

A short history of the Ordnance Survey of Great Britain

The formal 'foundation date' for the Ordnance Survey is usually taken to be June 1791, but its origins lie further back. What some writers have taken to be the starting point is a survey of Scotland at one inch to 1000 yards (1:36,000) executed between 1747 and 1755 as part of pacification operations following the Jacobite uprising of 1745-6. This survey remained in manuscript until 2007, when a facsimile was issued. The instigator appears to have been Col David Watson, an officer in the Army and also in the Engineers of the Board of Ordnance, (which until 1855 was a separate organisation). It was the first government-made survey of a substantial tract of Great Britain, and one of the participants was William Roy (1726-90). In 1763, 1766 and 1783 Roy made proposals for an official survey of Britain, to be published at either one inch or one and a quarter inches to one mile (1:63,360 or 1:51,138), which might have re-used some of the work done for the military survey of Scotland, but all these proposals failed because the cost was considered excessive, and by the 1780s a considerable number of counties had been mapped commercially at 1:63,360, to varying standards.

The real start of work which can be recognised as 'Ordnance Survey' came in 1783-4, when the Royal Societies of London and Paris agreed to settle a long running dispute as to the relative positions of the astronomical observatories in these two cities by connecting them by a system of triangulation. Triangulation is a means of measuring distance and fixing positions on the basis of measuring a single base and as many angles as may be necessary; if one side and two angles of a triangle are known, the remaining sides can be found by calculation. Until the recent advent of satellite positioning systems, triangulation was the universal means of providing a skeleton for controlling survey operations, and was the only feasible way of measuring distances across water and other obstacles where ground measurement, by chains or tapes, was impracticable. The English part of the operations was under the Roy's direction: he was now a Major-General and the leading geodesist of the day. Though the enterprise was civil in nature, he was assisted by men of the Royal Artillery.

By the time of Roy's death in 1790 the London-Paris triangulation had been completed, and he was contemplating its extension as a basis for survey work in Britain. That this came about was due less to any master-scheme and more to a state-of-the-art theodolite coming onto the market unexpectedly. The third Duke of Richmond, then Master-General of the Ordnance, who was thoroughly sympathetic to Roy's ideas, saw an opportunity, and the Ordnance duly authorised the expenditure of £373.14s (£373.70) of national funds on the theodolite on 21 June 1791, since taken to be the official 'foundation date' of the Ordnance Survey. Men were recruited or seconded to perform or supervise the operations, and Roy's work was gradually extended outwards from the south-east of England. By 1823 it had covered much of Britain.

Though a system of triangulation was a necessity for a national survey, it was by no means a guarantee of it; for maps, in the sense most lay people understand them, 1791 was a year much less significant than either 1784 or 1795. In 1784-6 a six inches to one mile (1:10,560) survey of Plymouth and its environs was carried out at Richmond's behest, for an abortive fortification proposal, and then the same team of surveyors went on to survey other places of military interest at the same scale. By the late 1780s they were in Kent. These military surveys appear to have been made as isolated entities; only in 1795, it appears, was the decision taken to survey the whole country: whether Britain, or just England and Wales, is uncertain. The reason was evident enough: the war with France, which had broken out in 1793, and which might lead to an invasion of Britain, and hence to a need for maps for defence. By the end of the war, in 1815, most of England and Wales south of a line through

Birmingham had been mapped, mostly at the two-inch (1:31,680) scale. Some of it had also been published.

It is as yet undecided whether the crucial initiative of publishing the Ordnance surveys was taken by the Board of Ordnance or by William Faden, 'Geographer to the King', and the leading map-seller and publisher of the day. What is certain is that early in 1801 Faden published a four-sheet 1:63,360 map of Kent, based wholly on Ordnance surveys. The Ordnance then took the work of engraving and publishing into its own hands, and in April 1805 issued four 1:63,360 sheets covering Essex. These were the first instalment of what would in time come to be called the 'Old Series' one-inch map. By 1820 there was OS one-inch coverage of the whole of southern England, as well as of Essex and Pembrokeshire, and a definite public demand for the map was evidenced by that of Lincolnshire being taken out of its intended turn in response to a request from that county's landowners.

At this point there came two diversions. In 1820 Captain Thomas Colby (1784-1852) was put in charge of the Survey, and almost immediately he was confronted with evidence from several sources that OS work was not of the best standard. As a result, between 1821 and 1834 almost all OS field work in Great Britain consisted of revising existing surveys; the cloud had a silver lining in that the engravers could catch up with the field work, and the ten to fifteen year time-lag common hitherto was almost eliminated. By 1844 publication of the Old Series one-inch was complete for the whole of Britain south of a line from Preston to Hull.

The second diversion came from Ireland, the mapping of which at the six-inch scale between 1824 and 1846 is described in more detail on another page of this website. Most of the workers on the Irish survey - over 2000 at its peak - were civilians, but they were under military supervision, by officers and men of the Royal Engineers and the Royal Sappers and Miners. The OS continued on this basis until 1939, after which the military component was drastically reduced, and finally eliminated in 1983.

In the late 1830s there came demands for the six-inch scale to be adopted in Great Britain. Most of these demands came from Scotland. The triangulation of that country had been suspended in 1823 in favour of that of Ireland, and a topographical survey, begun in Wigtownshire in 1819, had fizzled out with no published maps to show for it. The Scots wanted to be mapped, and Colby suggested that they consider well the scale to be used. Published Irish 1:10,560 sheets found their way to Scotland, and influential Scottish voices, plus a few in northern England and Henry De la Beche, in charge of the Geological Survey, which had begun under Ordnance auspices in 1832, felt that 'six inches would be the thing.' In October 1840 the Treasury duly authorised the adoption of the six-inch scale for northern England and for Scotland. The Irish survey was nearly complete, and when six-inch work began in earnest in Lancashire around September 1841 it was with a largely Irish labour-force. Towns of over 4000 population were mapped at the five feet (1:1056) scale, a scale which had not been asked for, but which was imported on questionable Irish precedents. This in turn led to special surveys of London and other towns at either this scale or at ten feet to one mile (1:528) between 1844 and 1853. In contrast to this expansion, the Geological Survey was removed from Ordnance control in 1845, though the OS continued to prepare and print the mapping until the last quarter of the twentieth century.

It might have been expected that the six-inch survey of northern Britain would proceed expeditiously, but it did not. This was probably partly due to underestimating the effort needed for surveying urban areas, so much more extensive than in Ireland, but was mostly due to a squeeze on public spending. The result was that by 1851 only one English county - Lancashire - and one Scottish county - Wigtownshire - had been completed at the six-inch scale, and though a few others were in preparation, sufficient influential Scots had had enough. A House of Commons Select Committee recommended the abandonment of the six-

inch scale and the reversion to two-inch survey for one-inch publication. The Treasury, thinking that this would save money, latched on to this eagerly. The Battle of the Scales had begun.

Though the six-inch had been found to have enemies, it became apparent in the course of 1852 that it had some friends as well. Requests for six-inch mapping came from several counties, where it was thought that it would facilitate mining operations, and the six-inch was provisionally reinstated pending a thorough reconsideration of the scales question. In April 1853 the Ordnance was instructed in future to survey in such a manner as to allow publication at a scale of 24 inches to one mile (1:2640) and in July 1854 the Treasury decided that all cultivated rural areas should be mapped at 1:2500 (25.344 inches to one mile), an international standard which had the advantage of splitting the difference between 1:2640 and 1:2376, or one inch to three chains, hitherto much favoured for estate and similar surveys. Though the adoption of such a large scale might seem to be a radical step, it could be justified on the grounds that it would contain all the data necessary to produce maps at smaller scales, and would thus be much more cost-effective than a survey at one-inch or six-inch. (The Treasury carried out its civil service reforms at much the same time with similar thinking in mind.) In May 1855 the 1:500 (10.56 feet to one mile) was prescribed for urban surveys. These decisions were not universally welcomed, and in 1857 a House of Commons vote forced a temporary reversion to the six-inch scale, which was reversed following the proceedings of a Royal Commission the following year.

By 1861 the survey of Scotland was making good progress and the then head of the OS, Colonel Sir Henry James (1803-77) urged that the question of remapping southern Britain at 1:2500 be considered. This remapping had been implicit to thoughtful people, such as W.E. Gladstone, in the earlier authorisation of large-scale work, and it was duly authorised in 1863. The resurvey was ostensibly justified on the grounds of impending land registration and parochial assessment needs, though it is unlikely that either provided much demand for the published maps; indeed, compulsory land registration on sale was only accomplished nationally in 1990, and much land remains unregistered. The resurvey proceeded more slowly than James had hoped for, probably because the magnitude the task, particularly in regard to urban areas, had been underestimated.

In 1880 a drastic acceleration in the work was effected. The spur was what the cynical might call another land registration scare, but it had the effect of completing the 1:2500 resurvey in 1888 instead of 1900. This was followed by the remapping at 1:2500 of those counties mapped at the six-inch scale before 1855. This was accomplished mainly by 'replotting' the original six-inch measurements, a method which ought to have been satisfactory, but which in practice sometimes was not, as the six-inch work proved to be of a lower standard than had hitherto been assumed. Defective work in the 'replotted counties' remained a nuisance until the recasting of the 1:2500 on National Grid sheet lines after World War II.

In 1870 the OS had passed from War Office to civil ministerial control, though it was still organised on military lines (if with a mainly civilian staff). In 1890 it was transferred to the newly-formed Board of Agriculture. A departmental committee that sat in 1892 led to the authorisation of regular revision, but the mapping of towns at scales larger than 1:2500 continued only for those few towns which were prepared to pay for them. The theory was that, once the first revision had been completed, in future no one-inch sheet would be more than fifteen years out of date and no six-inch or 1:2500 sheet more than twenty years out of date; in practice, before 1914 revision was often at shorter intervals. Like the original survey, revision was made almost wholly county by county. The revision went ahead smoothly until 1911, when in order to put into effect the recently introduced tax on the incremental value of land, normal revision was suspended in favour of partial revision of certain areas for Land

Valuation purposes. As the 1:2500 was rather crowded in some areas, some sheets were produced as photo-enlargements at 1:1250 scale. The backlog of normal revision was cleared by August 1914, when the drawing off of military manpower from the OS on the outbreak of war promptly started a new series of arrears, with large-scale revision proceeding at a much slower pace. Post-war economies meant that the arrears of revision grew rather than diminished; the twenty-year revision cycle was abandoned, and by 1935 almost the only large-scale revision in progress was that of developing areas in southern Lancashire, the West Riding of Yorkshire, and around London. At the same time up to date large-scale OS mapping was an absolute necessity for the successful working of some recent legislation, and for town and country planning, and to investigate this state of affairs a Departmental Committee was appointed, under the chairmanship of J.C.C. (later Viscount) Davidson. The Davidson Committee made two reports. The first recommended immediate increases in staff to tackle the revision backlog, and was acted upon at once; the second recommended that all the maps and plans of the OS should be recast on metric grid sheet lines on the Transverse Mercator projection (a yard grid using this projection had been in limited use for small-scale maps for some years), that all large-scale maps should then be placed under continuous revision and that experiments should be made with *ad hoc* mapping at 1:1250 (as opposed to the photo-enlargements) and 1:25,000 (a scale already used for military mapping).

By the time that war broke out in September 1939 good progress had been made with catching up with the arrears of revision, and preliminary work on National Grid mapping was in hand. The National Grid large-scale mapping programme started in earnest in 1944-5, and until about 1962 most of the effort was put into the 1:1250 urban surveys; 1:2500 mapping was mostly confined to some semi-experimental work in Devon and Essex, and to the coalfields, to help the National Coal Board with certain statutory obligations. From 1962 to the completion of the resurvey and recasting of the mapping on National Grid sheet lines in the early 1980s, the main work was at 1:2500 in rural areas and, increasingly, on continuous revision. In 1969 the OS adopted a metrication programme, with the 1:10,560 to be replaced by the 1:10,000, the one-inch by the 1:50,000, and all contours and altitudes to be expressed in metric units. Despite this, a diminishing number of 'imperial' maps at 1:25,000 and larger scales remained on sale well into the 1990s.

With the drawing to a close of the National Grid resurvey, an Ordnance Survey Review Committee was appointed in 1978, under the chairmanship of Sir David Serpell. It reported the following year. Its practical effect was that certain OS 'core activities' were defined, which would be eligible for a grant-in-aid from the national Exchequer; all other activities were to be undertaken on a strictly commercial basis. For almost a century from 1866 OS maps were priced according to the cost of printing individual copies, the cost of surveying and drawing being met from the Exchequer; from 1964 the OS was directed to recover some of the surveying and drawing costs. In the wake of the Serpell Committee proceedings it was directed to recover much more of these costs. By the late 1990s it was recovering around 90 per cent of its costs, and full cost recovery was achieved in accountancy terms by the devising of the National Interest Mapping Service Agreement, or NIMSA, under which central government paid OS for certain mapping services undertaken in 'the national interest' but which were not commercial. NIMSA apart, the means of increasing cost recovery was mainly by increasing map and digital data prices annually by more than the rate of inflation. For 1:25,000 and smaller scale maps the increases were comparatively modest, whereas for the larger scale maps they were much larger: the increase in the price of 1:10,000 mapping from £16 to £30 per sheet, on the grounds of its dubious viability, in November 1991 was merely the most marked symptom of the general trend. By that time the OS was selling a significant proportion of its 'mapping' as digital data rather than in conventional printed

form. By the autumn of 2006 OS finances were such that it was possible to balance the books without the assistance of NIMSA: thus OS is now self-financing.

At the time of the Serpell Committee proceedings OS digital mapping was not much further than the experimental stage. Experiments had started in 1969, and had been directed partly at trying to derive satisfactory small-scale maps from a large-scale database: this problem is not yet overcome even now, nearly forty years later. Inputting and outputting data at the same scale was more successful, and the first 'production' digital 1:2500 sheet appeared in 1973. A decade later progress had been slow, and it was anticipated that digitising the basic large-scale archive - a process akin to redrawing every map - would not be complete until 2015. As in 1880, this was far too long to wait. A Committee under Lord Chorley investigated the matter, and as a result of its demonstration of the need for digital data, of digitising work being contracted out and of rapid technological advance, the digitising programme was completed in 1995. Perhaps by happy coincidence the work was completed when the Director-General (and now Chief Executive as well) was the first civilian to hold the post without any military training: Professor David Rhind, one of the leading academic experts on digital mapping. OS small-scale mapping continues to be published mainly in conventional colour-printed form; OS large-scale 'mapping' is increasingly supplied as digital data.

In 1990 the OS became an Executive Agency, and since April 1999 it has been a government Trading Fund: its annual reports are able to report in terms of profit and loss. In 2007-8 turnover was £118.3 million, with an operating profit of £22.5 million. In 2000 the first woman was appointed Director-General: Vanessa Lawrence.