mountain is, as the eagle flies, more than nine miles distant from Kinlochewe, Poolewe and Dundonnell. Access to this area, not least by the surveyors in the nineteenth century but leading on to later times, seems, to this author, to necessarily be part of the whole story.

The majority of this Forest is in the lands of the Letterewe Estate. This is part of the traditional homeland of Clan Mackenzie. It was sold to a Lancashire industrialist, the coal magnate Meyrick Bankes, in 1837. In these land-based travel times, we forget that in 1837, before there was any through railway connection to Scotland, access by one’s own boat from Lancashire to Gairloch or Loch Ewe would be little more difficult than access by that same boat, to Glasgow. Regular visits by the family seem to have been made and some of his children were baptised there. In 1878 Maria Ann Liot, his daughter, became the proprietrix.

It is recorded in the margin of the earlier Ordnance maps, that this area, Sheet 92, Inverbroom, was ‘Surveyed in 1874 and Published … 1881’. The surveyors therefore visited this area and these mountains during the ownership of the Bankes family.

The fact that no fewer than four mountains had their height incorrectly recorded and that even the 250 foot spaced contours near these summits are now known to be incorrect inevitably leads to the presumption that these summits never emerged from the cloud whilst the surveyors were in the area. Given the high standards they achieved in the rest of Scotland, one is also inclined to presume that these same surveyors must have been harried out of the area by a protective landowner. Perhaps they tarried too close to the stalking season. The surprise is, given the possessiveness of many Scottish landowners during the Victorian era, that this did not apparently happen, certainly to this extent, in any other location.

On the completion of the survey and publication of the OS maps for Scotland, Hugh Munro prepared his Tables giving all the Scottish Mountains exceeding 3000 feet in height and this was published by the Scottish Mountaineering Club in their Journal in 1891. Much of the information came from those OS maps but Munro had a wide correspondence of friends who were able to supplement this information with their own aneroid height readings. In all the 555 mountains listed in the tables, the most serious discrepancy between Munro’s height and that found on the OS mapping is that of A’ Mhaighdean. Munro records ‘over 3100 ft’
whilst the mapping only showed a 2750 ft contour. The mountaineers must themselves have had to escape the clutches of a potentially irate landowner (or more likely his keepers) but at least there is a spot height for a loch within three miles of this otherwise remote summit, that would have enabled them to calibrate their aneroids.

There is a further anomaly regarding the hill Beinn Tarsuinn, some four kilometres south east of A’ Mhaighdean. This was ‘discovered’ by J Gall Inglis, the then editor of *Munro’s Tables*, in 1929. But, as Robin Campbell explains: “Whilst Inglis and the succeeding editors James C. Donaldson and Wilfred L. Coats flirted with the introduction of the Letterewe Munro Beinn Tarsuinn (known as an Ordnance Survey mistake for many years), it wasn’t properly included.”¹ It finally appeared in the 1974 edition of the *Tables* but this was still two years before the 1:50,000 series maps brought the OS position up to date.

The early one-inch mapping had mountain contours at 250 foot intervals but the Popular Edition introduced contours at 50 foot intervals. Between the existing old contours, the additional ones seem to have been inserted by interpolation. But on summits without a spot height, how was it decided how many new contour lines to include? As there is little evidence of any surveyors visiting the Fisherfield Forest in the 1920s it is hard not to conclude that much was done by guesswork; and that the larger the area covered by say, the 2750 contour, the more contours above that height would be inserted.

Hugh Munro’s revised estimate of A’ Mhaighdean’s height was in the public domain from 1891. That for Beinn Tarsuinn, even accepting that it was just as a footnote, likewise from 1953. It still puzzles me why the Survey failed to revise any heights in this area for much more than half a century on the one-inch mapping. Only with the introduction of the 1:50,000 series, in 1976, do their maps reflect well known information. And later still do more spot heights become available.

Some friends of mine were visiting this area in 1963, during Colonel Whitbread’s ownership. All the owners of the estate, including the Bankes, Col. Whitbread and the subsequent owners, by limiting access, and in particular vehicle access (including vehicle access by the estate itself) have managed to preserve this ground as one of the finest wilderness areas in Britain. But that does not make surveying easy. Also in 1963 the Survey were there and taking the opportunity of the good weather to do revision by helicopter. I was told that the surveyors were doing things like “Deleting a lochan from one corrie where there was none and then drawing it in for the corrie next door, where it should have been”. Apparently further evidence of the surveyors on the original survey being hounded out of the area before their work was complete. Hopefully the contouring of all the summits currently under discussion was subsequently done for the metric maps from stereo photographs.

Stereo photography and photogrammetry resulted in the revision of the height of Beinn a’ Chlaidheimh between the maps of 1976 and those of 2002, and therefore a change of status in *Munro’s Tables*. In my review of *Scaling the Heights*² I told of the interest of many people in re-examining the precise height of mountains known to be close to 3000 feet. Subsequently Beinn a’ Chlaidheimh was one of the hills chosen for the heighting by the team using GPS equipment. This resulted in an agreed height of 914.1 metres (2,999 feet) and thus a second change of status. This last change has not yet been reflected in the published mapping but the history of the other mountains in the area is detailed in the table below.

<table>
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<th>Mountain</th>
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<td>Beinn a’ Chlaidheimh</td>
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</table>

² *Sheetlines* 114, 59
**Colonel AD Yudin and others – the personalities behind Soviet military city plans**

Dave Watt

In the early days of the Ordnance Survey the familiar names of Benjamin Baker & Assistants and Ebenezer Bourne appear in the margins of many of the Old Series sheets. Real people directly responsible for specific work.

By the twentieth century this naming had gone, save for that of whichever Director General was in charge at the time. As to who wielded the tools on the bench, no mention unless they signed or initialled their work, overtly as with the artwork of Palmer and Ellis Martin etc, or covertly such as ‘Trev’ or ‘Bill’ in the chalk cliffs of the Isle of Wight.\(^1\)

In the Soviet Union accountability survived into the 1980s but my initial discovery of this only surfaced after my wife suggested I list my collection, starting with the stuff she couldn’t read, to understand what was “in that map press in your study”. These included the Soviet city plans.

My cataloguing criteria did not conform to any standard, but I quickly decided on a column of ‘Other notes’, derived from my shaky transliteration of the marginalia and on some of the plans this included personal names.

Davies and Kent in their standard reference ‘The Red Atlas’\(^2\) have covered this personal aspect of the City Plans, and not only by investigating the British examples, and as I ploughed on familiar names appeared regularly, the aforementioned Col Yudin but others as well (see spreadsheet below). Some were the ‘Kommander chast”, the Commanders of the various un-named Units of the Military Topographic Directorate which made the maps. Others were the actual compilers and editors of the maps, the people on the bench. These particularly interested me as you can only make a good map of a place if you understand its topography, culture and people through study of maps and any other sources. Here we had named citizens who were doing just that but moreover, unlike their western counterparts, they could never hope to visit the places they were mapping, so had no ‘prior knowledge’ bias, sometimes with unexpected results. The Unit Commanders meanwhile would presumably take the rap for mistakes so had to be able to recognize an error. So they needed this knowledge too.

Could anything be found out about these people?

Generally, analysis of the gender of surnames revealed the Unit commanders were all male. However, within the compilers and editors one characteristic was quickly apparent. Almost invariably the compilers, who actually wielded pen and ink were women, identified by the ‘a’ ending of their surnames. The only ‘a’ editor had worked on the plan of Belfast, so, except for her, they were all male

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too. This confirmed the typically Russian direct and non-PC explanation I’d been told elsewhere. Women have better colour vision, steadier hands, cost less, are less likely to hit the vodka or answer back so they draw better and work faster. Men are the opposites of all the above and in any event are, of course, naturally in charge.

But what of specifics? Having compiled a list of who’d done what, it was time to call in the brains – Dr John Cruickshank – to see if he could shed any light. Had he seen any biographies, obituaries or service records of any of these people? Unfortunately, both his documentary sources, *Military topographers of the Red Army*³ and *Book of memory*⁴ failed to yield results.

And so I’ve hit a frustrating dead-end especially as my language skills don’t extent to trawling Russian Google or eBay, but if any keen Russian speaker would like to take up the challenge, it would put faces to names and hence faces to maps.

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⁴ Moscow: Veterans Council of the Military Topographic Directorate of the General Staff, 2010(?).
City plans produced and published by the Military Topographic Directorate of General Staff of the Soviet Union

Unit Commander and Sheet | Notes
--- | ---
**Colonel I.I.Shalman**  
Beaufort  
Blyth  
Bristol  
Cardiff  
Coventry  
Great Yarmouth  
Leeds  
Luton  
**Compiled in 1970. Printed Nov 71, Saratov**  
**Compiled in 1970. Printed Aug 71, Saratov**  
**Compiled in 1971. Printed Nov 72, Leningrad**  
**Compiled in 1971. Printed Mar 72, Leningrad**  
**Compiled in 1970. Printed Jan 72, Saratov**  
**Compiled in 1971. Printed Sep 72, Leningrad**  
**Compiled in 1971. Printed Sep 73, Leningrad**

**Colonel E.S.Burmistrov**  
Birmingham, Wolverhampton, Walsall, Dudley, West Bromwich and Solihull  
**Compiled in 1975. Printed Jul 77, Leningrad**

**Colonel V.N.Golikov**  
Barrow  
Blackburn  
Leicester  
Manchester, Bolton, Stockport and Oldham  
**Compiled in 1972. Printed May 74, Leningrad**  
**Compiled in 1972. Printed Nov 75, Leningrad**

**Colonel A.D.Yudin**  
Blackpool, Cleveleys, Thornton, Poulton-le-Fylde  
Burnley and Padiham  
Cambridge  
Colchester  
Darlington  
Doncaster  
Dover  
Gainsborough  
Halifax, Sowerby Bridge  
Harblepool  
Hastings  
Northampton  
Nottingham  
Reading  
Rhondda  
**Compiled in 1974. Printed Jul 76, Saratov**  
**Compiled in 1972. Printed May 74, Leningrad**  
**Compiled in 1974. Printed Jul 76, Leningrad**  
**Compiled in 1972. Printed Feb 74, Saratov**  
**Compiled in 1973. Printed Nov 75, Dunaev**  
**Compiled in 1973. Printed Nov 75, Saratov**  
**Compiled in 1974. Printed Jun 78, Leningrad**  
**Compiled in 1974. Printed May 76, Dunaev**  
**Compiled in 1972. Printed Feb 79, Sverdlovsk**  
**Compiled in 1973. Printed Jul 75, Saratov**  
**Compiled in 1973. Printed Dec 75, Saratov**  
**Compiled in 1975 from materials dated 1974. Printed Mar 78, Tbilisi**  
**Compiled in 1975. Printed Apr 77, Dunaev**

**Colonel V.M.Kosyagin**  
Greenock  
Newcastle-upon-Tyne, Gateshead, South Shields, Tynemouth  
Oxford  
Preston  
Sunderland  
Swansea  
**Compiled in 1977. Printed Jun 79, Sverdlovsk**

**Colonel L.M.Balogh**  
Portland and Weymouth  
**Compiled in 1970. Printed Aug 72, Dunaev**

**Others**

**Plan of city of Belfast**  

**Plan of city of Crewe**  

**Plan of city of Harwich**  

**Plan of city of Kilmarnock**  

**Plan of city of Pembroke**  

**Plan of city of Wolverhampton**  

Note: the other 50 or so Soviet plans of UK and Irish cities do not include the names of personnel involved.
The Ordnance Survey and the mapping of tram routes

John Ambler

As a railway enthusiast and informal student of railway history, as well as a mapaholic, I was interested to read Richard Oliver's preliminary observations on tramways.\(^1\) As alluded to by Richard, there is potentially much confusion generated by the lack of standardisation in nomenclature and duplication, the same terminology (tramway) being used for different types of system. For myself I try to simplify things by using the generic term *railway* to refer to any system where a vehicle is guided on a low friction solid surface, guided and restrained from straying off the track or rail by some form of flange. Historically rails were L-shaped and made from wood with plain unflanged wheels, the flanges in this instance being the upstands of the rails which were generally on the outside edges of the track. As loads increased in weight, wear and tear increased, and so more durable materials were used, cast iron replacing wood, wrought iron replacing cast and ultimately steel being the material of choice. On Dartmoor a system employing granite ‘rails’ carried granite from Hay Tor quarries to the Stover Canal, and many of these can still be seen on the moor. Eventually the rail format was changed to an edge rail system with the guiding flanges being on the wheels as we see in modern railway vehicles. The advantage was reduced friction and rails which could be made stronger and longer.

Prior to the opening of the first passenger carrying railways all railways were of an industrial nature and carried freight exclusively. Many of the early railways in the eighteenth century served the canal system, short feeder railways carrying materials from the likes of mines, ironworks and other manufactories to canal wharves for onward, long distance transportation by boat. Motive power was by gravity, human, horse or rope/cable initially and locomotives began to be introduced in the early nineteenth century. I think of these systems as industrial tramways or mineral railways, though there was a wide range of other terms, sometimes regionally based, in use to describe essentially the same thing. Terms include waggonway, wagonway, dramway, plateway, and wainway.

The evolution of industrial tramways ultimately led to what Richard refers to as ‘heavy rail’ or in my terminology main line public railways which were classified as common carriers and transported both freight and passengers over long distances. Both industrial tramways and the main line railways operated with different track gauges to further confuse the issue. There can be no doubt for example that the Lynton and Barnstaple Railway with its narrow track gauge of just under two feet should be classified with the main line railways – it was simply a narrow gauge main line railway in my eyes. Similarly the standard gauge (4 feet 8½ inches) Bowes Railway in Durham was exclusively a coal carrying mineral railway with connections to the main line railway network; it was a feeder for the main line system just as the early wagonways fed into the canal system.

\(^1\) *Sheetlines* 116, 5.
Now the nomenclature becomes even more confused. Some street tramways were referred to as railways (see the example below) and some proper railways were referred to as tramways. The Selsey Tram is an example of the latter. The promoters of the Selsey Tramway originally planned their line as a multi-purpose public light railway; however finances were tight. As the 1896 Light Railways Act was not yet in place, the promoters saw an opportunity and set up the company in April 1896 as The Hundred of Manhood and Selsey Tramways Company and obtained permission to open their line as a tramway under the Railway Construction Facilities Act of 1864. This allowed the line to be constructed and operated to lower standards which were cheaper and less restrictive to implement than those required for a normal main line railway, which also needed a costly full Act of Parliament. As the line was wholly within its own reservation, and not running in the streets, the wheels and other moving parts of the locomotives did not need to be boxed in as required for street locomotives (and traction engines) to avoid scaring horses. Later when the company was seeking to be taken over by a larger concern and directly linked to the main line railway system, it changed its name to West Sussex Railways. However the cost of upgrading the line to full railway status was seen as prohibitive to prospective purchasers, and the line closed in 1935.

Richard’s suggestion of restricting attention to passenger carrying street tramways, makes the proposed analysis of the depiction of tramways on OS maps significantly simpler than it would be if everything named as a tramway were included. Like the industrial tramways, street tramways also had an evolution in terms of motive power, starting with horse haulage of a single carriage, followed by special steam tram engines hauling one or more passenger carriages and finally settling on the more convenient option of electric traction integrated into the carriage itself which on some urban systems may occasionally have hauled an unpowered trailer.

I offer three case studies to illustrate some of these points. The first was a passenger street tramway which also served in part as an industrial tramway; the second was a light railway by name but was actually an electric street tramway; and the third was also a tramway by name but might be considered to be a hybrid of a light railway and a street tramway which has an interesting history of depiction by OS. Extracts from six-inch and 25-inch plans and Revised New Series one-inch maps are from the National Library of Scotland website. Extracts from Popular Edition and Fifth (Relief) Edition maps are from my personal collection.

**Camborne and Redruth Tramways**
The Camborne and Redruth Tramway was an electric street tramway of 3ft 6in track gauge which was unusual in that it also carried freight in the form of tin ore along part of its length. The tramway was opened for passenger traffic in 1902 and for freight in 1903. The route closed to passenger traffic in 1927 due to competition from bus services, but the carriage of tin ore continued to 1934 when an aerial ropeway replaced the tramway. The main line ran 3.7 miles from Trelowarren Street in Camborne to West End on the western edge of Redruth. The tramway depot was located close to the mid-point of the system in Pool, on
the northern side of the line. The passenger carrying line was wholly on the street, however there were three off-street branches which dealt with mineral traffic. Short trains of mineral wagons were hauled by special electric locomotives from the two very short branches (sidings really) serving East Pool Mine to the south of the main line in Pool and Wheal Agar on the north side almost opposite. Tin ore was hauled from the mines half a mile westwards on the main line to the tramway depot where a longer (half mile) branch left the main line, ran behind the depot, then down the Red River valley to Tolvaddon Stamps where the tin ore was processed. The main line including single and double track sections, passing places and the branches are depicted in full on the 25-inch plan published 1908 (figures 1a and 1b).

Fig 1: OS 25-inch 1908 showing the Camborne and Redruth Tramways branches to East Pool Mine and Wheal Agar

Figure 1b: OS 25-inch 1908 showing the Camborne and Redruth Tramways Depot in Pool and the Tolvaddon Stamps Branch
Depiction on the six-inch map (figures 2a and 2b) also published in 1908 corresponds with Richard’s case studies in that the on-street portions are not shown, but the off-street branches and lines into the tramway depot are shown. The long branch to Tolvaddon Stamps and lines within the depot are depicted as a single line with crossbars and marked as ‘Tramway’. The branch to East Pool Mine is in a cluttered area on the plan, but the line symbol appears to have crossbars. The branch into Wheal Agar is clearly depicted by a single line but with no crossbars (engraving error?).

Figure 2a: OS six-inch 1908 showing the Camborne and Redruth Tramways branches to East Pool Mine and Wheal Agar
Interestingly on the 1938 revision (published in 1945, presumably delayed due to the war), the tramlines into the depot and the branch to Tolvaddon are still shown in full with crossbars, some four years after freight traffic had ceased (figure 3). The branches into East Pool Mine and Wheal Agar also remain depicted, but some details of structures associated with them have been altered suggesting that the rails may still have been in place when the revisors visited. I have not been able to discover when the rails were taken up. On the Revised New Series (Hills Edition) one-inch map published in 1907, the main line of the tramway is indicated by the words ‘Electric Tramway’ printed above the Camborne-Redruth road at Pool, and the Tolvaddon Stamps branch is depicted using the ‘Mineral line and tramway’ symbol of single line with crossbars but the two smaller branches cannot be seen (figure 4). On this map it would be easy to see the tramway as part of the North Crofty Branch of the GWR which reaches the area from the south and is shown using the same symbol, however consultation of the 25-inch plan shows the line to terminate a few yards south of the tramway where it turns north-westwards on its path to Tolvaddon Stamps.
Fig. 3: OS six-inch 1945 showing the Camborne and Redruth Tramways branches to East Pool Mine and Wheal Agar still depicted, four years after the closure of the tramway.

Fig. 4: OS one-inch Revised New Series (Hills Edition) 1907 showing the tramway branch to Tolvaddon Stamps.

I have two copies of OS one-inch Popular Sheet 146 printed in 1921, 1933 and a copy of the Fifth Relief Edition of 1934. The Popular Edition of the map is virtually a coloured version of the Revised New series map with the on-street sections depicted by printing the text *Electric Tramway* beside the route. The mine branch to East Pool Mine was too small to be depicted, the longer branch to Wheal Agar is possibly there, but is not easily seen due to that area of the map being cluttered, being over printed with the name of the locality *Illogan*. 
Highway’. The longer branch to Tolvaddon however is clearly shown adjoining a minor road using the ‘Mineral line and tramway’ symbol. On the Fifth Relief Edition of 1934 there is no Electric Tramway text, reflecting the closure of the line; however both the Wheal Agar Branch and the Tolvaddon stamps branch are depicted using the ‘Mineral Line and tramway’ symbol as on the Popular maps (figure 5). The New Popular Edition published 1946 (Full revision 1931 with later corrections) is virtually identical to the Fifth Relief Edition. Unsurprisingly nothing of the tramway is depicted on the Seventh Series map of 1961 (Fully revised 1958).

Figure 5: OS Fifth Relief Edition 1934 showing the Tolvaddon Stamps and Wheal Agar branches

Camborne and Redruth Tramways, circa 1907 (Geof Sheppard Collection)
**Dearne District Light Railways**

The Dearne District Light Railways (DDLR) system was located in the Dearne Valley coal mining area of what is now South Yorkshire, but at that time was the West Riding. The standard gauge tramway connected Barnsley to Thurnscoe via Wombwell, Wath-upon-Dearne, and Bolton-upon-Dearne (12 miles), with branches from Wath to Manvers Main Colliery (0.7 mile) and to an interchange with the Mexborough and Swinton Tramways system (1907 to 1928 as a tramway) near the Woodman Inn (1.5 miles) at the northern end of Warren Vale, the road linking Swinton to Rawmarsh. Interchange between the two systems was possible, but infrequently practised. A much shorter route from Barnsley to Thurnscoe was already available by motor bus at the time the route was being planned. The tramway was promoted by the local authorities of the towns served by the route. Despite its “light railway” name, this was a classic example of a passenger carrying electric street tramway with only a very short section of reserved track. Its claim to fame, or perhaps notoriety, is that it was the last street tramway of the old era to be opened, and it was also one of the first to be closed. The line was authorised under the Light Railways Act of 1896, the draft Light Railway Order being issued in 1915. Construction was delayed due to the First World War and in the face of so much competition from motor buses it is surprising that the project was progressed after the war. Progress it did however, and the line was eventually opened in July 1924. By 1933, the line which had never been profitable and was a burden on local ratepayers succumbed to motor bus competition and closed.

With such a short lifespan, the DDLR was lucky to be depicted at all on OS mapping; however revisions were carried out at the right time to capture it for posterity. The tramway is depicted in full on the 25-inch plan surveyed in 1928 and published in 1930 (figures 6a, 6b, 6c and 6d). However the six-inch plan surveyed 1928 to 1929 and published in 1932 only depicts the earthworks (cutting) associated with the off-street section of the tramway in Bolton-upon-Dearne, a revision to the originally planned route which was entirely on-street (figure 7). To avoid very tight corners in the heart of Bolton, the tramway was routed through a new cutting which was deeper than the height of the single deck trams. The cutting linked Wath Road with Station Road, crossing Thurnscoe Road on the level in the process. The tramway was still operational when the survey was carried out, so it is a mystery why the off-street tracks were not shown in the same way as on the Camborne system. My copy of the one-inch Popular Edition map of the area, marked as ‘Published 1923 with periodical corrected reprints’ is a 1935 reprint, so postdates the closure of the tramway, of which there is no sign whatsoever. The neighbouring Mexborough and Swinton Tramway is indicated by printing the text ‘Elec Tram’ beside the route along Warren Vale which links Swinton with Rawmarsh, though that had been converted to a trolley bus route in 1928-29. The Barnsley and District Tramways system (1902 to 1930) which is also not depicted on the 1935 reprint of the Popular Edition map almost met the DDLR near the Market Place in Barnsley but there was never an interchange despite both being standard gauge. Perhaps
somebody who has an earlier reprint of the Popular Edition, within the lifetime of these tramways could let me know if anything is depicted (Sheet 37 Barnsley and Sheffield had a major revision in 1920-21 and was reprinted in 1929 and 1931. Sheet 38 Doncaster had a major revision in 1920 and was reprinted in 1929).

Figure 6a: OS 25-inch 1930 showing the DDLR just east of Wath town centre where the branches to Manvers Main Colliery and the Woodman Inn diverge from the main line to Thurnscoe

Figure 6b: OS 25-inch 1930 showing Wath Road cutting in Bolton-upon-Dearne
Figure 6c: OS 25-inch 1930 showing the terminus of the branch at the Woodman Inn. The connection to the Mexborough and Swinton system was rarely used.

Figure 6d: OS 25-inch 1930 showing the DDLR terminus in Barnsley. The DDLR never made a physical connection with Barnsley District Tramways.
The Wantage Tramway

The Wantage Tramway Company opened its two-mile standard gauge line from Wantage Road Station on the GWR to its terminus in the centre of Wantage, to goods and passengers in late 1875 using horses to haul the rolling stock. The line was authorised under the 1870 Tramways Act. The line was constructed parallel to, but not upon the public road except where the road was crossed on the level on what was then the edge of Wantage, near Elm Cottages. Over the final quarter of a mile from Elm Cottages to the passenger terminus, the route was in its own reservation across fields and in 1905 a branch was constructed to a dedicated goods yard also serving a wharf on the Berkshire and Wiltshire Canal. This branch left the main line just after the level crossing and was entirely within its own reservation. Horse power was quickly replaced by steam driven machines of various types, some typical of street tramway systems and some mainstream light railway locomotives with no modifications to conceal the moving parts from horses on the adjacent public road. A steam tramcar was operated for a time followed by an all enclosed steam tram engine hauling unpowered single and double decked tramcars. Compressed air driven trams were tried briefly but they were not a success. The later motive power was provided by secondhand, four-coupled steam locomotives not modified in any way for tramway use. Declining use due to GWR motor bus competition saw the line close to passengers in 1925, although it remained open for goods traffic until the end of 1945.

As might be expected, OS depicted the line in full with passing places on the 25-inch plans of 1878, 1899, 1912 and 1938, the goods-only branch being shown on the later two plans (figures 8a and 8b). Interestingly, the 25-inch plan depicts the tracks within the boundaries of the road even though there is much
photographic evidence to show that the tracks were not embedded into the roadway itself, and sleepers can be seen between the rails in many photographs, though there was no physical barrier between road and rail. The six-inch series has an interesting anomaly. The plan published in 1883 (figure 9a) shows the entire length of the line including the roadside sections in full as a continuous line with crossbars offset to the eastern side of the road – that is, on the road, not beside it. Even the passing places are depicted using the same symbol. On the revision published in 1900 however, the entire map has been redrawn and there is nothing whatsoever depicted of the roadside sections of the tramway (figure 9b). The portions of line in their reserved formations at both ends of the line can be followed as a pair of near parallel lines just like a small road or track, but there is no symbol to indicate any form of railway. The revision published in 1913 however reverts to showing the presence of all sections of the line clearly (figure 9c). Both the reserved sections and the roadside part of the tramway are depicted using the line with crossbars symbol, though passing places are not shown. The 1944 plan is virtually identical to that of 1913 in its depiction of the tramway. On the Revised New Series one-inch ‘Outline’ edition of Sheet 253 published in 1895, only the non-street portions of the line in Wantage and at Wantage Road Station are depicted using the tramway symbol between thin parallel lines delineating the boundaries of its reserved route (figures 10a and 10b). The Revised New Series one-inch ‘Hills’ edition of 1903 is essentially the same as the 1895 map with the exception of the addition of the word ‘Tramway’ above the road at Grove (figure 10c). The Popular Edition Sheet 105 revised in 1913 (my copy is a 1926 reprint) is in colour but essentially identical to its forerunner of 1903 with the off-road sections shown and the word ‘Tramway’ appearing above the road in the same place at Grove. New Popular Sheet 158 published 1947 after the closure of the tramway shows nothing relating to the former tramway.

Figure 8a: OS 25-inch 1878 showing the deviation of the Wantage Tramway from the roadside to its own reservation near Elm Cottages
Figure 8b: OS 25-inch 1912 showing the junction of the goods branch of 1905 at the same point as Figure 8a

Figures 9a, 9b, 9c

9a: OS six-inch 1883 showing the tramway symbol for the track both in its own reservation and running along the east of the road to Wantage Road Station.

9b: OS six-inch 1900 showing the trackbed of the Wantage Tramway running along the edge of High Garden but with no symbol to denote the presence of track. There is also no symbol beside the road.

9c: OS six-inch 1913 with track depicted by the tramway symbol for both the reserved sections and to the east side of the roadway.
Figure 10a: OS one-inch Revised New Series ‘Outline’ edition 1895 showing the tramway symbol for the off-road approach to Wantage Road Station (GWR).

Figure 10b: OS one-inch Revised New Series ‘Outline’ edition 1895 showing the tramway symbol for the off-road section of track from The Elms to the passenger terminus.
Figure 10c: OS Revised New Series one-inch ‘Hills’ edition 1903 showing the absence of a tramway symbol on the road to the station, but with the ‘Tramway’ text beside the road.

Wantage Tramway Company locomotive Number 5 ‘Shannon’ at Didcot Railway Museum (photo: Hugh Llewellyn)
The site of Wyndham Chapel

Helen Livingston and Frank Haskew

During the Middle Ages the Hospital of St Edmund, sometimes known as Wyndham Hospital, stood in the present-day hamlet of Wineham on the old highway known as Wineham Lane, the pre-1974 boundary between East and West Sussex. All traces of the hospital have vanished and even the site where it once stood is something of an enigma, with three possible locations in contention: Abbeylands Farm; about a quarter of a mile north of the River Adur; and near the present Royal Oak.\(^1\) There is some OS map evidence – set out below - and we would very much like fellow members of the CCS to say what they think. We first raised the issue elsewhere\(^2\) although at that time we had only been able to consult photocopies of the relevant map sheets.

The hospital was founded (or maybe re-founded) in about 1252 by St Richard de Wych, Bishop of Chichester, as a home for sick clergy, although as a hospital it would also have given ‘hospitality’ to wayfarers – it would have stood alongside the road. It was one of only two of the twenty-eight known medieval hospitals in Sussex to be under the direct control of the bishop\(^3\), suggesting that in its early days at least it was of some importance. The hospital eventually fell into disrepair and was suppressed in the 1520s by Bishop Sherburne to found the Prebend of Wyndham, a stall in Chichester Cathedral, which still exists. But where exactly was it? Today it is more real in dusty archives than out in the Sussex countryside where, indeed, it is as though it had never been.

Traditionally, the hospital was thought to have been south of the River Adur at the present Abbeylands Farm, the Warden having been known locally as the ‘Abbot’.\(^4\) The OS does not mark any site of antiquity there but, certainly, the hospital held lands there which later belonged to the Prebend. However, an article published by the Sussex Archaeological Society in 1967\(^5\) stresses that the OS did map the hospital site, but does not say where. The author, Margaret Holt, comments that “although the OS marks it in the 1st Ed. Sussex, Sheet 38, all the relevant documents which might have pin-pointed the position were lost during the bombing of Southampton in 1940.” Two questions arise: firstly, is it true that all the information about the site perished in the War? We ask because the hospital is marked on the second edition of the OS map of Monastic Britain (south sheet) published post-War in 1954. Where did the information come from? Secondly, where did the OS mark the hospital? On the Map of Monastic Britain it is placed just to the north of the River Adur, although at a scale of 1:625,000 it is

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2 Helen Livingston, Sussex Past and Present 120, 2010, p.13
3 W. H. Godfrey, Sussex Archaeological Collections 97, 1959, pp. 130 -136
4 James Dalloway and Edmund Cartwright, A History of the western Division of the County of Sussex, 1830; J.H. Cooper, Sussex Archaeological Collections 44, 1900, p.10
5 Margaret Holt, Sussex Notes and Queries vol XVII (3), 1967, pp. 100 - 101
impossible to be absolutely precise as to the exact spot, referenced as lying in square TQ22. This rules out Abbeylands as the site of the hospital buildings, and leaves the two remaining sites, both in square TQ22.

If we consult the 1:10,560 scale map of Sheet 38 in the 1st edition of the County Series, surveyed in 1874-5 and published 1879 (figure 1), nothing pertinent is marked near the Royal Oak. However, the words ‘Site of Wyndham Chapel’ in the Old English lettering depicting a non-Roman site of antiquity are found beside Wineham Lane about a quarter of a mile north of the river. Is this the place where the OS thought the hospital once stood, the inference being that the chapel belonged to St Edmund’s Hospital? Interestingly, it is marked near the former Symonds or Simons Hall (note the name) and is the only site of antiquity marked in Wineham. This seems to be the site mentioned in both the 1967 article and the Victoria County History and that recorded on the Monastic map. But why ‘chapel’ and not ‘hospital’? It seems unlikely that the OS noted the site of an otherwise unrecorded wayside chapel while omitting, if the location was known, the site of a very well documented hospital.

The Old English lettering is written on the east side of Wineham Lane, while what appears to be a small and simple cross, possibly pin-pointing the site, is marked among buildings and trees on enclosed roadside waste on the west side of the lane. In our earlier piece on the subject we did not mention this cross because we were unsure about it on the copy we were then consulting, but can now state that it is stylistically very similar to those shown on the 1:10,560 Sheets 45 and 71 to mark the sites of Holy Trinity Priory in Hastings and both St Giles Church and Grey Friars in Winchelsea. Does this cross mark the supposed site of the chapel or not?

When you turn to the 1:2500 sheet (figure 2), instead of finding greater detail there is no cross to mark the site and the Old English lettering spelling out ‘Site of Wyndham Chapel’ is on the west, rather than the east, side of the lane. Was this merely to improve clarity, since to the west the lettering stands in an empty field but on the east has to be superimposed over a trackway? If so, why is there no cross to mark the site? We wonder if this is a case of ‘minor editing’ and that by the time the 1:2500 map was published some doubt had crept in and the exact location of the chapel was uncertain?

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6 Shown on both the map in the British Library and the map in the National Library of Scotland.
7 British Library.
8 Explained by Richard Oliver in Ordnance Survey Maps: a concise guide for historians, p 38.
This could possibly have been because a medieval hospital chapel, although by definition beside a road, was thought unlikely to have been built on enclosed roadside waste. Thus, all that could be indicated was that it lay at an unspecified point on the west side of the highway, an interpretation that we considered nearly ten years ago when we were unsure about the cross on the 1:10,560 map. We have also consulted the relevant OS surveyors’ drawings and it is not marked. What evidence would the OS surveyors have had before they marked such an antiquity as the site of Wyndham Chapel? With the exception of the Monastic Map it appears that the chapel site is not recorded on any subsequent OS maps. Perhaps this is not surprising as there is nothing to be seen and the spot that appears to be marked by a cross now lies under the tarmac of the front drive of Meadow Cottage. We would welcome members’ thoughts.
This intriguing map, dated 1949, came into my possession some years ago but I carelessly omitted to note its provenance.

Key questions are: what does the map show? what was its core purpose? who commissioned and produced it, and what is its cartographic legacy? I am hoping that Sheetlines readers may be able to offer some answers.

The title Airfield development in the London area is interesting because it introduces the term ‘airfield’ which (in 1949) had only recently been imported by the USAAF and was not in common usage in the UK. Also, the word ‘development’ evokes change as well as implying some historical content. And, in featuring ‘the London area’ the map has the ring of an economic regional study rather than one rigidly defined by a specific administrative area.

As to the map’s shape, its size is about 12.2 by 11.6 inches and it covers territory of about 57 by 53 miles, encompassing the whole of Middlesex (with London), most of Surrey and adjoining parts of Kent, Essex, Herts, Beds, Bucks, Berks and Hants. To avoid cartographic clutter, no landforms, county boundaries or grid lines are shown, nor are any roads or railways depicted. On the plus side, all rivers and large reservoirs are shown (in blue) while built-up areas are ghosted (in pale grey) to provide some topographical structure. The extent of urban development before and after 1909 is differentiated by tone.

A total of 84 airfields appear, differentiated by date of opening and usage: civil airports with scheduled and charter services, Service, manufacturers and private aerodromes and landing grounds. Those which have ever been used for scheduled services are underlined and those still in existence are circled.

The print code evidently indicates a print run of 300 in October 1949; other marginalia reads C.B.H. 17481-Wt27037-Dd.L.677 and 27.8.49/R.D./Aircraft4.

I would be very glad to hear from anyone with any information and I hope to write a fuller account of the map in a future issue of Sheetlines.

Ron Blake
Lows of Britain
Peter Haigh

There have been numerous writings about the highest points, either by country or county or whatever, for Britain. Not least this journal has entered the discussion at various times. Some of us can even remember the metric height of a mountain, as well as its imperial height. When a friend of mine asked “What is the lowest point in Britain?” I was somewhat startled when I realised how little seemed to have been written on this comparable topic.

Another friend, overhearing the question, immediately answered “Westminster” and “Bingo” was my response to that, in that cynical autumn of 2019. However, let us reformulate the question in a more precise form for this august journal.

‘What is the lowest altitude recorded by the Ordnance Survey on any of their printed maps?’

I regret that I do not have sufficient maps, and particularly recent maps, to provide a definitive answer to this question. I can provide some information to get the ball rolling and these details seem to be of sufficient interest to be worth sharing. What follows relates entirely to Great Britain; perhaps others can provide details for the island of Ireland.

In at least two locations, current mapping shows the zero contour line; there are possibly others. These are south of the Lincolnshire village of Wroot and NW of Wisbech, Cambridgeshire. These zero contours appear on Landranger 112, Scunthorpe & Gainsborough, Explorer 280, Isle of Axeholme, and Landranger 131, Boston & Spalding, Explorer 235, Wisbech, respectively. The spot heights in these areas are almost all along the roads, which are themselves embanked above the surrounding fields. I have not yet found any zero or negative spot heights, though there are some in both areas of 1[m].

On the Seventh Series one-inch mapping, the sheets are 103, Doncaster and 124, King’s Lynn. Neither of these gives a zero contour line shown on the later 1:50,000 mapping. There are two spot heights of 1[ft] at TF 383133 and TF 403137. Such earlier one-inch mapping that I have for these areas has no apparent significant differences from the Seventh Series.

By chance, it happens that both these areas are at the intersection of three counties. The commendable NLS website is at its least friendly where three sets of six-inch county sheet-lines are superimposed. I have therefore confined my investigation of earlier larger scale maps for these areas to the 1:25,000 maps of the 1950s. I have found nothing in these online searches to add to my comments of the contemporary one-inch mapping mentioned above.

Two other incidentals can be noted about the area south of Wroot. First it is the site of the 1801 base line measurement at Misterton Carr and secondly, although at such a low altitude, this area is over 40 miles inland from Spurn Point.

Underwater, the situation is rather more complex than might first be imagined. In Loch Morar, the one-inch sheet 35 records sub-marine contours at 100 feet intervals down to a 200 yard length at 1000 [ft]. The later 1:50,000 sheet 40 has contours at 50 metre intervals down to a length of 1.8km at 300 [m] depth.
Therefore, although the 300m depth is slightly shallower, a resurvey has greatly extended the area given as this depth. In both cases, shallower lochs in the adjacent area have the contours below water level at more frequent intervals. For England, the first underwater recording that I have found appeared in the Lake District in 1945. Wast Water not only has 50 foot contours down to 250 [ft] but also a spot height for the surface of the lake, 200 [ft]. This latter vanished with the introduction of the Seventh Series mapping. On the 1:50,000 sheet, contours are at 10 metre intervals down to 70 [m]. (Intriguingly, there are two differences in recording depths in the change from one-inch to 1:50,000 mapping. In Crummock Water, where the surface spot height of 321 [ft] is only present on the earlier one-inch sheets, the depth lines are annotated 21, 71 and 121 [ft]; the 1:50,000 just has lines at 10, 20, etc. metre intervals below the surface. The one-inch provides no depth details in reservoirs such as Haweswater but these are given on the 1:50,000 maps). In contrast to the above, no water depths are found on the 1:25,000 maps of the Lake District.

So my findings to date for Great Britain are at least two areas shown on current mapping with the zero contour line, which is not shown on earlier mapping at these locations and, on the one-inch, a couple of spot heights given as 1 [ft]. Can anybody improve on this?

Zero contour near Wroot, North Lincolnshire (SE 714030)
A trainee’s lot: the OS in the 1950s

Trevor Radway

In early January 1951 I was in my last year at the City of Bath Boys School when the geography master asked me: “Radway, when you leave here in July what are you going to do?” My reply was simple, but negative. “I have no idea, sir.” A few weeks later he told me that the Ordnance Survey was being re-organised and that its Bristol office was going to get more control as a regional headquarters. He thought they might need extra staff. The idea appealed to me as I had always been interested in maps and I wrote to ask for details of employment and an application form. By return came a form and details of various jobs, ranging from office work to surveying. I applied for a job as a Cartographical Draughtsman and Surveyor. My interview at the Regional OS office in Bristol was on 28 February 1951 – my sixteenth birthday, and the interview panel was headed by none other than the regional head, a serving colonel in the Royal Engineers.

Just under six months later, on 1 August, I reported to the Bristol office at 8am: monthly payment meant monthly employment in those days so if the first of the month happened to be a Wednesday then that was when you started. The hours were 8am to 5pm in summer, 8am to 4pm in winter, and 8am to noon on Saturdays, with half an hour for lunch. My salary was £150 … say £3 a week. Or to put it another way, about one shilling an hour – hardly a king’s ransom.

The day duly arrived. I was directed to a large office at the back of the building where I met fellow new employees. We entered a world which is difficult to understand today. The cartographical element of the job included calligraphy and the ability to use a Josef Gillot Crowquill pen. A standard two bladed drawing pen with a straight edge was also employed. For the first three days we spent half our time writing the letters A to L on Whatman Paper or on anodised aluminium plates with an enamel surface. The next three days were devoted to M to Z, with straight lines and later curves as a variation using thick Cerric ink which was more like today’s Dulux paint.

The metal plates were one of the revolutionary ideas arising from the Davidson Committee Report in 1938 (but not introduced until 1944) that all new surveys would be based on the National Grid. To expand the survey it was simple to draw over the machined butt-plated joint on your survey board using the anodised aluminium plate coated with enamel. That meant that if you had a house located right across the edge of a plate you just carried over the detail in a seamless way. As a relief from leaning over a drawing board we would spend an hour in the morning and another in the afternoon being lectured on the OS, its history, and the plans for its future.

The next stage of our training took us to the School of Survey, based in some nissen huts two miles down the road. We were introduced to a heavy 20 metres long Gunters Chain with its brass handles and 100 straight metal links each of 20 decimetres (200 millimetres) joined together with a metal loop at each end. Having undone the leather strap holding the chain together we were then shown how to throw it out for use on the Measured Standard beside the huts. That was the very first thing to be done every day before use. In all my time with the OS I never knew a chain or tape to vary by more than two or three millimetres. The important thing here is that if measuring a line say 500 metres in length you could acquire a compound error of note which would need adjustment.

At this point we were introduced to another member of the team - the Chainman/Labourer, who took instructions about where to lay out the chain and would
then be told about the offsets, which were measured at right angles to the chain. By this means, we produced a basic skeleton. The chain always had to be laid in a dead straight line with the end point marked with chalk or something similar on the ground for the next length starting point. The solid brass handles were used to stand on with your heels when the chain was snaked by the Chainman to get it absolutely straight and on the correct line. How did we know where to measure? The lines had to be close to permanent development such as a wall because the offset lengths could not exceed eight metres. At some stage prior to our involvement the real experts had been around – the Trig Boys! They chose Revision Points (RPs) on a strategic basis and anticipated where we, the Surveyors, needed to measure to get a basic skeleton structure of detail.

These RPs were given National Grid co-ordinates to something like seven figures as a result of the Trigometric Division (Trig boys) chasing lines and levels from places such as Newlyn Datum. The RPs were described and photographed so it was possible to identify exactly where each one was.

The RPs were mainly provided in pairs so you measured between them and dropped pickets, often pipe nails, into the hard surface and at the best location for running another line at right angles to pick up further details. Thus the measured references went right back to the National Grid base - the first time such control had been possible. We had been given an area of land to survey under supervision and a proposed framework for survey lines was agreed to obtain as much detail as possible. The chain was laid out on the line to be followed and correctly aligned. I would then walk the length of the chain taking as many right angle measurements as were needed for accurate entry in my survey book. So, on the ground the best available information was gathered and it was time for plotting the skeleton detail back at the nissen hut.
So, a plan with basic red lines (the chain survey) now appeared on the plate and it was time to fill in the detail at 1:1250 scale, armed with a 20 metre linen tape, a 9H pencil, a brass point also 9H+ and most importantly an optical square - a small instrument with two prisms, one fixed above the other. The idea was that you viewed the detail in the top prism (such as house corner), then you viewed the detail in the bottom prism (a different house corner). When you managed to get the top object of view directly over the top of the lower one, you were on a straight line between the two points. It was simple device that saved miles of walking each week. And gradually the 1:1250 map was appearing before my very eyes in black ink to show my recent work. If ever the red lines were found to be wrong, and it did happen from time to time, then the black Cerric went over the top of the red with some careful erasing.

**The beginning of ‘real work’**

It was now deemed that we had become competent enough to do real work. Much damage was done to Bristol during the war and there were many vacant areas of land in 1951-2, rendering the original 1:2500 surveys out of date. We were told to update them. I was sent to Catbrain Lane to record the fact that a farm had been demolished and a large area of land incorporated into the Filton airfield to provide sufficient take-off and landing space for the Bristol Brabazon airliner. I was lucky enough to be at Catbrain one Sunday to see it take off. I was also asked to update several plans in Bath where the Germans had changed the landscape in April 1942 - including my parents’ house. And so we were now earning our keep for the OS albeit at a pittance subject to only miniscule annual pay rises.

My career was interrupted by national service, but on leaving the Army it was back to the OS – this time in Southampton, from where I was involved in surveys for the 1:2500 revision in the New Forest (during which I recall we had a problem with ponies attacking us).

I will end with a photograph of a group of surveyors (I am on the right) in the New Forest, wearing the latest thing in headgear circa 1956. The board containing the sheet is under the canvas cover. We were using Astrafoil sheets which were not in common use at the time. Some people thought they could have been more stable, but we never experienced a problem apart from when they got wet in the field; and I am pleased to report that this photograph was taken in a pony free zone.

*(Author’s photograph)*
**John Harwood Andrews, 1927-2019**

**Richard Oliver**

It is not often given to a writer to develop the map-history of a country almost from scratch, but that is what John Andrews did. After school in Croydon, graduating from Cambridge, and a short period of teaching, in 1954 he went to Trinity College Dublin as a lecturer in geography. At Cambridge he had combined both geography and history, and was well placed not simply as an historical geographer, but as an historian who could wear his geographical learning lightly. His first essay was a booklet, *Ireland in maps: an introduction*, published in 1961, which accompanied an exhibition at Trinity College. Further essays and articles followed, culminating in two publications: *History in the Ordnance Map* (1974), conveniently timed for the one hundred and fiftieth anniversary of the Ordnance Survey of Ireland, and *A paper landscape: the Ordnance Survey in nineteenth-century Ireland* (1975). The reissue of the latter in 2002 contains an introduction that with characteristic modesty attributes inspiration to RA Skelton and JB Harley, though a close attention to dates suggests that Andrews was a good deal more original than he gives himself credit for.

*History in the Ordnance Map* built on what Harley had achieved a decade earlier in *The historian’s guide to Ordnance Survey maps*, scoring with many more illustrations, and the advantage that survival of pre-publication materials is much better in Ireland than in Britain. *A paper landscape* appeared seemingly fully-formed out of almost nothing. It is certainly true that Andrews was approached by Skelton and Harley as one of the collaborators in the project that eventually emerged in 1980, edited by WA Seymour, as *A history of the Ordnance Survey*, but *A paper landscape* reads as something quite different from any expansion of the three Irish chapters in ‘Seymour’. There is a focus that the apparently more comprehensive volume lacks.

Having shown that there was rather more to Irish Ordnance Survey history than such episodes as the measurement of the Lough Foyle baseline, Andrews turned his attention elsewhere, and indeed published little more on the Survey that covered new ground. However, he wrote two more substantial volumes on Irish mapping. *Plantation acres: an historical study of the Irish land surveyor and his maps* (1985) includes a final chapter ‘Mapping without surveyors’, describing the coming of the Ordnance Survey. In 1997 he published *Shapes of Ireland: maps and their makers 1564-1839*, which was a general history of the topographic mapping of Ireland and, again, with the Ordnance Survey appearing in the final chapters. At the same time he was concerned with the substance of, and reaction to, Brian Friel’s play *Translations* (1981), and what he saw as the play’s misinterpretation (some would say misrepresentation) of the Survey’s place-name collecting in Ireland between 1825 and 1842. Andrews published several pieces on this, but, as a meticulous worker, he found it hard to produce a completely satisfactory rebuttal.

Also from the late 1980s Andrews was concerned with approaches to map history, more particularly the school of theory-based writing espoused by Brian
Harley. A short-term verdict may be that Andrews did not make much headway against the prevailing orthodoxy; a longer-term view is that his much more empirical approach will better stand the test of time.

John Andrews’ last substantial work was *Maps in those days: cartographic methods before 1850* (2009): an elegantly-written 500-page book pithily summarised in its title. It was an apt summing-up of his career.

John Andrews told me, on the last occasion that we met, that he did not enjoy writing – to which a just riposte is that a lot of people have enjoyed reading him, as well as profiting by it. In fact he took huge pains, effectively concealed in his fluid, witty style. He was a man of considerable interests outside cartography, exemplified by his official farewell lecture in Dublin being on – modern jazz. He will be very greatly missed.
Kerry musings
David Archer

Was it in a previous issue of *Sheetlines* that I read of an Ordnance Survey map on waterproof paper being folded into a hat and worn in the rain? Although this was not what the OS intended the use to be, it does show the versatility of OS maps, which offer far more than an image of the landscape on the date of survey or revision.

I assume and generalise to say that the intention of the young Ordnance Survey was that the first states of Old Series sheets were to show where everything was in relation to everything else in order to help one get around. But from the very beginning, other unintended attributes were attached to these maps. Many were considered a status symbol for the owners; they impressed visitors if displayed on a wall or were given as presents. And in the two centuries since, even more uses have been found for OS maps, over and above landscape depiction. So, what other uses have OS maps been put to that were never considered in the early days?

Well, they appear in books, usually as map extracts but occasionally whole maps have been folded and included. The OS has never done much for such projects, except issue a license and maybe charge a fee, with the user doing all the work and being charged for it. Good eh? Map extracts have long been used in examinations, and again could never have been envisaged in 1801. Indeed, map studies, or whatever they are now called, did not exist; the Ordnance Survey has a strong claim to bringing them into existence by producing the studied maps. I wonder whether French schools study IGN maps in the same way? And whilst on the subject of books, I wish that I had kept a record of every time I have read, or been told of, a piece in a novel where someone consulted the ordnance map. Not any old map was consulted, but the ordnance map, which was significant as it gave authority to what was found on it. The OS never set out to have their maps quoted in novels, but they have been. In the same way, OS maps appear frequently in relation to the law. They accompanied requests for acts of parliament; they are used in legal arguments concerning boundaries and footpaths, where again, what is shown is held in high regard by many professional and lay people. Situations not originally envisaged.

Examples abound of OS maps being used to support or even create hobbies or interests. In the last issue of *Sheetlines* Frank Iddiols told us of his interest in the bench marks shown on maps and his search for them. Nobody is going to convince me that this was envisaged by the OS when it was decided to show bench marks. Yes, they might have assumed bench marks would be sought, but not as a hobby. In the same issue Richard Oliver produced a piece on the treatment of ‘trams’ on various map series, an approach which illustrates just how useful OS
maps are for historical research, something not possible when the very first sheets were issued, but eminently possible in increasing degrees as revision after revision and series after series followed.

When preparing a new map specification, has the Ordnance Survey ever taken into account that what is produced will be compared with earlier maps for a whole range of reasons? No. I do not believe they have ever provided detail in order that it can be compared with older maps. If users decide to do so, that is their privilege, and if any detail is now omitted, or given in a more generalised form, tough. But in the eyes of many people older states of OS maps do not automatically acquire usefulness for historical studies; it takes time. In the late 1980s we could not sell large scale maps issued post-1945. No-one was interested in them, with local historians saying they were too recent to be of interest, whilst professional people such as architects wanted the latest state; five years old was not good enough. Today, sixty year old maps are very much to the liking of local historians, prompting forgotten memories of childhood, which can be written about with authority.

Most of us would agree that whoever drew up the specifications for many map series, especially coloured maps, did an excellent job in creating visually attractive products. Not that they were necessarily looking to be attractive, more a desire for clarity. That these maps appeal to and are used by others for non-cartographic reasons is by the way. A hundred years ago, the OS began using decorative covers to attract attention to, and hopefully increase sales of, small scale maps. This very same attractiveness has continued to be used by others. The map shop in Hay on Wye usually has a good selection of Populars in the window, advertising that they sell Ordnance Survey, as well as older maps, and most of us have seen maps used as displays in bookshops over the years. Indeed, it was when I was paying for a book and saw a Popular edition on a bookshop counter that I first started on the slippery slope. The advertising industry is always on the lookout for good props: a very nice coloured Damart advert from about twenty years ago, shows an elegant pair of men’s grey trousers, with colour added by the model holding a Popular beside one leg; Popular sheet 54 Nottingham adorns the cover of Alan Sillitoe’s *Down From The Hill*. And yet again I ask, why do so many find Populars above all other series so attractive?

Over the years, I have probably had about a dozen artists contact me seeking maps to use in their work. Most have said that they find OS maps and their colours attractive, whilst only a couple have been very specific and wanted a particular series. Someone, who will remain anonymous, as I cannot recall his name, did some lovely creations using Seventh Series mapping which were exhibited in several galleries in the 1990s. Another group are those who wanted to use maps as wallpaper, and here, most definitely, the Seventh Series was preferred. Usually the tý bach was the chosen room, but one summer a good customer went on
holiday and left his decorators to paper the stairwell from the basement up to the attic of a three storey London house using Seventh Series maps, with Land’s End in the basement to Shetland at the top. Luckily, I had an excellent stock of maps in mint condition in the all red covers. From the photographs, the result looked exceptional. What would William Mudge have made of it all?

In my book, postcards are ideally suited to having maps on them. Over the years, a few commercial concerns produced postcards with OS maps on the front, all very bitty, nothing serious, and then the Ordnance Survey hit on the idea of what they called location postcards. These were map extracts, obviously, centred on a specific location with the addition of a little artwork such as an arrow pointing to the exact building and maybe a logo or company name. A similar idea to the current custom maps. Several hundred different cards were produced of various scales. Although the cards seem to have been quite popular, the OS stopped offering them, but the idea of using map extracts was taken up by others, especially if location centred, with the result that curtains, cushions, table mats, you name it, all appeared decorated with maps. Gift shops in small towns offered cushions with an OS map of the town centre on it. Some very nice cloth table napkins for one society wedding had an extract of the 1920 coloured six-inch map of York.

The paper used for National Grid large scale plans has always been of exceptional quality; so much so that when I had a vast pile of the things in mint condition that I could not bring myself to take to the recycling centre, I offered them to the local play group and primary school. Turn the maps over and the strong white paper is excellent for drawing on, and of a far higher quality than these groups could ever have afforded.

And then we arrive at maps as objects to collect, with an emphasis on the word objects. I defy anyone to argue that for those who collect different map covers, the maps are of more than secondary interest, just as some collect groups of maps, for example manoeuvre maps, not for what is shown, but because each map is different. Differences are collected, not maps. Yes, the early Old Series were envisaged along the lines of county maps, and it was expected that those buying them would seek the whole county, but in my book, this was not collecting. It would be interesting to find the first reference to an Ordnance Survey map collection, in the sense of the collections held by our members. Would it refer to an individual or a library? When did the legal deposit libraries commence collecting after realising that they lacked some maps, revised reprints and such, or that they had few examples of different map covers? Again, it would be interesting to put Mudge in a room with a display of early Old Series, and a modest collection of later Ordnance Survey maps, put together around two hundred years on by one of several hundred members of the Ordnance Survey’s fan club. His Old
Series can only be seen as maps, whilst the collection would consist mostly of objects.

Before 1990, if anyone at the OS had thought about it, they might have suggested that on average maybe six or seven different people, would look at any given map in its lifetime, giving it a pretty limited circulation. But with the internet and websites devoted to Ordnance Survey maps, many, many more people are liable to look at a given sheet. From anywhere in the world. With the rise of computer technology and all the associated gadgets, the Ordnance Survey has pretty swiftly fallen into line, by providing purchasers of some hard copy maps, access to a digital version which can be downloaded to a smartphone or tablet. Undoubtedly hard copy maps are declining in importance, with the OS considering itself a data provider, rather than a map publisher, and libraries increasingly offering holdings on-line. The National Library of Scotland website amongst others presents OS maps in a way that the OS never intended, nay was never able to envisage. Seamless maps, where the margins have been cropped and the maps butted together, presented on a website rather than adorning a stairwell.

As quizzes are such a popular feature of Sheetlines I will end with a question: with OS maps decorating lamp shades, cushions and table mats, what OS extracts would you suggest for decorative male or female clothing or underwear? Answers should not be sent either to me or the editors, thank you.
Letters

Congratulations on another chunky issue of Sheetlines. On page 65, inspecting the cover map of Explorer 102, I note that the sea to the north-west of the Cornish peninsula is named as the ‘Celtic Sea’. A new one on me. On my own earlier printings of 102, there is no designation for this stretch of water. By contrast, whilst my most recent Landranger 203 agrees on ‘Celtic Sea’, earlier editions favour ‘Atlantic Ocean’. When and why did ‘Irish Sea’ fall out of favour?

Peter Haigh

My request in Sheetlines 116, pp18-22 for further examples of British Army training maps 1906-1918 has resulted in four more examples. Member Chris Bull has kindly supplied me with details of three maps at the scale of one inch to the mile - an Irish map The Curragh District Training Map 1903, and two English maps - Eastern Command Training map 1907 and 12th Divisional Training map 1914. The last map is particularly unusual in that it is based on the short-lived fourth edition of the Canterbury/Folkestone/Ashford area. The other new example is at the two miles-to-one-inch scale and is a 6th Divisional Training map of 1913. None of the new maps have training manuals attached to the reverse of the maps, though the Eastern Command map is dissected.

Derek Deadman
I read Rob Wheeler’s piece about first edition Yorkshire and Lancashire maps with interest.

Some of the Society’s older members may recall that, many years ago, I used to deal in secondhand OS maps. And so in, I would guess, 1981, I received a phone call from Sotheby’s in Chester that they had some first edition OS maps that might be of interest. Expecting them to be Old or New Series one inch maps, I travelled down to Chester by train from Newcastle to be met by some friendly staff, a cup of tea – and a pile of first edition six-inch maps of Yorkshire. I placed a bid and a few days later was told that I had won, and that the maps would be sent north to me.

Though I knew little about six-inch maps at the time, it was clear that these were early states. This was apparent not just from the lack of some railways but also by incomplete data in the lower margin of some maps, with surveyors’ or engravers’ names left blank. Presumably these had been released early to a land agent or similar. I set about checking other collections, primarily using the railways as a guide, and found that in many cases my maps were earlier than the copies in the BL or Cambridge (I did not check the Bodleian) and much earlier than those in NLS. I also visited Leeds and found that the collection in the Central Library, though in indifferent condition, was probably the earliest in any of the libraries I visited.

Greatly excited I set about listing them, devoted one of my monthly catalogues to them, and waited for the phone to ring. And waited. And waited. A few laments came in – “Are there no Seventh Series this month?” – so after waiting a couple of days I sent the catalogue to some of Yorkshire’s local history libraries. I recall that Wakefield, whose energetic local history librarian, John Goodchild, would later become an author of mine, bought several, and I believe Northallerton took some too. I later gave the Harrogate map to Harrogate Library by way of thanks for their help to me. A few were bought by the BL and possibly by Cambridge. The sheet covering Leeds – virtually without railways save the early Leeds & Selby, I recall, and to my mind the most important OS map I ever sold – was acquired by one of our Society’s more distinguished female members.

I can scarcely keep a document safe for a year, let alone almost forty, so I do not have a copy of the catalogue today, but perhaps somebody more naturally organised might have put one by. NLS certainly collected many of my catalogues. If anybody is interested in preparing a carto-bibliography of the Yorkshire maps, it might be worth trying to locate a copy of it, anyway. And also to bear in mind that local libraries might sometimes have earlier editions of maps than do the national, copyright libraries.

Time can play tricks with the memory but my recollection of this collection is that, though far from complete (it was perhaps one hundred maps), it covered several major towns and future conurbations in the West Riding – places like Normanton, Wakefield, Castleford etc, as well as Leeds. The importance to a historian lay in the fact that the towns and countryside were shown just BEFORE the railways arrived. Many if not all railways surveyors had been trained by the OS, and so their survey work would be trusted and accepted, as it was until
recently (is it still?)

I recollect my excitement at this collection, but also the work and time I put into researching it. Journeys to Cambridge, London, Leeds and Edinburgh in a few days do not come cheap – and this was reflected in the prices I charged. Of course, it is difficult for a private collector to store large six-inch maps satisfactorily. Nevertheless, I was very disappointed, and not just financially, from the failure of the catalogue, and this soon became a factor in my decision to wind down the secondhand business and concentrate on publishing. That is a decision I have never regretted!

Alan Godfrey

Peter Wynn’s explanation of ‘main river’ (Sheetlines 116 p52) was extremely helpful, and the map showing Catchment Areas in England and Wales was a particularly useful summary. The exact boundaries of these statutory Catchment Areas were added to the six-inch map during the 1930s. The maps normally carry a marginal note to the effect that these boundaries are administrative ones decided by the Minister of Agriculture and Fisheries. Usually, the boundaries correspond to watersheds but Peter rightly drew attention to the complications that can arise through artificial drainage channels.

The attached extract from Lincs 60NW (accessioned by NLS in 1933) shows the sort of problem that can arise. The two miles of the Fossdyke Navigation closest to the Trent pass through land that drains independently to the Trent, so are correctly included within the Trent Catchment Area. Most of the rain that falls on the Fossdyke itself is likely also to pass into the Trent through leakage at Torksey Lock. However, maintenance of this watercourse was the responsibility of the London and North Eastern Railway, the Fossdyke and the Witham below Lincoln being treated by the railway as a single unit. It therefore made sense for the watercourse to be designated as falling within the Witham and Steeping River Catchment Area. Hence the map shows boundary lines flanking the navigation as far west as the upper gate of the lock chamber. Actually, the Railway was responsible for the whole lock and the channel thence to the Trent, but one can only take administrative fictions so far; hence this western part was designated as part of the Trent Catchment Area.

Rob Wheeler

(courtesy NLS)
Railways and roads quiz – solutions and solvers

The towns with the defunct stations and the motorway junctions depicted in the puzzle in *Sheetlines* 116 are:

1: Abingdon 1: M27
2: Alnwick 2: M50
3: Amlwch 3: M77
4: Bakewell 4: M11
5: Ballachulish 5: M65
6: Barnard Castle 6: M2
7: Bude 7: M90
8: Cardigan 8: M25
9: Cirencester 9: M8
10: Coniston 10: M23
11: Crieff 11: M40
12: Dornoch 12: M3
13: Fraserburgh 13: M20
14: Hornsea 14: A74(M)
15: Maldon 15: M4
16: Newhaven 16: M5
17: Newport (Isle of Wight) 17: M6
18: Portishead 18: M62 / M60
19: Saffron Walden 19: M1
20: Wells-next-the-Sea 20: M60

This evidently proved more of a challenge than recent puzzles and several of our regular solvers didn’t offer solutions. The winner was Tony Walduck; the other successful solvers were: Matt Ashley, Martin Buckley, Phil Hall, Bill Henwood, Bill Hines, Graham James, Roger Holden, Phil Pearson, Jonathan Roberts, Nigel Smith, Duncan Stewart, Andrew Turnbull, Dave Vaughan, Keith Warman and Alan Young.

As ever, the comments by solvers added interest: ‘very challenging over the Christmas break. Crieff in particular was very hard to get’, ‘the disused railways were frustrating! Saffron Walden especially’, ‘Cirencester was a real devil because of that halt’, ‘the rail experts will argue about whether or not Newhaven Marine should be treated as still existing; the joys of the law on station closures’, ‘looks like the Freshwater line at Newport had already shut to passengers, as no platforms shown on the left railway’, ‘I discovered some amazing, long lost branch lines, also, it was good to see Barter Books at Alnwick Station included’, ‘the intersection of membership of CCS and ASLEF remains fruitful, even if no ASLEF member has driven a train to these stations for many a long year’, ‘I am one of the Disused Stations website team as well as an OS 7th Series fan so it was a matter of honour to identify all of the stations correctly’.

*Thanks to John Ambler for compiling the reservoir quiz which appears on the next page. They are at varying scales, but the km grid squares indicate their sizes.*
Can you name these alphabetically-arranged reservoirs?
Answers to editor by 31 July.