Uncle Joe knew where you lived

The story of Soviet mapping of Britain (part I)[1]

John Davies

It is a spine-chilling fact. Every Soviet president from Stalin to Gorbachev, and all their high-ranking officers, knew not only where you lived but how to get there by tank. They knew the width of the roads, the height of the bridges, the depth of the rivers, the names of the streets. And they knew the exact location and purpose of every building of possible strategic importance, even those which were omitted from OS maps.

For over fifty years, before during and after the cold war, the Soviet military undertook the most comprehensive global survey ever attempted and created detailed, accurate maps of practically every country in the world. For many African and Asian countries these maps are, even today, the most reliable or only open source of good quality topographical information.

This top secret enterprise was on a vast scale, driven by military imperatives and executed to the highest technical standards. Today, very little is known about how the organisation was structured and how such incredible results were achieved. The achievement is particularly astonishing when compared with the regime's inability to fulfil industrial and agricultural production targets and its failure to feed the people.

Almost the only information available is the evidence of the surviving maps themselves, supplemented by the stories of those who became involved after the collapse of USSR. The present account has been compiled from such sources and is therefore inevitably incomplete and somewhat tentative. No doubt more information will come to light in due course. However, no history of Soviet military mapping has yet appeared in print in English and this represents an attempt to establish some of the facts. Part one comprises a general description of the maps and the circumstances of their production. Part two will tell the story of their emergence in 1993 and provide a closer look at the map content and the probable sources of information.

World mapping

The scope of the Soviet mapping initiative is staggering:

- the whole world[2] was mapped at scales of 1:1 million, 1:500,000 and 1:200,000;[3]
- most of Asia, Europe, northern Africa and North America was mapped at 1:100,000;
- USSR and much of Europe, the Far and Near East at 1:50,000;
- USSR and eastern Europe at 1:25,000;
- about a quarter of USSR at 1:10,000.

In addition plans at 1:25,000 and 1:10,000 were produced of thousands of towns and cities around the world. These latter are particularly interesting for the level of detail shown, much of which could only have been gathered by having a local presence; easier in friendly countries than elsewhere.

The military machine realised the importance of accurate topographic mapping for military, economic and political purposes almost immediately after the Russian revolution. A

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[1] The Web links may be followed from the text to be posted on the CCS website. Part II will appear in *Sheetlines 73*.

[2] Taken from *www.cartographic.com/documents/russian.pdf*.

[3] Western military surveys used 1:250,000 for medium scale planning maps, but communist countries preferred 1:200,000.

military cartographic administration was created in 1919 and began to make geodetic and cadastral surveys of significant parts of the new Soviet Union.

The earliest British map example seen so far is dated 1938,[4] indicating that the global project was under way before World War II. In the mid-fifties a new 'Sofia' standard was established and worldwide mapping activity intensified during the cold war. The latest maps seen date from as recently as 1990.[5]

The most striking feature of the maps is that all text and place names are printed in Cyrillic script, causing familiar places to look quite unfamiliar. Foreign names are transliterated phonetically so that a Russian speaker could easily read and pronounce them. London appears as ЛОНДОН, Paris as ПАРИЖ. This is particularly helpful with places having non-obvious pronunciation. Gloucester, Leicester and Dun Laoghaire appear as ГЛОСТЕР ('Gloster'), ЛЕСТЕР ('Lester') and ДАН-ЛЗРЕ ('Dun Leary') respectively.

One standard global sheet numbering system is used, the International Map of the World system, which provides a simple and comprehensive indexing method. The globe is divided into latitudinal bands four degrees deep and longitudinal zones six degrees wide. The bands are coded A-U working north from the equator and the zones are numbered 1-60 working east from longitude 180° (the date line). Thus, grid square M30 lies between latitude 48° and 52° north and between longitude 0 and 6° west (S.W. England). M31 contains S.E. England, northern France and Belgium, whilst most of Ireland lies in N29 (lat. 52°-56°N; long. 6°-12°W). The band letters are repeated south of the equator, with a prefix.

Nomenclature

The 1:1 million map sheets each cover a single grid square (except in the far north) and are named accordingly (M30, N29 etc). Larger scale sheets are numbered as divisions of these:

- there are four 1:500,000 sheets per grid square, with suffix А, Б, В, Г (the first four letters of the Russian alphabet). The suffix is applied from top left to bottom right,
- there are 36 1:200,000 sheets per grid square, with suffix I to XXXVI,
- there are 144 1:100,000 sheets per grid square, with suffix 1-144,
- there are four 1:50,000 sheets for each 1:100,000 sheet, with suffix А, Б, В, Г,
- there are four 1:25,000 sheets for each 1:50,000 sheet, with suffix 1-4.

Thus, for example, 1:50,000 sheet M-31-1-A occupies the top left hand corner of sheet M-31-1, the 1:100,000 sheet which itself occupies the top left hand corner of grid M31.

Sheet lines rigidly adhere to the graticule; no exceptions are made for bits of land jutting off the edge. Sheet sizes vary but those of UK are typically about 450-600 mm high by 300-500 mm wide (paper size). Town plans, however, are positioned regardless of graticule lines and may comprise several sheets, each of much larger size.

This graticule is also the basis of the projection, Gauss-Krüger, a version of the UTM system. This can be best explained by starting with the familiar Mercator projection. In the Mercator projection, the globe is mapped as if a cylindrical sheet of paper touches the globe all round the equator. This provides low distortion near the equator, but poor representation further away where most populated places lie. This problem is overcome by Universal Transverse Mercator (UTM) whereby the cylinder is rotated so that the tangent is along a line

[4] 1:1 million sheet M30 dated 1938.
[5] Town plans of Bradford, Bournemouth and Brighton are all dated 1990.

of longitude instead of the equator. In fact UTM has 60 such tangents, each along the central meridian of the 60 longitudinal zones. This preserves the linear scale along the central meridian with low distortion within each zone, but it is difficult to combine maps of different zones. The Soviet implementation of Gauss-Krüger is based on Pulkovo 1942 datum on Krassovsky 1940 ellipsoid.[6]

Specifications of style, colour, typography and content are standard throughout, and there is an exceptionally detailed and comprehensive manual of symbols to identify topographic features, places, buildings, industrial works, type of agriculture, soils, vegetation, hydrography and so on.[7]

Maps of the British Isles

The small scale maps (1:1 million, 1:500,000, 1:200,000, 1:100,000) cover the entire British Isles. Examples have been seen of particular sheets[8] having dates of both 1960s and 1980s indicating that there was at least one complete revision of each series. Printing is in six colours.

The 1:1million sheets and 1:500,000 sheets have contours at 50m intervals and show roads, railways, canals, rivers, reservoirs, forests, shipping routes, spot heights and features such as airfields, lighthouses and monuments. Places are named in different size of script according to population size. Both have small ancillary diagrams showing county boundaries and disposition of adjacent sheets. The 1:1 million map also has hill shading.

The 1:200,000 sheets are similar but with more detail, such as pylon lines, arrows to show direction of river flow and 40m contours. Major roads are annotated with information about width, clearance and carrying capacity of bridges. On the back of most 1:200,000 sheets is a full written description of the territory under the headings 'Population Centres', 'Transport Network', 'Relief', 'Hydrography', 'Vegetation', and 'Climate', with a geological diagram.

The style of the 1:100,000 sheets is again similar but with much more detail. Contour interval is 20m, submarine contours are at 2m, 5m and 10m depths, roads are labelled with national and European road numbers, urban areas are coloured salmon and smaller built-up areas black. Additional details include quarries, footpaths, embankments, cuttings and frequent spot heights and depths. No paper sheets at 1:100,000 seem to exist of Ireland, but reprographic material did exist and raster copies are available.[9]

1:50,000 series

Paper sheets at 1:50,000 scale, dated 1980-82, exist for the southern part of England and Wales.[10] It is believed that much of the rest of the country was mapped at this scale and reprographic material produced ready for printing. It is also likely that an earlier series was produced in 1960s, but if so, no examples have been seen.[11] General appearance and standards are as 1:100,000 but the contour interval is 10m. Railway station symbols indicate the position of the station buildings, and county boundaries are shown.

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[6] For more about the Pulkovo Observatory see *www.confluence.org/confluence.php?visitid=7270*.

[7] See *www.rkkaww2.armchairgeneral.com/maps/keymap/mapkey.htm* for a translation of the 1958 manual. The 1983 manual, translated by East View Cartographic, 1997, is in the British Library map room at shelfmark B3b(10).

[8] These are 1:1 million N-29 *Ireland* dated 1969 and 1987; 1:500,000 N-31-B *Norwich* dated 1970 and 1985; 1:200,000 N-30-XXIX *Nottingham* dated 1967 and 1986; 1:100,000 sheet M-31-1 and others east of Greenwich dated 1964 and 1982.

[9] Eastnor (see below) offer them on CD.

[10] Known sheets cover land areas of M30 and M31 plus a few odd sheets in N31 and N30.

[11] See under 'Compilation Information and Print Codes' for evidence.

Town plans

At least 80 British urban areas were mapped at 1:25,000 or 1:10,000 scale between 1950 and 1990. A list of known sheets and dates is appended.

Some towns occupy a single sheet, but many extend to two, three or even four. All have a comprehensive street gazetteer, extensive text description of the locality[12] and a numbered list of important buildings. In most cases this information is printed on the sheet itself, but in the case of Liverpool, London and Portsmouth a separate booklet was issued.

Town plans produced after 1970 are printed in ten colours; earlier ones are in four colours. Most plans are printed on large sheets, typically 900mm high by 1200mm wide and contain a staggering amount of detail. Contours are at 2.5m or 5m intervals with grid of 500m or 1km squares. Spot heights are shown to tenths of a metre. Most streets and localities are named, dimensions and paving material of major roads specified, tube stations are differentiated from railway stations and streams and rivers are annotated with their width.

However, the most striking feature is the attention given to buildings of potential strategic significance. These are depicted in great detail, colour coded, numbered and listed. Military establishments are coloured green, administrative buildings purple and industrial plants black. In some cases an asterisk is used to denote 'unknown type of production'. The Chatham, Gillingham and Rochester sheet shows details of the naval dockyard which were omitted from OS maps.[13]

Interestingly, the vertical grid lines on the part of the London sheet east of Greenwich, in grid square M31, are offset from those on the equivalent smaller scale maps by some 250m. This is because the grid is based on the datum for M30 (west of Greenwich).

The London and Glasgow maps have supplementary diagrams of the respective underground railway systems. The London diagram contains one of the few errors so far detected in the entire map series; a non-existent line is shown linking Barbican and Angel.[14]

The Dublin map is dated 1970 but, oddly, shows street tramways, although the city tramway system was abandoned in 1949. The same sheet shows the altitude of the summit of Howth Head as 169.2m whereas the 1:200,000 map indicates a height of 171m. OSI maps do not give a height.

One intriguing question concerns the towns missing from the list of known sheets. Surely places like Carlisle, Cork, Derby, Dundee, Hull, Limerick, Norwich, Perth, Peterborough, Reading, Slough and Stirling would have been of just as much interest to the Soviets. Did they simply not get round to them or could there have been many more maps than we currently know?

Compilation information and print codes

All maps carry some compilation information in the bottom right hand corner of the sheet. This sometimes consists simply of the year of production, but in many cases specifies scales and dates of declared source material. For example, 1:100,000 sheet M-31-13, London East, 1964 edition shows that it was partly derived from 1:50,000 material dated 1963 and partly from 1:63,360 material dated 1960-62. Presumably the former was an existing Soviet map (suggesting that a 1960s series did exist) and presumably the latter was the OS one-inch map. See below for more about source material.

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[12] See example for Birmingham at *www.fourone.com/mcp25.htm*.
[13] More about map content and sources will appear in part II.
[14] Thanks to Alan Cubitt for pointing this out.

The maps also have a print code. This comprises three parts, in the format В-99 XII-81 Д, where В-99 indicates map type and serial number; XII-81 indicates the month and year of production and Д indicates the print factory.

- map type codes are Ж - 1:1million, Е - 1:500,000, Д - 1:200,000, Г - 1:100,000, В - 1:50,000, И - town plan
- factory codes seen on the UK maps are Д, К, Л, Ср, Срт, Т. Д (Russian D) is Dunayev, the name of the main Moscow printing plant. The others have yet to be identified.

What sources were used?

This topic will be addressed in more detail in part two, but the short answer is everything from high technology to low skulduggery. Satellite images and high altitude aerial reconnaissance played a major part, but there was also a diplomat (who was not a cartographer) stationed in every Soviet embassy round the world whose job it was to collect all possible information, by fair means or foul. All available published maps, guides, directories and similar documentation were gathered and despatched to Moscow. Where these did not suffice, then illegal means such as bribery, theft or blackmail were used. Money, it seems, was no object.

It is also possible that pre-war German low altitude aerial photography (which is known to have existed and from which relief can easily be determined) was captured by the Soviets during WWII, but no tangible evidence exists.

Questions of copyright

USSR was not a signatory to the Berne Convention, so no copyright applied to the maps when they were produced. This was not an issue at the time, as even the existence of the maps was top secret. Russia signed up in 1996 but whether or not retrospective copyright applies has not been tested. The current Russian government sanctions the distribution and use of the maps generally, except for maps of scale 1:50,000 and larger of Russian territory.

Much of the remaining stocks of the original maps are held in Russia. They are generally released to dealers on demand, except in certain circumstances, such as military conflict or tension. For example, from 2002 distribution of 1:50,000 and 1:100,000 maps of China, Iran, Iraq and Afghanistan was suppressed.[15]

Here, the Ordnance Survey declared in 1997 that the mapping *'is almost entirely an adaptation of Ordnance Survey Crown copyright material. It was produced without the permission of Ordnance Survey and thus it infringes Ordnance Survey's Crown copyright'*.[16] The British Cartographic Society queried this at the time,[17] but the matter was not pursued. The OS confirmed in 2005 that this remains their position.[18]

American dealers advertise the Soviet maps of Britain as 'open source mapping'[19] or use the words 'where all other maps are copyrighted'.[20]

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[15] Information from Aleksander Lesment at Eastnor.
[16] See *www.cartography.org.uk/Pages/Groups/DesignG/Copyrit5.html* for OS statement.
[17] BCS response is at *www.cartography.org.uk/Pages/Groups/DesignG/Arch_3.html*.
[18] Letter to author, 14 January 2005.
[19] East View Cartographic, *www.cartographic.com*.
[20] Omni Resources, *www.omnimap.com*.

Where can you see them?

The British Library Map Library, Cambridge University Library Map Department and the Bodleian Library Map Room in Oxford all have examples of British and foreign maps and town plans. For all three libraries a reader's ticket is required to gain admission.[21] A summary of their holdings is appended.[22]

Several dealers offer these maps on their websites,[23] some as paper sheets but mainly in raster form. Most offer only complete sets of the smaller scale maps of whole countries at prices of several thousands of dollars. At least three map shops in former eastern Europe offer the maps: TopKart in Warsaw, Eastnor in Tallinn and Jana Seta in Riga.[24] The latter has stocks of paper sheets, including UK town plans, for sale at €2 each.

How were the maps produced?

The establishment responsible for Soviet mapping was ГУГК (GUGK, Chief Administration of Geodesy and Cartography). This vast organisation controlled map production factories throughout USSR producing military, topographic, economic and civil mapping.

Military mapping was produced by staff with very high security clearance at dedicated military cartographic printing factories including Moscow, Kiev, Tashkent, Leningrad, Irkutsk and Khabarovsk. The source material gathered by espionage or agents was collected in Moscow, where (usually) the maps were drawn and the printing plates created. Seven copies of the printing plates were distributed for security.

Although some factories did appear to concentrate on particular regions, it is probable that printing was undertaken at whichever factory had capacity at the time. The print runs were huge and the printed maps were distributed and stored at depots throughout the USSR (one in each of the 25 military regions). The depot for Kaliningrad, which included the entire Baltic region, was in Cēsis in Latvia. On occasions when capacity problems occurred, print production was carried out at the civil ГУГК plants, one of which (factory number 5) was in Riga in Latvia. As a matter of policy, a factory did not print maps of its own locality.

Civil maps produced by ГУГК for public use were drastically simplified and poorly produced on cheap paper. Surviving examples can be bought for a few pence in the Jana Seta shop.

Conclusion

The Soviet military mapping project was evidently an enormously expensive and well controlled operation and it achieved spectacular results. Ultimately, futile, of course, if the purpose was world domination, but leaving a fascinating legacy for enthusiasts.

The author is deeply indebted to the following for valuable advice and information, for which he is very grateful: David Watt and staff at DGIA, David Archer, April Carlucci of The British Library, Anne Taylor of Cambridge University Library, Aleksander Lesment of Eastnor Ltd, Tallinn, Aivars Beldavs of Jana Seta Map Shop, Riga and Jānis Turlajs of Jana Seta Map Publishers, Riga.

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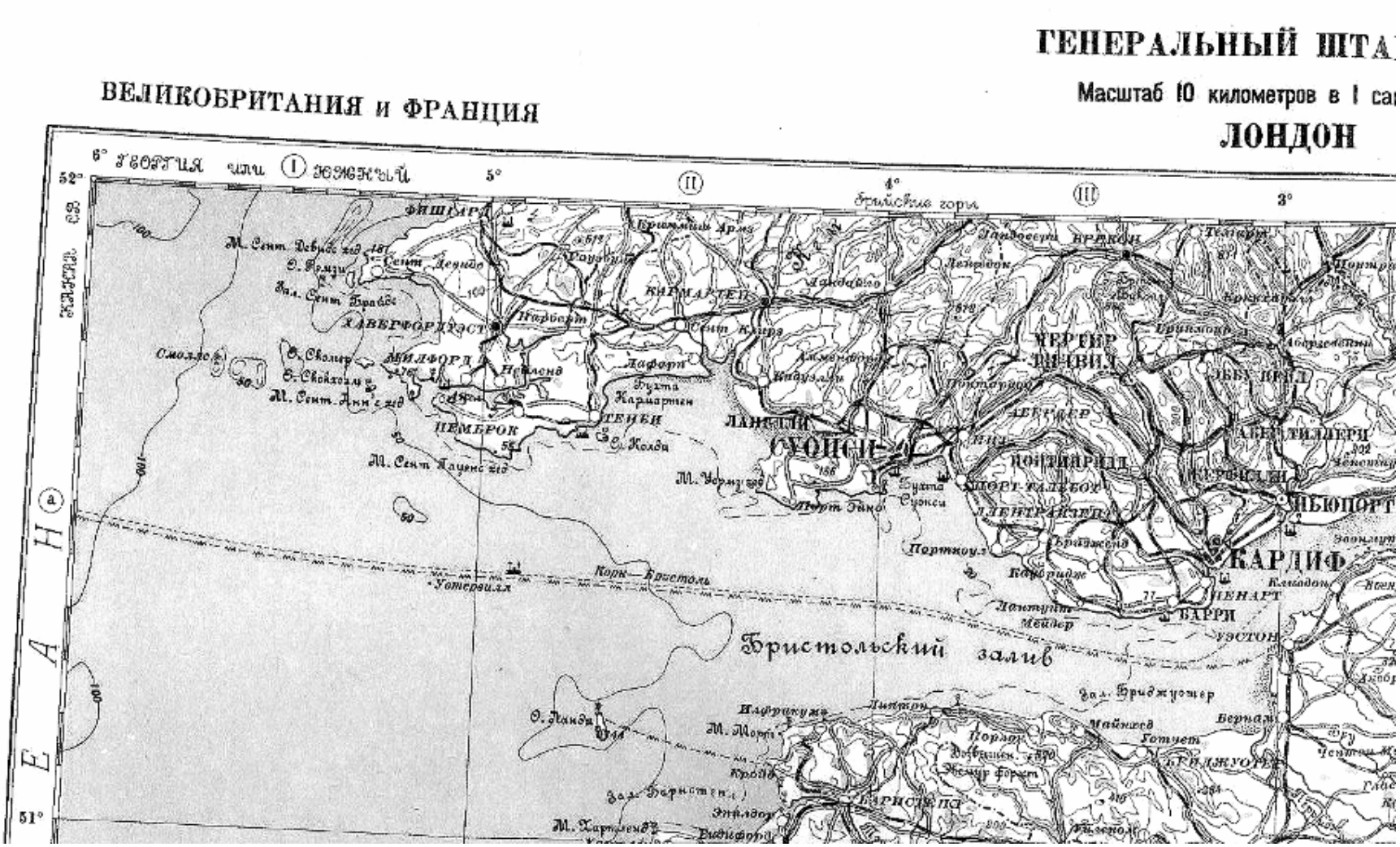
[21] BL: *www.bl.uk/collections/maps.html*, CUL: *www.lib.cam.ac.uk/maps/Home.htm*, Bodleian Library: *www.bodley.ox.ac.uk/guides/maps/*.

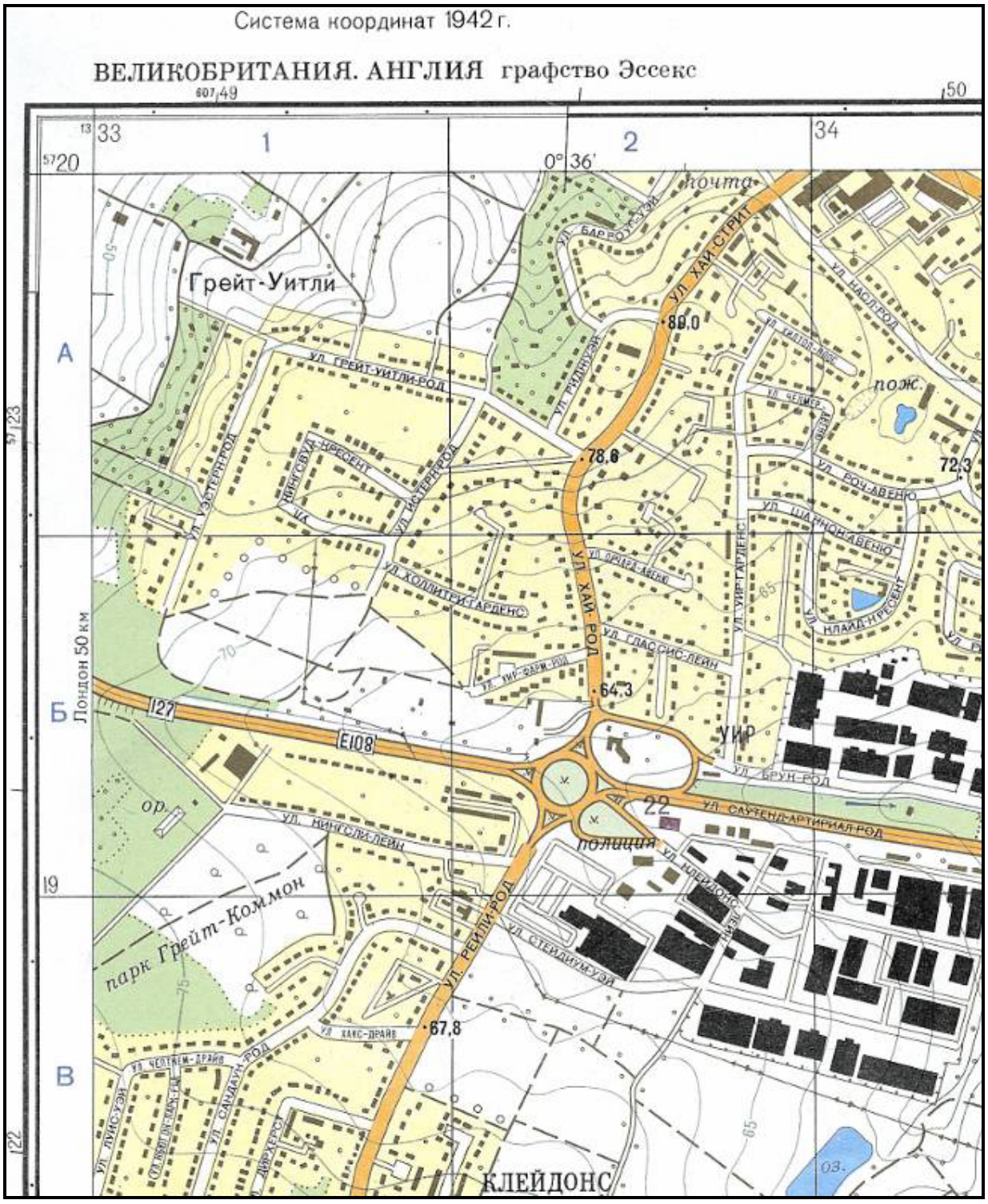
[22] Each of the three libraries holds all the known British 1:50,000 sheets as well as the town plans noted in the appendix. BL and CUL both have complete coverage of UK at the four smaller scales. All three also have a collection of foreign maps and town plans.

[23] As well as East View Cartographic and Omni Resources, see *www.geopubs.co.uk* and *www.fourone.com.*

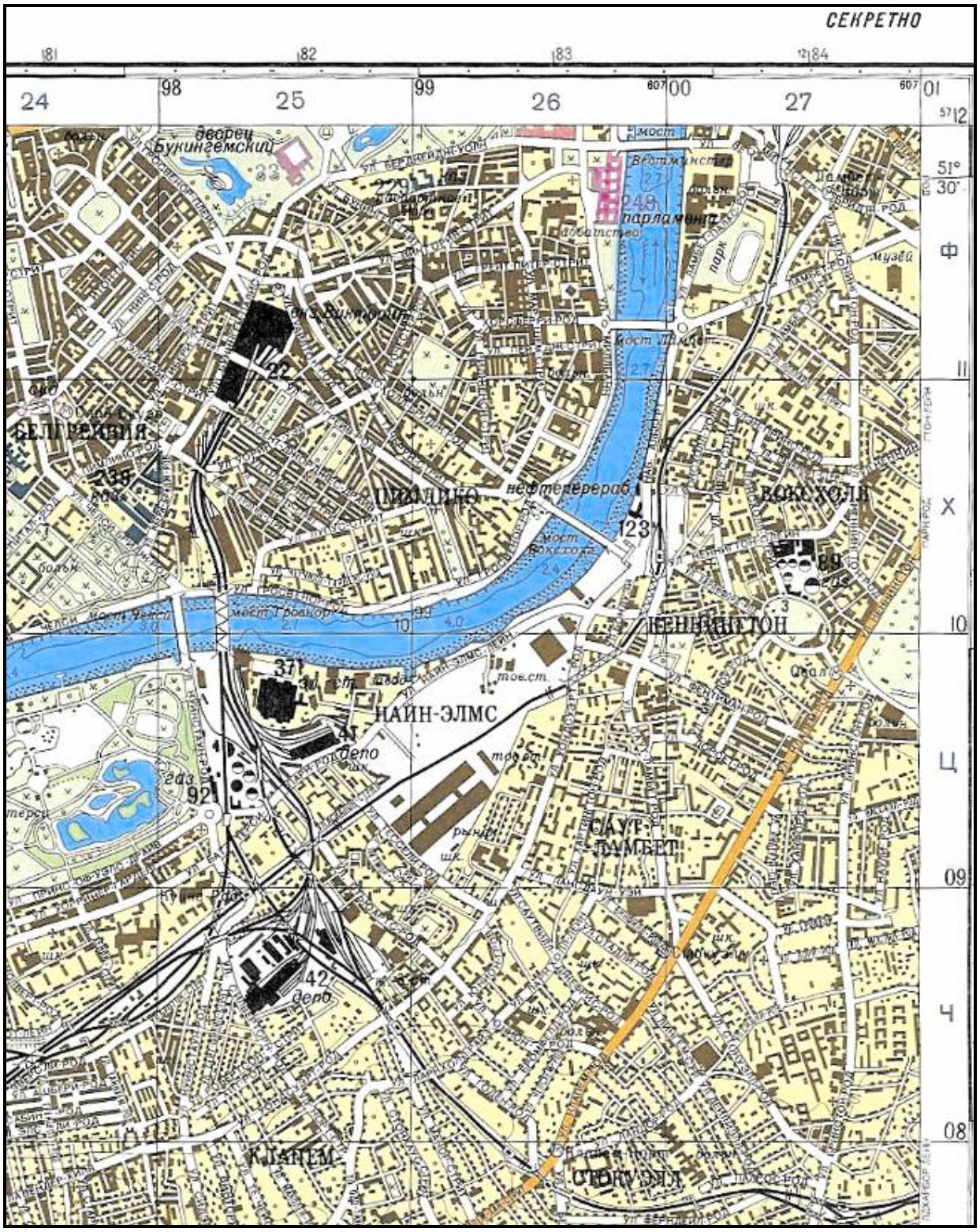
[24] For TopKart see *www.topkart.com.pl*; for Eastnor, contact Aleksander Lesment on *lah@hot.ee*; for Jana Seta *www.kartes.lv/eng/3100_news.php* or contact Aivars Beldavs on *aivarsb@kartes.lv*.



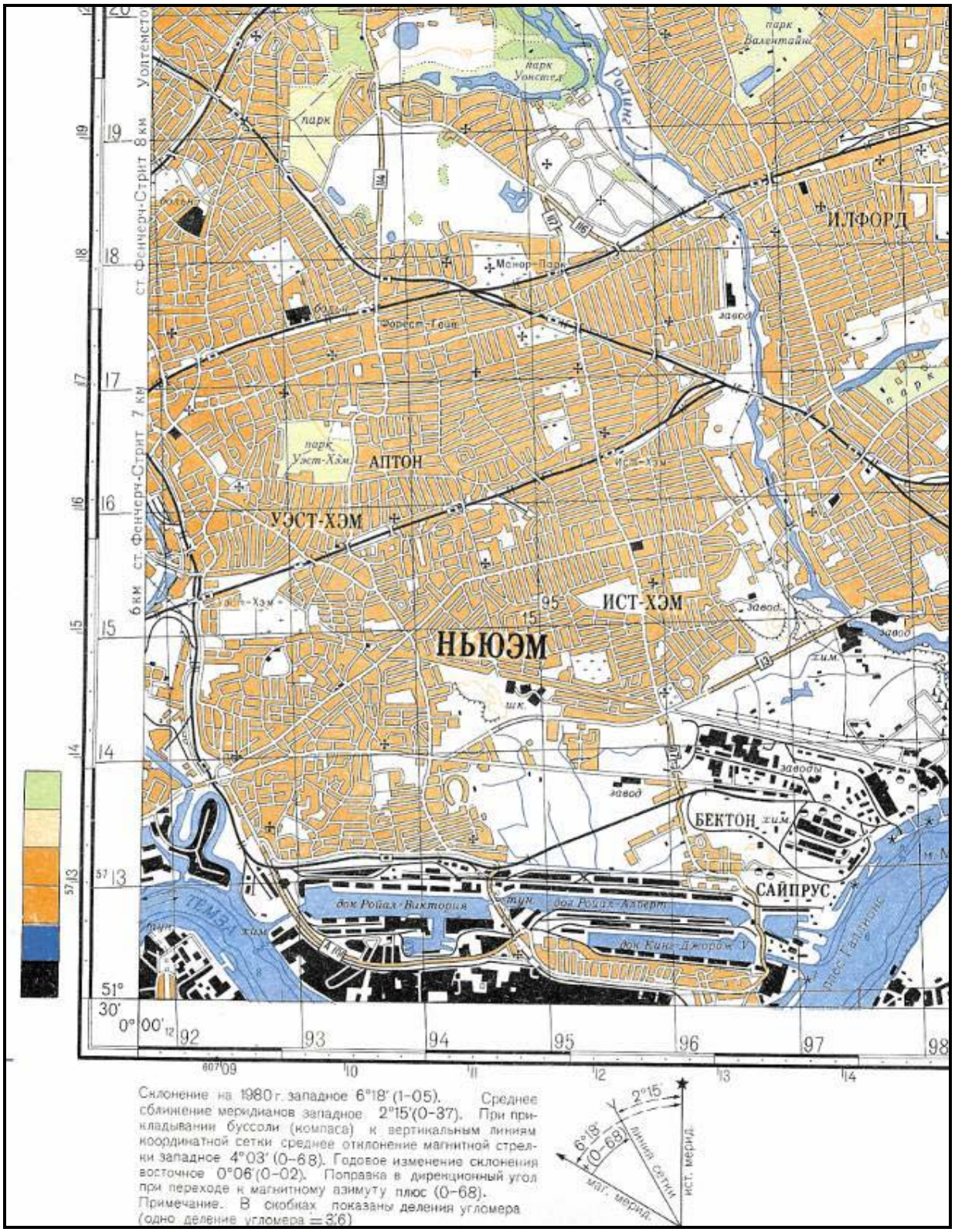
North western corner of 1:1 million sheet M30 at 52˚ N 6˚ W. This is dated 1938 and is printed in three colours with ornate script for marine features and names. The map boundary is not parallel with the sheet edges on maps of this scale due to the curvature of the earth. An undersea cable links Croyde with Lundy Island and a transatlantic cable runs from Weston super Mare. The shipping route is labelled Cork-Bristol. County boundaries are shown.



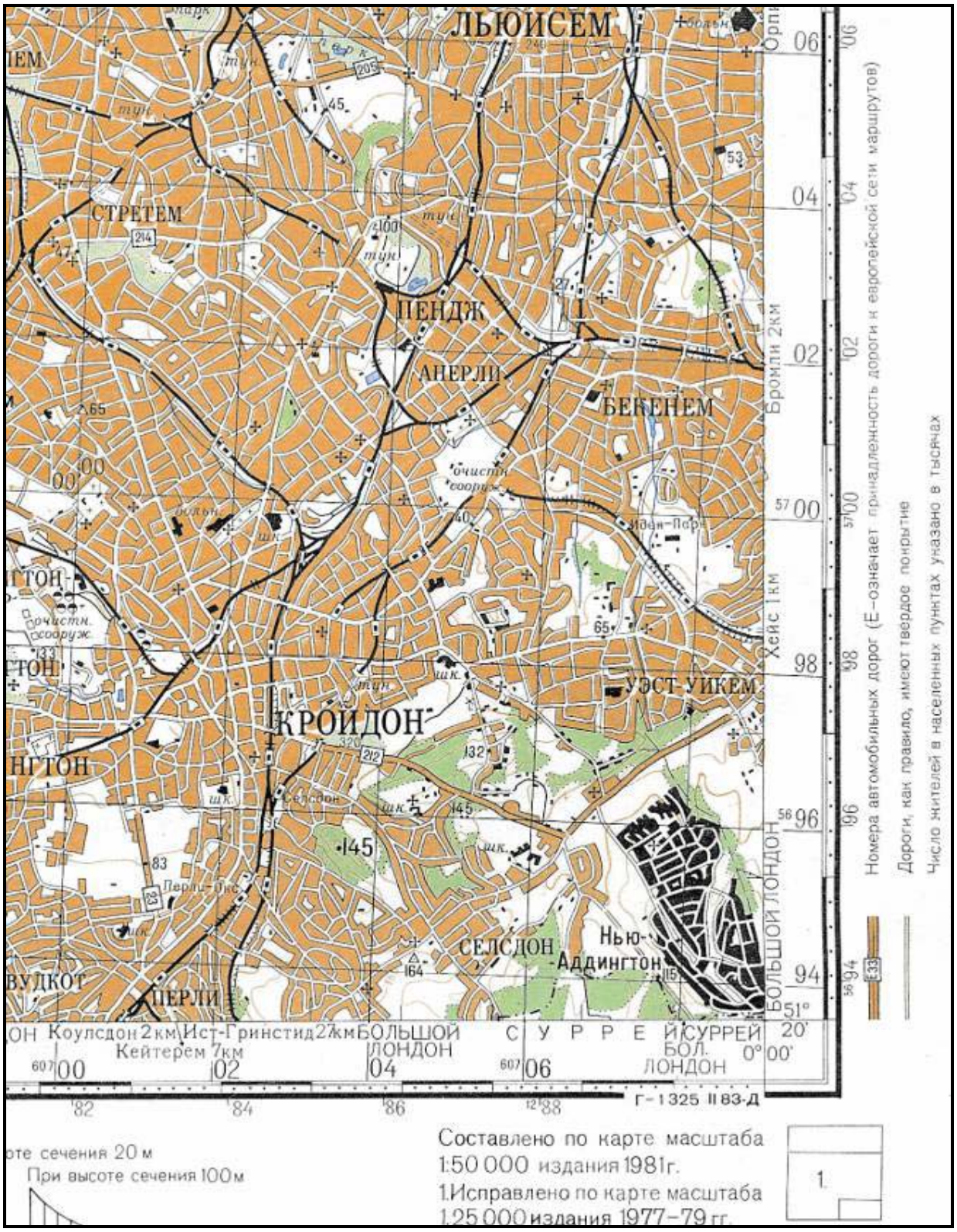
Part of 1:10,000 plan of Southend-on-Sea. The A127 dual carriageway road is named as 127 and E108, with London shown as 50km distant. Spot height of 64.3 is shown just north of the roundabout and the building east of the roundabout, coloured purple and numbered 22 is listed in the key as a police station. Just east of this and north of A127 a blue arrow indicates stream direction. Contours are at 2.5m intervals and the grid squares are 500m. Legend along the top reads 'System Co-ordinates 1942' (this refers to the Pulkovo 1942 datum used as a base for the Gauss-Krüger projection). Below that is 'Gt. Britain England county Essex'. (Approx. 90% actual size.)



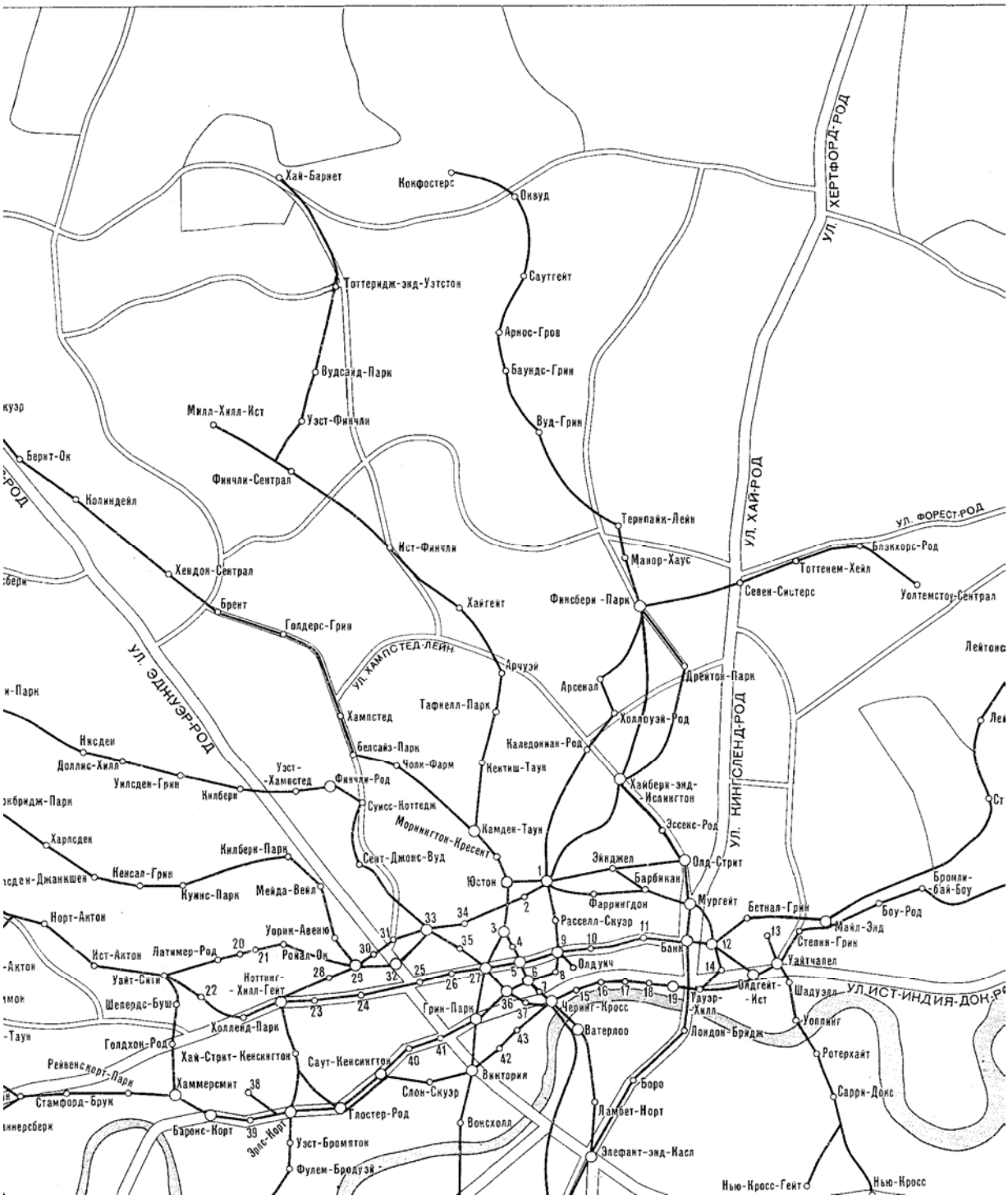
Part of 1:25,000 plan of London. СЕКРЕТНО is 'Secret'. Arrows in square 26Ф indicate that the river flows north and has tidal flow from the north. Submarine contours and low water markings are shown. Among the many annotated buildings are Houses of Parliament (purple 249), Battersea power station (black 37) and Chelsea barracks (green 239). The M symbol by Victoria station indicates metro (tube) station. (Approx. 80% actual size.)



Part of M-31-13-A, 1:50,000 map of east London showing the six colour print registration blocks. The railway station just below the name УЭСТ-ХЭМ (West Ham) at grid ref. 931155 has the station buildings positioned to the north side of the line. The star symbols by the river are navigation lights. (Approx. 80% actual size.)



Part of M-30-24, 1:100,000 map of west London showing print code Г-1325 П 83 Д, indicating production in Feb 1983 at the Dunayev factory. Below that is 'Compiled from map scale 1:50,000 published 1981, updated from map scale 1:25,000 published 1977-79'. The spot height 145 on the green hill below the name КРОИДОН (Croydon) is in large type as it is at a highest point.



Part of the diagram titled 'Plan of subway lines' which is included as a fold-out sheet, size about 36cm by 56cm in the gazetteer booklet provided as part of the 1:25,000 London plan. An inset table lists the station names which appear here as numbers. This wrongly shows a line connecting Angel and Barbican stations.

Appendix – List of known town plans

Town	*Sc*	*Yr*			
Aberdeen	10	81	*b*	*c*	
Barrow in Furness	10	75		*c*	
Bedford	10	71	*b*	*c*	
Belfast	10	51			
Belfast	10	64	*b*	*c*	
Birmingham etc	25	77	*b*	*c*	
Blackburn	10	74	*b*	*c*	
Blackpool	10	76		*c*	
Blyth	10	71	*b*	*c*	
Bournemouth & Poole	10	74		*c*	
Bournemouth & Poole	25	90	*b*	*c*	
Bradford	10	90	*b*	*c*	
Brighton & Hove	10	90	*b*	*c*	
Bristol	10	72	*b*	*c*	
Burnley & Padiham	10	76	*b*	*c*	
Cambridge	10	89		*c*	*o*
Cardiff	10	82		*c*	
Chatham etc	10	84	*b*	*c*	*o*
Chester	10	73	*b*	*c*	*o*
Colchester	10	75	*b*	*c*	
Coventry	10	72		*c*	
Coventry	10	84			
Crewe	10	57		*c*	
Darlington	10	76	*b*	*c*	*o*
Dewsbury, Batley, etc	10	83	*b*	*c*	*o*
Doncaster & Bentley	10	76	*b*	*c*	*o*
Dover	10	74	*b*	*c*	*o*
Dublin	10	80	*b*	*c*	
Dunfermline	10	79	*b*	*c*	*o*
Edinburgh	10	83	*b*	*c*	*o*
Exeter	10	82	*b*	*c*	*o*
Gainsborough	10	75	*b*	*c*	*o*
Glasgow & Paisley	25	81	*b*	*c*	
Gloucester	10	89		*c*	
Gt Yarmouth	10	72	*b*	*c*	*o*
Greenock	10	79	*b*	*c*	*o*
Grimsby	10	86	*b*	*c*	*o*
Guildford	10	79		*c*	
Halifax & Sowerby Br	10	89		*c*	
Hartlepool	10	78	*b*	*c*	*o*
Harwich	10	57			

Town	*Sc*	*Yr*			
Harwich	10	64		*c*	
Hastings	10	76		*c*	
Havant	25	83		*c*	
Huddersfield	10	84	*b*	*c*	*o*
Ipswich	10	84	*b*	*c*	
Kilmarnock	10	58	*b*	*c*	
Lancaster, Morecambe	10	83		*c*	
Leeds	10	72	*b*	*c*	
Leicester	10	74	*b*	*c*	
Lincoln	10	89		*c*	
Liverpool	10	74	*b*	*c*	
London	25	85	*b*	*c*	
Londonderry	10	81		*c*	
Luton	10	86	*b*	*c*	
Manchester etc	25	75	*b*	*c*	
Newcastle upon Tyne	25	77	*b*	*c*	
Newport (Gwent)	10	83	*b*	*c*	
Northampton	10	79	*b*	*c*	
Nottingham	10	75		*c*	
Oxford	10	73	*b*	*c*	*o*
Pembroke	10	50		*c*	
Plymouth	10	81		*c*	
Portland	10	72		*c*	
Portsmouth, etc	10	88		*c*	
Preston	10	76	*b*	*c*	
Rhondda	10	78			
St Helens, Haydock,etc	10	84	*b*	*c*	*o*
Sheffield, Rotherham	25	77		*c*	
Southampton	10	86		*c*	
Southend-on-Sea	10	85	*b*	*c*	*o*
Sunderland	10	76	*b*	*c*	*o*
Swansea	10	76	*b*		*o*
Swindon	10	88	*b*	*c*	*o*
Teesside	10	75	*b*	*c*	*o*
Thurrock, Gravesend	10	77	*b*	*c*	*o*
Torbay	10	76	*b*		*o*
Warrington	10	84	*b*	*c*	*o*
Wigan	10	79	*b*	*c*	*o*
Wolverhampton	10	50			
Wolverhampton	10	63	*b*		
York	10	80		*c*	

Sc: Scale 1:10,000 or 1:25,000. *Yr*: Year of production as print code.

b, *c*, *o* indicate holdings by The British Library, Cambridge University Library and Bodleian Library Oxford.

This list has been compiled from various sources and verified as far as possible by visual inspection, but errors and omissions are likely.

Any corrections or additional information for inclusion in part two would be very welcome. Please contact the author on jomidav@btinternet.com.