CO-392

CREATING A STYLE FOR A REGIONAL SCALE TOPOGRAPHIC MAP, THE CASE OF THE SOUTH AFRICA 1:250,000 SERIES

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INTRODUCTION

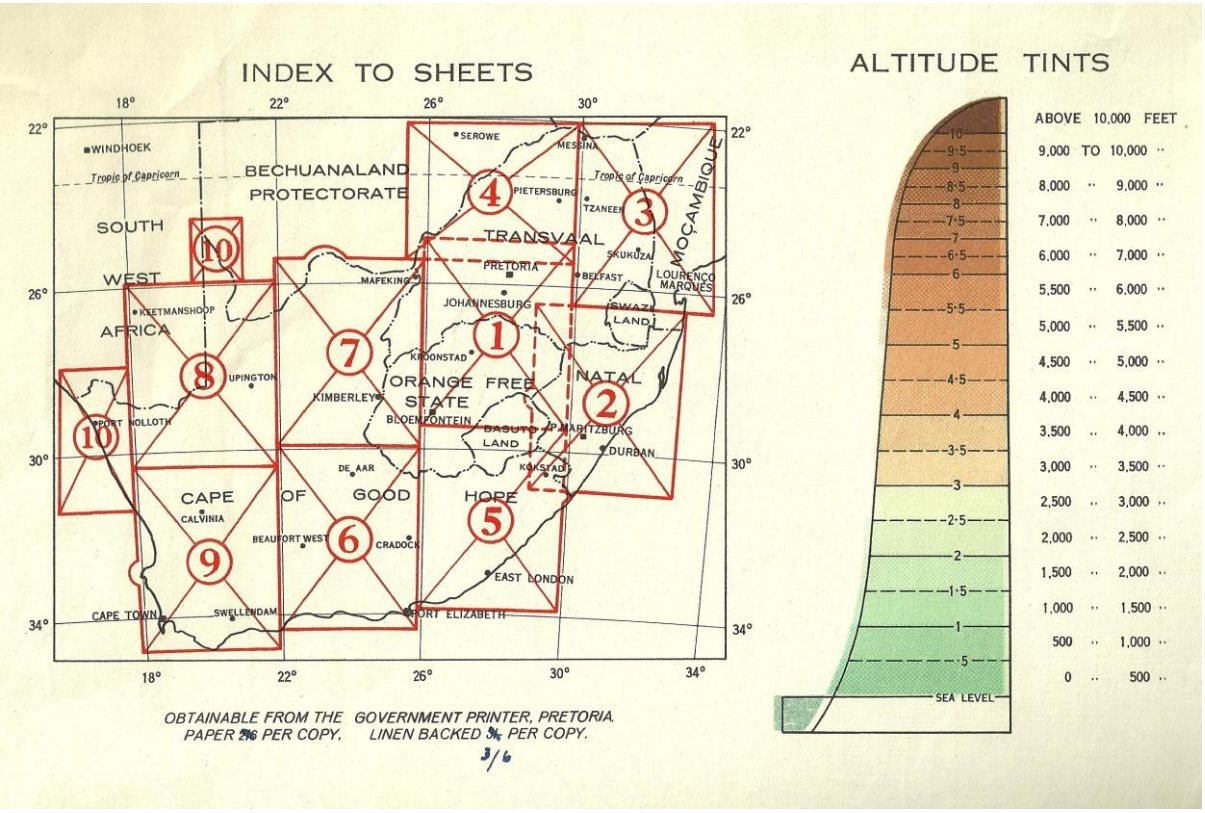
In 1904 it had been agreed by the colonial governments in South Africa that the area needed a 1;250,000 topographic map to serve as a planning tool for military and civil uses (Thomas, 1982). Financial stringency affecting the governments prevented the plans for sharing the cost of mapping South Africa with Great Britain from starting with two local exceptions. Funds could be found for a survey of the Orange River Colony (1)

and for a reconnaissance survey of the north-western Cape Colony adjacent to German South West Africa.(2)

Following the creation of the Union of South Africa from the four colonies in 1910, the new dominion was soon embroiled in the First World War when only military mapping received any priority. After the war mapping on a national basis took some time to match the desires of 1904, re-emphasised in the 1920s to form part of government policy and action. By 1936 the Union government made early moves to begin the mapping of South Africa at 1:50,000, but within four years was involved in the war in East and North Africa, leaving only a few small, isolated patches of mapping at this scale and others of a more experimental nature.

MAKING A START

Meanwhile the Department of Irrigation in the late 1930s initiated the first national map on a standardised basis at 1:500,000. For the first time a topographic map employing conventional layer colours, rather than the less precise hill-shading typical of previous small-scale mapping, was produced and printed by the Government Printer in Pretoria.



(Figure 1) Part of Reference sheet for Topographical Map of the Union of South Africa. 1:500,000. Department of Irrigation. 1938.

It was this map in ten large sheets which became the model for more modern 1:500,000 and 1:250,000 topographic map after the Second world war. In a paper devoted to the compilation of the post-war

1:500,000 topographic series, Watson examined the accuracies of the GSGS series and the Irrigation series compared with that of the latest 1:50,000.(3)

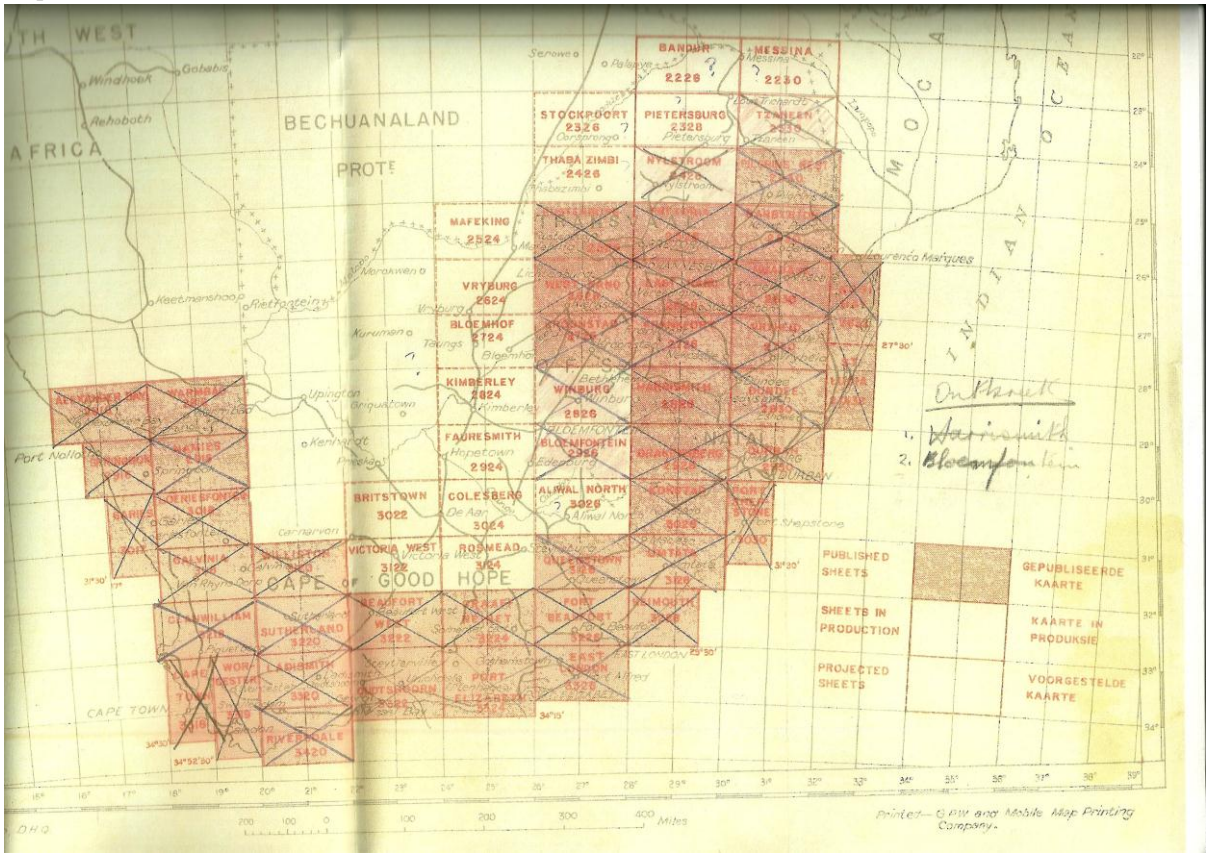
He demonstrated that the generalisation from the GSGS 1764 series which was used in compiling the Irrigation series was satisfactory for rivers and roads but for contours only in areas of high relief. These findings support the claims made for the value of the Irrigation series, such as visual air navigation, military strategic thinking and defining catchment areas. This was just as well, as the series was published by 1939 and was soon to provide a major role in the defence of the Union.

The threat of enemy action from the Indian Ocean and roving submarines in the Atlantic Ocean prompted the Union government to turn its attention to mapping the country in more detail. Reorganising army survey units made it possible to bring back SAEC 45 Company of military engineers to map the coastal zones of the Union from the Orange River in the west to the Moçambique border in the east.(4)

(Clough, 1952 & Wongtschowski 1990). There was a clear requirement for a standard map to serve the Union Defence Force (UDF), whose engineers in little over a year had produced 33 sheets mostly one degree latitude by two degrees of longitude. This reconnaissance map employed the field sheets used for the Irrigation map of 1935-38 and plane-table survey for detail. Annual unpublished reports for 1942 and 1943 of the Trigsurvey also reveal that a pilot sheet of a future 1:250,000 map based on photogrammetric methodology of the Cape Town area had been produced. Although its coverage is not complete, this UDF 400 series served the Union well, as it had been field checked, modern roads and place names were recorded on a much more accurate base map of hydrography and sketch contours with spot heights. The historical geographer Forbes was able to interpret the accounts of routes taken by pioneer travellers in the Cape as far back as 1752 by relating the text to contemporary maps and the landscape depicted on the UDF series informed by retracing routes recorded in their journals.(5)

Later the present author was obliged to use the series in the mid 1950s when planning a land use survey of the East London hinterland.

A sheet index of the UDF series survives marked “Not to be published” in the Library of the Trigsurvey in Cape Town.



(Figure 2) Index to S.A. Topo UDF Index/413. [April 1944] The crossed lines almost certainly indicate the sheets published in all styles.

The annotations are not explained, but appear to refer to maps compiled and printed after the end of the war, but were regarded as UDF products. Examination of all the known sheets reveals that the survey

began in Natal in September 1942. In the Cape Province coastal sheets were surveyed and compiled early in 1943, leaving those nearer Cape Town and those in the interior until later. For small areas where larger scale mapping existed, such as around East London, this source was also acknowledged. Last minute corrections were made to complex areas on the Witwatersrand and around Cape Town, putting back printing by a few months. Sheets were printed by the Government Printer in Pretoria and made available for official use soon after compilation, mostly in 1942 or 1943.

Generally the maps of this series are clear and legible, relief is shown by brown formlines at about intervals of 250 feet (m) and watercourses with their names are included together with pans, dams and marshes all in blue. Woodland, large orchards and sugar plantations appear in green, as do lines of trees and "natural bush likely to be an obstruction to movement". Black is reserved for settlements, place names, built-up areas, isolated buildings, mission stations and railways. Due to the sparse nature of houses and the more numerous native kraals (homesteads) the scatter of black squares or hut symbols are merely indicative of the existence of settlement in that area. Roads of various qualities are mostly prominently depicted in red. Features concerned with aviation are also in red. Power lines and telephone/telegraph lines in red complete the depiction of linear infrastructure. Bridges and concrete drifts (causeways) and useful features such as post offices, police posts, stores, mines and trigonometrical beacons and spot-heights in feet also appear in black. Black gridlines numbered in red signify the map's military purpose. Provision was made to show major features under construction such as new national roads and re-aligned railways. Lettering is mostly typeset and probably stuck onto the medium used to produce the black plate, but additional spot heights were drawn in.

(Figure 3) Part of UDF sheet 3228 Keimouth. Original scale 1:250,000 Revised, compiled, drawn 1943, reprinted 1951

Reprinting sheets from this UDF series came about more because the existing stocks had been exhausted and new editions had not been put in place. Relatively few sheets indicate that revisions were made, but these can show up on the reliability diagrams. Most sheets were reprinted, some more than once, up to 1963. Such reprintings were a short-term solution. Its chief advantage lay in "a manner suited for rapid reproduction and [was] not in a form suitable for maintenance as a permanent series".(6)

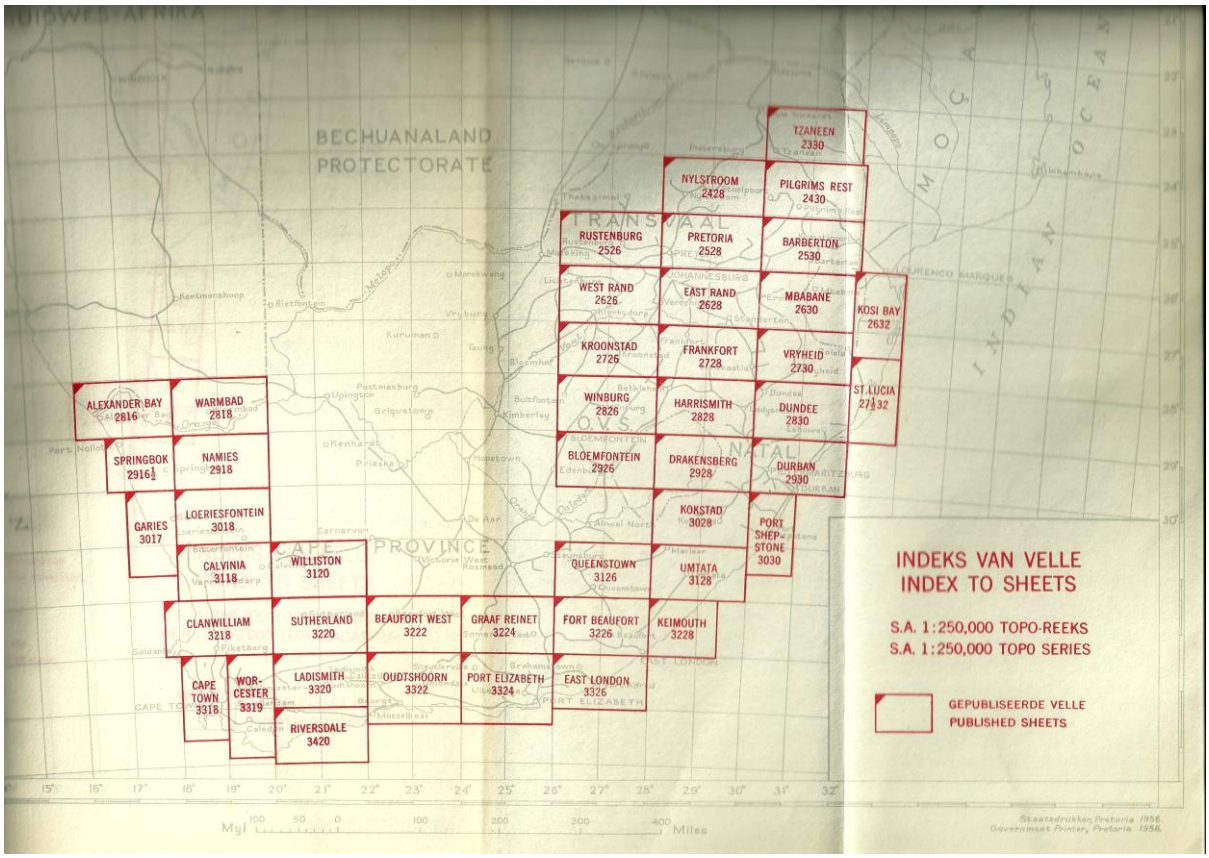
Understandably the Trigsurvey appears not have been satisfied with the look of the UDF map, regarding it as provisional. Its annual report for 1942 mentioned a pilot sheet 3318 of Cape Town with hand-drawn lettering which does not seem to have survived. However the annual report for 1944 is a reference to a pilot sheet also of Cape Town. As the regular sheet of Cape Town had been printed in September 1943, the hand-drawn pilot sheet may have been an essay for an improved design. In the 1944 Catalogue of Maps, under notes on the 1:250,000 map series it reads "This series is being redrawn in a new style. All roads will be in double black lines with main communications emphasised by red fillings". Such a map was

found in two British collections and has layer-coloured relief. As it was compiled in the Trigsurvey Office (TSO) in 1944 and was printed in 1946, it appears to be the printed version of the pilot sheet now lost. Despite the origin of the map it carries the designation UDF 400/445.

(Figure 4) Part of sheet 3318 Cape Town in improved style. UDF400/445. IInformation dated to June 1943. Original scale 1:250,000. Printed 1946.

This new map is strikingly different from its predecessor because now the roads are double-lined, and main roads are wider and are enhanced by a red fill. Typed names are now rather smaller than those on the usual UDF maps and names for mountains are sometimes curved to match the feature in question. More varied styles and sizes of lettering give the map an authority and a sense of balance. This is maintained by the use of green tree symbols for three classes of woodland and for natural or native bush. Gone are the swathes of screened green on the regular series. The layer colours are conventional with two greens for land up to 200 feet above sea level followed by increasingly dark browns up to 6000 feet, leaving vegetation still legible. There is no suggestion that this is considered to be a second edition. It must be assumed to be an improved design to be used in future and perhaps a suitable style for the comprehensive coverage of the entire country.

In fact yet more sheets are to be found in the two main collections examined in British libraries. These appear to have been added to the published sheet indexes. Those sheets appearing on late 1940s indexes were never drawn in the original style, but are graced by a style similar to the Cape Town sheet described as improved UDF maps, usually as First Editions. Accordingly I sought evidence for the emergence of a definitive second edition. Unsurprisingly the dates of second editions will vary across this large country, but are confused by a long period of experimentation with different styles. Fortunately at an early stage in investigating the 1:250,000 topographic series I was able to examine the record map collection at Trigsurvey in Cape Town where all the types and editions of each sheet had recently been filed together.(7)



(Figure 5) Trigonometrical Survey Office, Catalogue of Principal Series of Maps. June 1956. Chart 12, showing mostly the UDF and a couple of TSO sheets without distinguishing them.

STAGNATION?

We now find several new sheets which have either layer-coloured relief or cased roads or both. These are 2826 Winburg (1947), 2926 Bloemfintein (1945), 2330 Tzaneen (1946 and 1949) and 2428 Nylsroom (1947) However the annual report of the Trigsurvey for 1949 reports that the preparation of a detailed specification for a proposed series of topographical maps at a scale of 1:250,000 was on hand. No fieldwork had been undertaken, but some experimental compilations had been done.(8)

It is tempting to argue that these experiments were the sheets in the improved style of the UDF series. By 1950 consideration was being given to the revision of the 1:250,000 topographical series and some experimentation was taking place.(9)

Over the next few years there was little to mention on this subject except for the survey and mapping of small areas in one case for the Geological Survey. In 1954 field revision of the Cape Town and Worcester sheets was completed. The two sheets which appear to have benefitted from this revision are in the author's collection. Sheet 3318 Cape Town is described as the Third Edition, surveyed and drawn 1954 and printed 1955. Sheet 3319 Worcester is a Second Edition, surveyed 1954 and drawn 1955 and printed 1956. These designations are consistent in regarding the improved version, where it occurred, as a second edition. The 1959 report discloses that the eventual publication of the 1:250,000 topographical series depended on there being a complete set of 1:50,000 maps referred to as the Reconnaissance Series. It seems that ad hoc printing of 1:50,000 maps rather than whole blocks of them was delaying compilation of the 1:250,000 series. By 1960 the annual report mentioned field checking of three sheets: 3226; 3326 and 3420. These were published only in 1974, 1968 and 1964 respectively. Thomas records (10)

that map production at Trigsurvey had stagnated until the appointment of van Breda Smith in March 1961. At the urging of the Department of Defence priority was given to completing coverage of the whole country by 1;50,000 mapping replacing ad hoc production of mapping at that scale in response to local or factional interests. Linking this effort to the compilation of the derived 1:250,000 topographic map, it then became possible to complete the required 1:50,000 coverage for entire sheets of the smaller scale. Full coverage of the country at 1:50,000 was achieved in 1976.

SLOW PROGESS ON THE 1:250,000 TOPOGRAPHIC MAP

At first, in a combined report for 1961, 1962 and 1963 only one fairdrawing of a 1:250,000 sheet had been achieved (probably 3420 Riversdale). Reports for the next three years refer to lack of progress on the series as work on the 1:50,000 had priority. In 1965 the geodetic network was extended into the northern Cape Province to provide trigonometrical control for mapping at 1:250,000. Progress was still disappointing in 1966, but possibly owing to the introduction of scribing for fairdrawing, the pace of cartographic work dramatically increased in 1967. A two year report (1968-69) revealed that there were eleven published sheets and 34 in hand out of a total of 71 in the series. The annual report for 1970 confidently adds an index of maps of this series as at the end of 1970, showing 16 published. The next decade saw the completion of the task and its extension to South West Africa (Namibia). Completion of the series for South Africa was achieved in 1980 with the publication of the new style sheet for Durban, by which time revisions of earlier sheets was already under way.

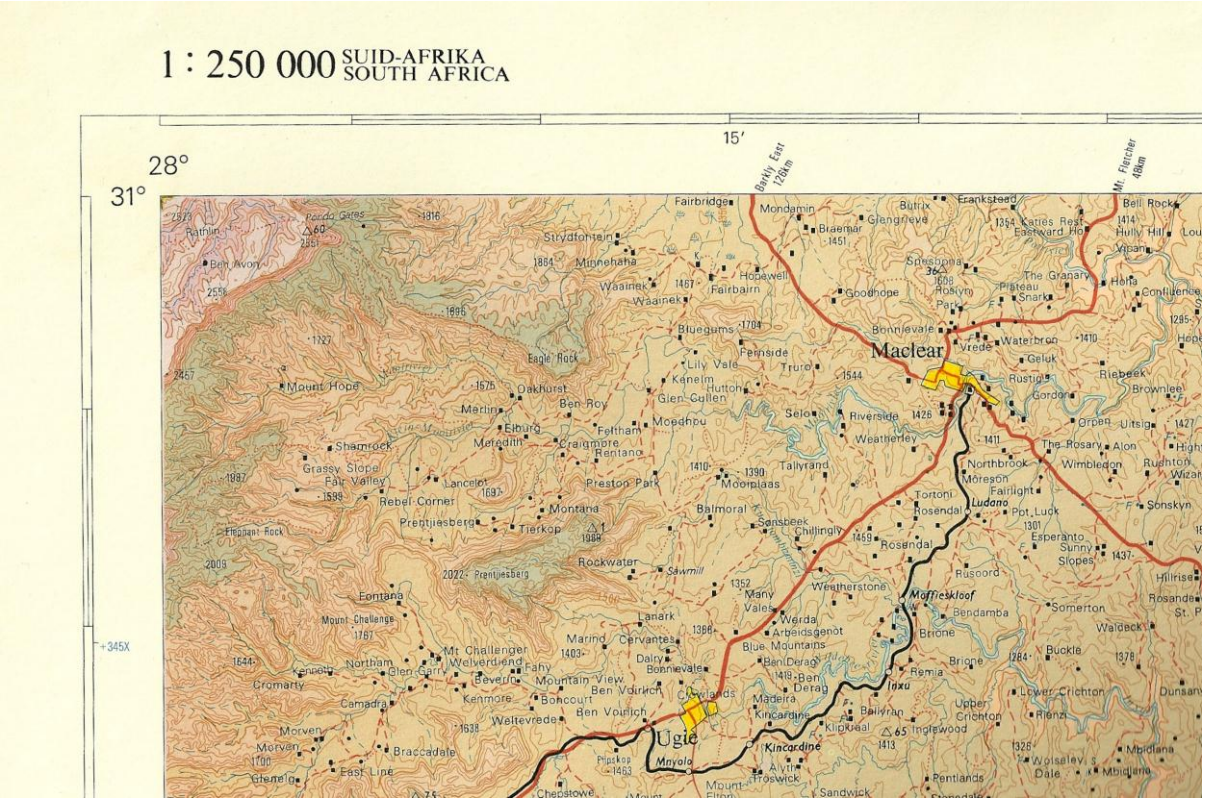
(Figure 6) Part of 3318 Cape Town, 3rd edition. Surveyed and drawn 1954, printed 1965. Uses the lilac grey fill for built-up areas. In the style laid down in the 1963 specification. Original scale 1:250,000

CHANGING STYLES

In the early 1960s a new style had emerged and was codified in a specification for the series.(11) A comparison between the second edition of 3328 Kei Mouth (1959) and the style chart (1965) displays little difference at first glance. The text of the specification indicates that built-up areas are to be shown in grey within a black-lined perimeter. Small centres, such as coastal resorts, which had been shown with an open circle, which were too small to be shown in the former manner, would be depicted by their pattern of roads and buildings. The contour interval is stated as 200 English feet. An extra contour at 500 feet is require to separate the lowest layer in deeper green from the next in pale green. Eight layer colours above 1000 feet graded from lighter to darker up to 8000 feet complete the range. Aerodromes are to be omitted. In order to comply with the employment of the two official languages (English and Afrikaans) the order of the languages alternates from sheet to sheet. This applies strictly to much of the explanatory text in the sheet border. Exceptionally a few common types of features were given letters such as P for Post Office and Poskantoor, or H for hotel. Stores, important in rural areas, were labelled W from winkel in Afrikaans, as S was allocated to School or Skool. Thus was the stage set for the large amount of drawing carried out in the cartographic branch in Pretoria. In effect the style adopted in 1963-65 had been employed on sheets produced in small numbers during the 1960s. As the production programme speeded up, a larger team of

draftsmen and women were required, necessitating the preparation of scribing instructions spelled out in the specification.

Such was the urgency to complete the topographic coverage of the country, once the topo-cadastral mapping had been completed in 1961, that the 1963 specification itself came under scrutiny. The topo-cadastral mapping also at 1:250,000 and on the same sheetlines as the topographic map employed a yellow filling for built-up areas. It was not long before the topographical series also began to replace the grey fill with yellow. Despite the built-up areas suppressing the layer colour, grey was not as visible as yellow, which gradually took over from about 1972. Indeed the large, new satellite townships which had sprung up around many towns and cities in the 1970s then became very visible. Previously they had been mostly categorised as a dense pattern of isolated buildings. Thus changes on the ground gave rise to evident changes in specification.



(Figure 8) Sheet 318 Umtata 2nd edition, then first since the UDF edition of 1943. Surveyed 1971, drawn 1972, printed 1973. Note the use of yellow fill for built-up areas, which show up well here. Note also the odd effect in the highest corner of the map above 2400 metres in the Drakensberg.

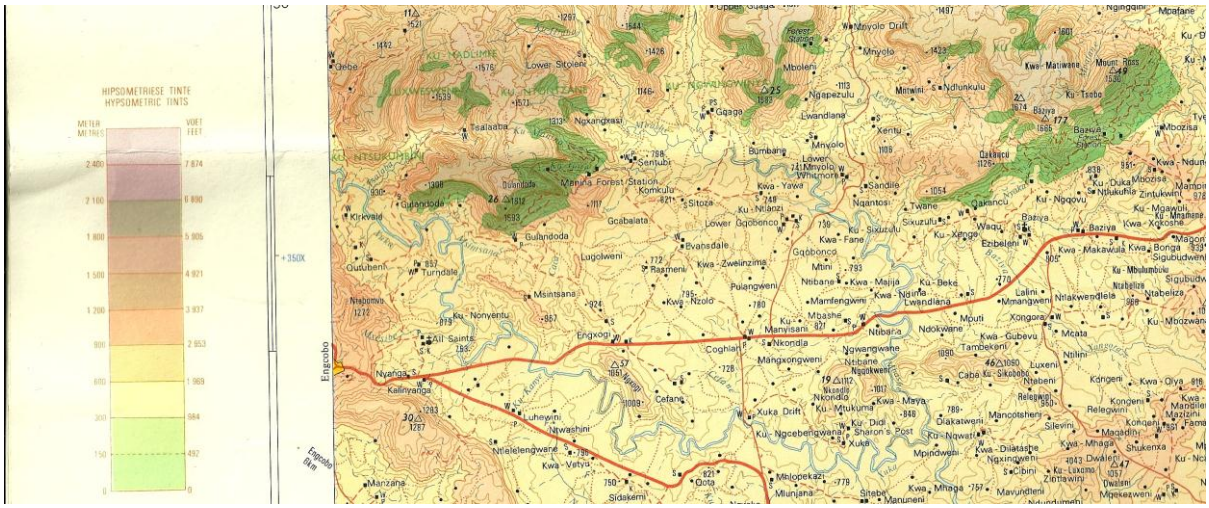
CONCLUSIONS

This paper has attempted to show how a war-time expedient was gradually turned into a regional scale map series by the mid 1970s. Maps in the UDF series were all produced in the 1940s and were regarded in the 1950s as First Editions of the definitive series. From 1945 a few sheets in an experimental style were published extending the original military sheets (also First Editions) as well as serving as exemplars for the Cape Town area. From the late 1950s the precursor to the new style began to appear and was soon codified in the 1963 specification. Sheet 3228 Kei Mouth, published in 1959, provided a useful model as there was plenty of space on it for all the usual detailed instructions to the cartographers. As each sheet was revised and redrawn on the new specification it was recognised as a Second Edition. There were few exceptions to this rule.(12)

For that part of the interior which had not been included in the UDF series all the 26 sheets in the new style are First Editions. This paper has shown how the transition from a military map was on the whole successfully transformed into a civil map by a government agency over a period of some thirty years. Priorities to complete 1:50,000 coverage at first delayed much progress on the 1:250,000 series, but the larger scale was naturally the source material for the smaller scale.

FURTHER RESEARCH

Perhaps the greatest remaining problem lies in the adaptation of the layer colouring system to a country which contains many densely populated areas in relatively flat terrain at high elevations.



(Figure 9) Sheet 318 Umtata 2nd edition, the first since the UDF edition of 1943. Surveyed 1971, drawn 1972, printed 1973. Original scale 1:250,000. Note the large range of heights required and the uneven gradation in the higher zones.

Watson had recognised this dilemma in the 1970s and began some experiments to see how different schemes of layer colours would look.(13)

Indeed there are on record two versions of the sheet 3218 Clanwilliam. One is conventional and the other reverses the range of colours starting with the browns at sea level and working up to the greens in the mountains. To say the least, the effect is unsettling. Consistency between sheets has obviously been a problem because the range of elevations requires up to ten layers. Conventional ranges from greens, through buff to browns of increasing darkness have proved hard to employ on some sheets examined for this paper and there is evidence that improvements were made within the currency of a single edition. The relation of the topographic with the topo-cadastral series at the same scale has not been studied here, but is worthy of closer examination. As always, errors are those of the author. Conclusions and interpretations are subject to the discovery of new exemplars.

ACKNOWLEDGEMENTS

To the late Mr W.C. Watson of Trigsurvey, Pretoria who introduced me to the series and was involved in its evolution; to Prof. Elri Liebenberg who first reviewed the entire history of South African mapping.. I have benefitted greatly from help freely given by the map curators and other staff of the Trigonometrical Survey in South Africa, the Royal Geographical Society (with the IBG), the Bodleian Library, Oxford and the National Library of Scotland.

1 Liebenberg, E.C. 1997. Mapping British South Africa: The Case of G.S.G.S. 2230. Imago Mundi, 49, 129-142

2 Board, C. 2008. The style sheet for the War Office series GSGS1764, Cape Colony Reconnaissance Series. in Liebenberg, E., Demhardt, I.J. and Collier, P. (eds) Proceedings of the Symposium on the History of Cartography "Shifting Boundaries. Cartography in the 19th and 20th centuries, Portsmouth, 10-12 September. pp.1-13.

3 Watson, W.C. 1970. A Study of the Generalisation of a Small-Scale Map Series. International Yearbook of Cartography, 10, 24-34

4 Clough, A.B. Maps and Survey. The Second World War 1939-1945. Army. The War Office, London, 1952. esp. pp.534, 536. Wongtschowski, B.E.H. 1990. Between Woodbush and Wolkberg. Googoo Thampson's Story. 2nd edition. Haenertsburg (the Author) p.153. Thomas, P.W. 1982. The topographical 1:50,000 map series of South Africa. S.A. Journal of Photogrammetry, Remote Sensing and Cartography, Vol. 13(2) pp.77-88. This is the first of four parts published 1982-84.

5 Forbes, V.S. 1965. Pioneer Travellers in South Africa. Cape Town (A.A. Balkema). His Notes reveal the extent to which Forbes used this series. This work is based on two decades of research.

6 Huntly, G.R.N. 1949, in an unpublished report TSO D.310 Notes on the present state of a national poicy for topographical surveys. cartography ..... 29.9.1949, quoted by Liebenberg, E.C. 1978. Die Topografiese Kartering van Suid-Afrika, 1878-1972 'n Histories-Geografiese Ontleding. Masters thesis, University of South Africa, Pretoria, p. 379

7 I am indebted to Derek Clarke, Mariana French and staff at Trigsurvey. UDF maps were produced under the authority of the Director of Military Survey who was also the Director of Trigsurvey. The latter term ceased to have currency in 1971. See chapter 10 in The Chief Directorate of Surveys and Mapping, 80th Anniversary 1920-2000, published by the Department of Land Affairs, Republic of South Africa, 2000.

8 Trigsurvey Annual Report 1949, p.11.

9 Trigsurvey Annual Report 1950, p.12

10 Thomas, P.J. 1983. The Topographical 1:50,000 Map Series of South Africa, Part 3. S.A.Journal of Photogrammetry, Remote Sensing and Cartography, Vol. 13(5), pp.335-36.

11 South Africa, Trigonometrical Survey Office, Cartographic `instruction No. 1. Specification for the S.A. 1:250,000 Topographical Series. Part 1, October 1963. Its Appendix C A Style Chart for Scribing, is a complete sheet to illustrate the application of the specification, viz 3328 Kei Mouth, printed in 1965. A large expanse of ocean allows other instructional detail to be included.

12 Exceptions are noted where a map has been given a new sheet name e.g.3226 King William's Town or has such a major amount of revision that it could be regarded as almost a new map e.g.2626 West Rand.

13 Watson, W.C. personal communication