

**PETRONAS
PETROLIAM NASIONAL BERHAD
MALAYSIA**

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(595)

**REPORT TO THE SAR ACQUISITION
CONTRACTOR CONCERNING QUALITY
ASSESSMENTS OF THE SAR DATA
ACQUISITION AND PROCESSING FOR
SABAH & SARAWAK**

September 1992

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A. Individual Mosaic Sheet Assessments

CHAPTER 1

1. INTRODUCTION

The sixth QC visit was undertaken by J.W. Trevett from the 2nd to 18th August in Kuala Lumpur.

During this visit, a combined meeting was held between Petronas, Intera and Mr. Trevett when the major outcome of the QC was discussed and actions resulting were agreed.

The findings of the QC have been made fully recognising the problems associated with the construction of mosaics from any type of imagery, especially where the mosaics are classed as semi-controlled. The tolerances for mosaics constructed from various types of air photographs are well defined as are those for satellite imagery, and experience from using radar mosaics for national coverage in other countries, shows that the problems are similar.

2. OVERVIEW OF THE QC PROCEDURES

The QC of the delivered items concentrated on the mosaic sheets, in particular the 1:50,000 series. This was based on the assumption that since the mosaics were constructed from the strip images any defects in the mosaic image would indicate defects in the strips. Similarly since the 1:50,000 mosaics were derived by segmenting the 1:100,000 mosaics, the quality should be comparable.

The principal consideration was the availability of a map series, for all of Sabah and Sarawak, at 1:50,000 scale. The radar survey had used this series as the basis for designing the mosaic sheet layout, and had used the same referencing system and sheet numbering. The cut lines had the same Latitude and Longitude numbering. Earlier discussions had considered the problems of relating sheet dimensions and the use of the same projection data.

It was further understood that the relationship between the maps and the radar mosaics was considered important to both Petronas and other potential users, in order to satisfy the requirement to be able to compare the radar mosaic information with other map based data.

The QC therefore concentrated on comparing each 1:50,000 mosaic with the corresponding map sheet after first examining the mosaic for overall image quality.

The comparison was based upon achieving the best mean fit between the two data sets, ideally this would mean fitting the sheet corners and comparing the relationship of the mapped detail. In reality the differences between the two graticule systems was such that the fitting of the corners did not result in a fit of the detail and this method could not be used.

The best mean fit was therefore achieved by identifying comparable points of detail on both the map and the mosaic, usually coastline or drainage detail, and matching the two over a light table in such a way that the differences in location were evenly equated over the area radial from a centre point.

The best mean fit was found to be suitable to detect any serious distortions in mosaicing and for assessing the overall relationship between the map detail and the mosaic. It must be understood that where, in the detailed assessments, the relationship is shown to be satisfactory, this does not mean that an overall perfect fit was achieved. What it does indicate is that given the type of terrain and the normal errors and distortions that can be reasonably expected to occur in radar mosaicing, the differences in relative position of the detail are within acceptable limits.

The maps, where contoured, give a good representation of the relief and it is possible to relate the trends in the relief as exhibited on the radar mosaic to the expression of relief as given by the map contours; this relationship was used to assess the overall reliability.

Each individual sheet assessment includes a comment on the relationship of the detail on the mosaic to the map.

In order to record some measure of the difference between the map graticule and that shown on the mosaic, the relationship between the two was measured at the NE corner after achieving a best mean fit. The measurements shown in the detailed records refer to the position of the mosaic relative to the map, thus E +7 N - 5 would indicate that the mosaic was 7mm East of the map and 5mm South.

The maps used were paper copies and often many years old, thus they could not be relied upon to be true to dimension or scale. At the same time the mosaics are on photographic paper and have different distortion characteristics. Overall the mosaics were found to be larger than the maps. By using the system of comparison described above some indication of the relationship between the two bases could be given which, whilst not precise, would indicate any possible errors in mosaic construction.

3. CHECK MEASUREMENTS

Intera suggest that a measurement check is the method approved in the contract, and is expressed as; any comparison of the measured distance between two well placed points of map detail and the same two points of detail identified on the mosaics, should agree to within one per cent.

This system has not been used for the following reasons:

- a) it would be necessary to calculate the true scale of both the map and the mosaic and to ensure that there was a method of compensating for any internal distortions;

- b) the detail selected would have to be at the same altitude in order to minimise the effects of height distortion; and
- c) the points would need to both be in the near range of the radar in order to further minimise the oblique/height effect.

In order to test the 'measurement check' system, three 1:50,000 mosaic sheets were selected in a relatively flat area where the maps could be shown to be recent and reliable. Measurements were made both diagonally across the sheets in order to take in a number of strips of data, and horizontally across the sheets within the area of a single strip.

The evidence from this test was sufficient to indicate that had these rules been applied, the one per cent level of agreement would not have been met. It is very doubtful if such a level could be achieved on any of the sheets and if strictly applied would have resulted in a more serious rejection of the mosaic sheets.

It should be pointed out that one per cent error is the same whatever the scale so that using the 1:50,000 mosaics or the 1:100,000 mosaics would not alter the findings. To test this the same measurements were made on the 1:100,000 sheets with the same results.

The empirical method based upon the best mean fit described in section 2 takes into account the severity of the terrain and other factors as described, before making a judgement and is regarded as more practical.

4. THE MAPS

The maps available at 1:50,000 scale have been variously produced by the British Forces (survey section of the Royal Engineers), the U.K. Government Department of Overseas Surveys or the Federal Survey of Malaysia and must be taken as the authoritative data base.

Comparison with the radar data shows that in some areas local changes in the coastline have occurred, in others, especially the flatter flood plains, some changes have occurred in the course of rivers. In urban areas obvious expansion and road changes are visible and in rural areas changes related to clearance of forest and subsequent development can be seen.

In the sheet assessments a record is made of the date of the mapping and the date(s) of any air photography. On the more recent Federal Survey editions the date of photography is not recorded; this does not however mean that the map has not been constructed from air photographs.

5. RADAR QUALITY

In earlier QC reports the problems of commenting on the performance of the radar system in accordance with its specifications, were outlined.

A visual inspection of the data indicated that the standard has remained constant throughout the survey and that factors such as the tonal quality, the signal to noise ratio, the occurrence of system artifacts (antenna patterns, gain control etc.), interference from point spread caused by dominant radar targets, the incidence of rain shadow or weather turbulence, are not apparent or have been reduced to a level that does not impede the interpretation.

An inspection of certain details appearing on the image, for example street lighting in one instance, indicated that the resolution was within specification.

Overall the quality of the imagery is of the highest order and well suited to the applications for which it was acquired and with potential for a wider range of interpretation applications.

At the beginning of the flying programme, the decision was made to realign the original flight lines for Sabah to ones better suited to the grain of the country. Examination of the imagery showed that this was a correct decision and overall the best expression of relief had been obtained.

Given the changes in the relief between fairly flat areas and severe mountains, the depression angle used has ensured that in areas of low relief the maximum expression of useful information has been achieved without resulting in over-extensive shadows in the areas of severe terrain.

Examination of the strip imagery in stereoscopic mode indicated that for many applications this will be of great value.

6. MAP TO MOSAIC RELATIONSHIP

It was evident from the first comparison of the mosaics to the maps carried out in March 1992, that the graticules did not match. Although no clear trend could be detected, it was reasonable to conclude that the differences between the two data sets, were largely attributable to differences in the construction of the base projection.

Whilst this difference was not ideal, provided that the difference was consistent and the detail could be matched reliably, it was considered that a cautionary note on the mosaic would be adequate to alert users and to recognise the problem.

Following the present QC and an examination of all the map sheets and mosaics, no logical trend in the relative displacement could be identified. It is therefore concluded that the problem is of a more serious nature.

There is adequate evidence that the mosaics are in general larger than the maps. This cannot always be attributable to variations in the paper distortion of the maps and therefore indicates that the mosaics are at a slightly different scale. The difference is not

considered to be significant on a sheet by sheet basis, but could be a factor over long distances measured over several sheets.

The variations in the shift of the graticule are thought to be the result of the variations of the mosaicing of each 1:100,000 quad and are discussed in section 7 of this report. As a result of this variation it is not possible to calculate the actual amount of the graticule shift or to suggest a correction figure that could be added to the cautionary note.

7. MOSAIC TO MOSAIC RELATIONSHIP

In the March QC visit the variations in the mosaic to map fit were noted and recorded. At that stage the blocks examined were not sequential and many of the map sheets were not available, and so a full analysis of the trend was not possible and the observed errors attributed to the variations in the projections.

It was also assumed that the whole area of each state had been digitally mosaiced as a single file and that the values for the projection graticule added to this digital model to provide precise cut lines. This is normal practice and ensures that the cut lines of the mosaics are accurate and match.

It was evident that each state had not been mosaiced as a whole but had been mosaiced block by block and only the internal cut lines of the block added from the computer. Each block had been constructed independently so that the result can be compared to a series of tiles, with each tile being a 1:100,000 sheet, which when laid out on the floor would overlay each other, be at different angles or would have gaps between.

Whilst the fit to map could be accepted, it was considered that these differences in fit, which were as much as three millimetres in places, were not. The combined effect of failure to fit to the maps and to adjacent mosaic blocks meant the assertion that the mosaics were on a map projection and the edges had precise values in latitude and longitude could not be upheld.

It was known that the mosaic's primary use would be for geological interpretation and although the strips would be used for detailed interpretation, the mosaics would be used to observe regional trends. Any variations in location between the mosaics would impair this requirement for regional observation. Finally it was known that there was a requirement to correlate with other data sets such as seismic records which were recorded on the map base.

Thus the combined effect of the failure of the mosaic construction to agree with the map series or internally between mosaic blocks, lead to the conclusion that the mosaics did not satisfy the expectations or requirements of Petronas or its potential users and the mosaics should be rejected.

8. OTHER DISCREPANCIES

Other than the block to block discrepancies, no apparent serious distortions in mosaicing comparable with those noted during the March QC were observed.

It was noted that in many instances where data limits or international boundaries were masked on the mosaics, the masking did not agree across the sheet boundary. This did not appear to affect the coverage up to the boundary but should the sheets be joined together to form a wall display, then the misalignment will be intrusive.

Where the coastline runs diagonally across a 1:100,000 sheet through the sheet centre, the subsequent segmentation into four 1:50,000 sheets has occasionally resulted in a loss of recorded detail at the larger scale for the quad where the coast marginally crossed at the centre.

Some of the 1:50,000 mosaics have been made oversize in order to accommodate minor extensions of detail rather than make a mosaic with only a small area of interest. There are however other cases where a 1:50,000 sheet has been made of a small area which would have been better included as an extension to an adjacent sheet. This appears to be the result of block segmentation, that is the areas are included if they fall within a block but excluded if in another block.

There is an apparent problem where offshore islands are involved. The relative location of the islands either to each other or to the main land is often at variance with the map. In this case it is difficult to establish which is correct although preference is given to the map since it will also have been compiled using admiralty chart data.

It is probable that errors will occur when carrying mosaics across a water body. This is minimised with radar since it is strip imagery and not individual photographs. The water is a featureless area and co-location of detail relies entirely on the GPS data.

As long as the island itself relates to the island as shown on the map, irrespective of its location relative to other land areas, the sheet has been accepted; but it is recommended that users are made aware of the potential differences in location.

In general the international boundaries are adequately covered. Along the Indonesia border the cover is generally good but there are some minor gaps in the south of Sarawak, these are usually covered on the strip imagery and do not warrant rejection.

Difficulties were known to exist on the Brunei border. Whilst this is in the main covered satisfactorily, the gaps that occur are in accordance with the known gaps in the data observed during the flying campaign. The two sheets that cover the area of Sarawak that is bounded on three sides by Brunei (4/114/4 & 4/114/8), are a good example of the failure to match masking as well as the sheets themselves, these two sheets relate to

other sheets except at the bottom of 4/114/8, and the failure to match the edges of the sheets is poor presentation.

In both the 50,000 and the 100,000 series some mosaics were made before it was agreed to add names and the style of lettering used varies in the series, it is strongly recommended that with the need to reprint all the mosaics, the opportunity should be taken to complete the naming and to standardise the type styles.

At the same time the opportunity should be taken to change the sheet location index on the 1:50,000 mosaics to the block of nine sheets with the central sheet being the sheet referenced, rather than the present block of four which leaves two adjacent sheets unreferenced.

It has been agreed that the new sheets will also include a cautionary note on the limitations of a radar mosaic especially with respect to the location of hills and the taking of measurements.

All of the mosaics have been examined. As an appendix to this report each mosaic examined during this QC has been listed together with notation on its relationship to the map, the quality of the mosaic, and any other comments. All major factors have been highlighted, these included the incorrect sheet names and positional differences. Some minor factors have been noted but given the intended use of the mosaics and taking into account the recognised inherent problems of a semi-controlled mosaic, these are not regarded as warranting rejection of the data.

It is recognised that improvement in the positional accuracy of the data can only be obtained either by rectifying the data to a digital terrain model to take into account the height distortions, or by using a proper block adjustment routine linked to map data as control points, ideally by a combination of the two.

The use of block adjustment related to map control points would have been the best solution for the current application and may still be necessary. It is understood that the contract costs did not include this solution.

9. DIGITAL DATA

It was considered impractical to verify each and every digital tape that had been delivered. To do so would have taken considerable time, it has to be accepted that all the tapes will contain the data as labelled and that if it is found in use that this is not so, then the tape will be remade.

Three tapes were selected at random and taken to the Remote Sensing Centre, after some initial problems the tapes were read into the computer and a display of the data achieved. The initial problems occurred because the format of the tapes was not specified and the header was not clear. It is essential that all of the tapes contain clear

header information and statement of the format used. It was only the experience of the centre's operator that enabled the tape to be read and an image displayed.

It should not be difficult for TCT to obtain a proper set of tape header data and to re-run each of the delivered tapes to add the information.

10. ADDITIONAL COMMENTS

During the joint discussions referred to in section 10, it was agreed that a cautionary note would be included on each mosaic sheet. The final wording was not decided but the note should call attention to the differences between the map and mosaic projections as well as warning against using the mosaic for measuring distances or slope.

A possible form of words is given here for guidance:

" This is a semi-controlled mosaic, constructed from side looking airborne radar, it should not be used for making any precise measurements of distance or for estimating slopes. Differences between the construction projections used for the National 1:50,000 map series and the mosaics will result in some displacement between the graticules."

APPENDIX A

INDIVIDUAL MOSAIC SHEET ASSESSMENTS

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The following is a list of 1,000,000 and 1,000,000 mosaic sheets examined during the QC work. For each sheet of the 1,000,000 series, unless the difference in the fit to the map is given, together with a comment on the fit to data, the date of the map, the source of the air photography (where available) from which it was constructed and finally any other comments on special work or reference sheets.

Some of the sheets were reviewed after the meeting when it was decided that all the sheets would be reviewed and returned to be re-formatted, those have been marked with an 'X' and do not have references to fit to other sheets.

The differences in fit to the maps have been measured at the NE corner after achieving a best fit to it and are in millimetres showing the relationship of the mosaic to the map.

Where the details shown as being 'OK', this means that having achieved a best fit to the aerial photography of the mosaic, the map was within acceptable standards, given the tolerances involved and the normal standards to be expected from reviewing air photography.

APPENDIX A

INDIVIDUAL MOSAIC SHEET ASSESSMENTS

Errors or omissions are reported in this column to each other, as given in column and column.

9/1182 E OK N-0m2
Detail OK (reference boundary covered)
Map 1364 Photos 1952-54
0/110/3 (ref 0717071-045) (0/3 portion) overlap of 4mm, cut lines to not match

9/1193 E OK 35OK
Detail OK (reference boundary covered)
Map 1363 Photos 1951

1/1282 E-sum N-0m2
Detail OK
Map 1365 Photos 1955

1/1282 E-sum N-0m2
Detail OK but 25000740 not 25000740
Map 1365 Photos 1955

APPENDIX A

INDIVIDUAL MOSAIC SHEET ASSESSMENTS

The following is a list of 1:50,000 and 1:100,000 mosaic sheets examined during the QC visit. For each sheet of the 1:50,000 scale series the difference in the fit to the map is given, together with a comment on the fit to detail, the date of the map, the dates of the air photography (where available) from which it was constructed and finally any other comments on quality or fit to adjacent sheets.

Some of the sheets were examined after the meeting when it was decided that all the mosaics would be rejected and returned to be re-formatted, these have been marked with an* and do not have reference to fit to other mosaics.

The differences in fit to the maps have been measured at the NE corner after achieving a best mean fit and are in millimetres showing the relationship of the mosaic to the map.

Where the detail is shown as being OK, this means that having achieved a best mean fit, the overall relationship of the mosaic detail to that on the map was within acceptable tolerances, given the terrain involved and the normal distortions to be expected from mosaicing and a rectified oblique view.

Errors or serious discrepancies in fitting mosaics to each other, are given in italics and bold type.

<u>0/110/3</u>	E OK N -6mm Detail OK Indonesia boundary covered Map 1965 Photos 1950-51 <i>0/110/3 and 1/110/14(0/110/2 portion) overlap of 4mm, cut lines do not match</i>
<u>0/110/4</u>	E OK N OK Detail OK Indonesia boundary covered Map 1965 Photos 1951
<u>1/109/3*</u>	E -5mm N -2mm Detail OK Map 1965 Photos 1965
<u>1/109/4*</u>	E -6mm N -1mm Detail OK <i>but SEMATAN not SEMANTAN</i> Map 1965 Photos 1965

- 1/109/7* E-4mm N -3mm
Detail OK Partial boundary missing
Map 1965
- 1/109/8* E -3mm N-8mm
Detail OK
Map 1965
- 1/109/12* E -7mm N OK
Detail OK Indonesia boundary covered
Map 1973 Photos 1947/54 & 72
- 1/110/5 E -4mm N -2mm larger N-S
Detail OK
Map 1965 Photos 1948 & 56
- 1/110/6&2 E -5mm N OK
Detail OK
Map 1977 Photos 1972
- 1/110/7 E -8mm N +4mm larger N-S
Detail OK
Map 1965 Photos 1947 & 65
1/110/6&7 bad fit, 7 up about 2mm
- 1/110/8 E -8mm N part sheet not able to assess
Detail OK
Map 1965 Photos 1947 & 65
1/110/8 & 1/111/5 Gap
- 1/110/9 E -4mm N OK
Detail OK
Map 1965 revised 1972 Photos 1954 & 1972
1/110/9 & 110/5 overlap 6mm
- 1/110/10 E -3mm N -7mm
Detail OK
Map 1974 Photos 1954 & 72
1/110/10 is 7mm East of 110/6
- 1/110/11* E OK N OK
Detail OK
Map 1965

1/110/12* E OK N OK
Detail OK
Map 1965 Photos 1965

1/110/13 E OK N -7mm
Detail OK Indonesia boundary covered
Map 1965 Photos 1954

1/110/14 E OK N -6mm
Detail OK Indonesia boundary covered
Map 1965 Photos 1965

1/110/15* E -10mm N +2mm
Detail OK
Map 1976

1/110/16* E -10mm N OK
Detail OK
Map 1965 Photos 1965

1/111/1 E OK N OK
Detail OK
Map 1970 Photos 1968
1/111/1 & 2/1111/13 2mm overlap and 111/1 is 10mm East

1/111/2 E OK N OK
Detail OK
Map 1970 Photos 1968
1/111/2 & 2/111/14 2mm overlap and 111/2 is 8mm East

1/111/3 E -3mm N-5mm
Detail difficult to fit but no error detected
Map 1969
1/111/3 & 111/2 overlap 7mm and some distortion of detail at edge

1/111/4 E -3mm N -2mm
Detail OK
Map 1969

1/111/5 E OK but larger N -7mm
Detail OK
Map 1969

- 1/111/6 E -2mm N -7mm mosaic does not appear to be parallel .to sheet
Detail OK
Map 1969
- 1/111/7 E OK N -8mm
Detail OK
Map 1969
Poor masking SW corner of sheet, 111/6 & 7 4mm overlap
- 1/111/8 E OK N OK
Detail OK
Map 1969
- 1/111/9 E -6mm N OK but larger N-S
Detail OK
Map 1973
1/111/9 & 111/5 overlap 10mm and 5 is 4mm East
- 1/111/10 E -5 N OK
Detail OK
Map 1973
111/10 & 111/6 overlap 10mm, 6 is 3mm East some antenna and gain pattern
- 1/111/11 E -5mm N OK but larger N-S
Detail OK
Map 1973
1/111/11 & 10 3mm gap, 111/11 & 111/7 overlap 7mm & 7 is 6mm East
- 1/111/12 E -4mm N +2mm
Detail OK
Map 1976
11/12 & 111/8 overlap 8mm & 8 is 6mm East
- 1/111/13 E -6mm N +2mm
Detail OK Indonesia just covered, **PASAR PANTU not BANTU**
Map 1974
- 1/111/14 E -10mm N +2mm
Detail OK Indonesia boundary covered if the watershed, but does not agree with the map.
Map 1974

- 1/111/15 E -5mm N -2mm
Detail OK Indonesia just covered
Map 1974
- 1/111/14 & 15 gap
Detail OK Indonesia covered
- 1/111/16 E OK N OK
Detail OK Indonesia covered, note new lake (artificial)
Map 1976
- 1/112/1* E -10mm N -2mm
Detail OK Photos 1964
Map 1967 Photos 1962-3
- 1/112/2* E OK N OK
Detail OK Photos 1965
Map 1968 Photos 1962-3
- 1/112/3 E -5mm larger overall N -5mm
Detail OK Photos 1964
Map 1968 Photos 1962-64
- 1/112/3 & 2/112/15 15 is 10mm West and possible gap
Detail OK
- 1/112/4 E OK N OK but both larger
Detail OK
Map 1968 Photos 1963-64
112/4 & 112/16 edge suspect
Map 1968 Photos 1964
- 1/112/5* E +2 N -2mm
Detail OK
Map 1968 Photos 1962-3
Map 1968 Photos 1963
- 1/112/7 E OK N -4mm
Detail OK Indonesia boundary covered
Map 1968 Photos 1962-3
Map 1968 Photos 1963
- 1/112/8 E +4mm N -6mm
Detail OK Indonesia boundary covered
Map 1968 Photos 1963-4
Map 1968 Photos 1963
- 1/112/9 E OK N +4mm
Detail OK Indonesia boundary covered
Map 1980 Photos 1973
Map 1980 Photos 1973

1/112/10 **Sheet too small to match with maps and should be added to 1/112/6
112/10 & 112/9 cut lines do not agree**

1/112/13 E OK N OK
Detail OK Indonesia covered
Map 1972
112/9 & 112/13 cut lines do not match

1/113/1* E OK N +4
Detail OK
Map 1966 Photos 1964

1/113/2* E +3mm N -3mm
Detail OK but sheet not true to square
Map 1965 Photos 1965

1/113/3* E OK N OK but mosaic larger
Detail OK
Map 1966 Photos 1964

1/113/4* E -3MM N +6mm
Detail OK
Map 1966 Photos 1964

1/113/5* E +10mm N -4mm
Detail OK
Map 1966 Photos 1964

1/113/6* E OK N -5mm
Detail OK
Map 1966 Photos 1965

1/113/7* E OK N -2mm
Detail OK
Map 1966 Photos 1965

1/113/8* E +5mm N -4mm
Detail OK
Map 1966 Photos 1965

1/113/9/ E OK N +5mm
Detail OK Indonesia boundary OK
Map 1966 Photos 1965

- 1/113/10 E -4mm N +4mm
Detail OK Indonesia boundary covered
Map 1966 Photos 1965
- 1/113/11 E -4mm N OK
Detail OK Indonesia boundary covered
Map 1966 Photos 1966
1/113/11 and 1/113/10 overlap at southern edge of 5mm, not parallel
- 1/113/12 E OK N OK but mosaic larger
Detail acceptable Indonesia boundary covered
Map 1966 Photos 1966
1/113/12 & 1/114/5 southern part edges do not agree, gap?
- 1/114/1 E +6mm N OK but mosaic larger
Detail OK
Map 1968 Photos 1964
1/114/1 & 2/114/13 overlap 13mm and 114/13 is 12mm East
- 1/114/2 E +5mm N +2mm
Detail OK
Map 1968 Photos 1964
1/114/2 & 2/114/14 overlap 15mm and 114/14 is 14mm East
- 1/114/3 E +6mm N OK but mosaic larger
Detail OK Indonesia boundary covered
Map 1967 Photos 1966
Edge between 2 & 3 match not good
1/114/3 & 2/114/15 overlap 7mm and 15 is 9mm East
- 1/114/4 E -5mm N +7mm
Detail OK Indonesia boundary covered
Map 1968 Photos 1966
GUNONG MAKITAI not MEKITAI
1/114/4 & 2/114/6 cut lines do not match, 8mm overlap and 6 is 14mm East
- 1/114/5 E +15mm N OK
Detail OK
Map 1966 Photos 1964
SUNGAI SERANI not SERARI
- 1/114/6 E +14mm N -3mm
Detail OK Indonesia boundary covered
Map 1966 Photos 1966

- 1/114/7 E +18mm N -3mm
Detail Indonesia boundary covered but top strip of mosaic not in such good relationship to the remaining strip to map fit, however acceptable as being within the normal limits of mosaicing.
Map 1967 Photos 1966
1/114/6 & 7 edges do not agree, suspect a gap
- 2/111/3* E OK N OK
Detail OK several coastal changes
Map 1973
- 2/111/4* E +6mm N OK
Detail OK
Map 1973
- 2/111/6&2 E -10mm N OK mosaic larger
Detail, relationship of the peninsular to the mainland is not good, some coastal changes have occurred but not in a manner to account for the differences.
Map 1973
- 2/111/7* E +5mm N -3mm
Detail OK
Map 1973
- 2/111/8* E +4mm N -10mm
Detail OK
Map 1973
- 2/111/9&10 E -4mm N OK but mosaic larger
Detail OK
Map 1973
- 2/111/11* E +4mm N OK but mosaic larger
Detail OK
Map 1973
- 2/111/12* E OK N OK but mosaic larger
Detail OK
Map 1973
- 2/111/13 E -12mm N OK but mosaic 5mm larger
Detail OK
Map 1968

- 2/111/14 E -10mm N -2mm and 5mm larger
Detail OK
Map 1969
- 2/111/15 E -2mm N -4mm
Detail OK
Map 1969
SARIKEI BINATANG not BIMATANG
- 2/111/16 E OK N -4mm
Detail OK
Map 1970
- 2/112/1 E -5mm N OK but 5mm larger
Detail OK but antenna banding
Map 1974 Photos 1972
- 2/112/2 E -4mm N OK but 5mm larger
Detail OK but antenna banding
Map 1973 Photos 1972
- 2/112/3 E +4mm N OK but 5mm larger
Detail OK but antenna banding
Map 1973 Photos 1972
2/112/2 & 3 edge does not match some evidence of gap and possible displacement
- 2/112/4 E +4mm N OK but larger
Detail OK
Map 1973 Photos 1972
- 2/112/5 E +4mm N OK but larger
Detail OK
Map 1973 Photos 1972
- 2/112/6 E OK N OK but larger
Detail OK
Map 1973 Photos 1972
- 2/112/7 E +4mm N OK
Detail OK
Map 1973 Photos 1972
112/7 & 6 edge does not match, gap?

- 2/112/8 E +6mm N OK but larger
Detail OK
Map 1973 Photos 1973
112/8 & 4 2mm overlap, 2/112/8 & 2/113/5 edges in error
- 2/112/9 E -4mm N -3mm
Detail OK
Map 1973 Photos 1972
112/9 & 112/5 overlap 4mm and 5 is 8mm East
- 2/112/10 E -4mm N -3mm
Detail OK
Map 1973 Photos 1972
112/10 & 112/6 slight overlap and 6 is 8mm East
- 2/112/11 E -4mm N +5mm
Detail OK
Map 1975 Photos 1972
112/10 & 11 11 is 5mm North, 112/10 & 112/7 overlap 3mm and 7 is 18mm East
- 2/112/12 E -2mm N +5mm
Detail OK
Map 1975 Photos 1972
112/12 & 112/8 2mm overlap and 8 is 16mm East
- 2/112/13 E -6mm N -6mm
Detail OK
Map 1973 Photos 1972
KANOWIT not KANONIT
- 2/112/14 E -3mm N -4mm
Detail OK
Map 1973 Photos 1972
- 2/112/15 E -16mm N +2mm
Detail OK
Map 1974 Photos 1973
2/112/15 & 14 edges do not match, below the 5 minute line overlap is 15mm, above this up to 8mm but river does not match. 112/15 & 112/17 edges do not fit but form of error not evident.

- 2/112/16 E -24mm N +7mm
Detail OK
Map 1974 Photos 1973
112/12 & 16 edges do not fit, gap?
- 2/113/3 E +1mm N +5mm
Detail OK
Map 1974
- 2/113/5 E +11mm N -5mm
Detail OK
Map 1973
- 2/113/6 E +7mm N -5mm
Detail OK
Map 1973
From about 37' N edge with 2/113/7 overlaps 10mm, sheet edges skew
- 2/113/7 E +5mm N -4mm average
Detail, some evidence of difference on NW edge
Map 1974
- 2/113/8 E OK N -7mm
Detail OK
Map 1973
- 2/113/9 E OK N OK but mosaic larger
Detail OK
Map 1975 Photos 1973
2/112/12 & 113/9 edges do not match, gap? 113/9 & 113/5 overlap 7mm
- 2/113/10 E OK N OK but mosaic larger
Detail OK
Map 1980 Photos 1973
113/10 & 113/6 overlap 7mm
- 2/113/11 E +3mm N OK but mosaic larger
Detail OK
Map 1980 Photos 1973
2/113/11 & 10 bad edge fit, gap? 2/113/11 & 113/7 overlap 12mm

2/113/12 E +5mm N +3mm
Detail OK
Map 1972
113/12 & 113/8 overlap 14mm, 113/12 & 114/9 edges not parallel, 9 is 4mm North of 12

2/113/13 E +6mm N -3mm
Detail OK
Map 1974
113/13 & 113/9 edge gap, 113/13 & 112/16 edges not parallel and error possible gap

2/113/14 E +10mm N -3mm
Detail OK
Map 1975

2/113/15 E +11mm N -4mm
Detail OK
Map 1975
113/14 & 15 possible gap

2/113/16 E +7mm N -4mm
Detail OK
Map 1977
2/113/16 & 114/13 edges do not agree not parallel and gap.

2/114/1 E +3mm N OK
Detail OK
Map 1968 Photos 1967
3/114/13 & 2/114/1 overlap 20mm and 114/13 is 9mm East of 114/1

2/114/2 E +3mm N OK
Detail OK
Map 1968 Photos 1967
2/114/2 & 3/114/14 overlap 19mm and 14 is 8mm to the East

2/114/3 E OK N OK but mosaic larger
Detail OK
Map 1968 Photos 1967
ADAV not ADAN, 2/114/2 & 114/3 3mm overlap, 2/114/3 & 3/114/15 overlap 21mm and 15 is 12mm East

- 2/114/4 **MOSAIC IS UPSIDE DOWN, 2/114/4 & 2/115/1 overlap 7mm and 115/1 is 7mm North, 2/114/4 & 3/114/16 overlap 19mm and 16 is 10mm East**
- 2/114/5 E +7mm N OK
Detail OK
Map 1968 Photos 1963/4
2/113/8 & 2/114/5 gap and 5 is 8mm East
- 2/114/6 E+13mm N -4mm
Detail OK
Map 1968 Photos 1963/4
2/114/6 & 114/2 gap
- 2/114/7 E OK N OK but mosaic larger
Detail OK
Map 1968 Photos 1963
BATU not BOTA, 2/114/6 & 7 overlap 12mm some evidence of mosaic distortion between sheets below 35' 2/114/7 & 114/3 gap.
- 2/114/8 E OK N OK
Detail OK
Map 1968 Photos 1963/4
2/114/8 & 2/115/5 edges not parallel
- 2/114/9 E +5mm N +7mm
Detail OK
Map 1968 Photos 1964
2/114/9 & 2/114/5 overlap 12mm
- 2/114/10 E +7mm N -6mm
Detail OK
Map 1968 Photos 1963/4
2/114/10 & 2/114/6 overlap 13mm and 6 is 3mm East
- 2/114/11 E +3mm N +5mm
Detail OK
Map 1968 Photos 1963/4
2/114/10 & 11 overlap 2mm, 2/114/7 & 11 overlap 3mm
- 2/114/12 E OK N +5mm
Detail OK Indonesia boundary covered
Map 1968 Photos 1963/4
2/114/8 & 12 overlap 4mm

- 2/114/13 E +12mm N -6mm
Detail OK
Map 1968 Photos 1964
2/114/9 & 13 some evidence of edge misfit
- 2/114/14 E +11mm N +6mm
Detail OK
Map 1967 Photos 1964
MALARANG - BAHAU not MELARANG - BHAU, 2/114/14 & 10 overlap 2mm
- 2/114/15 E +16mm N +5mm
Detail OK
Map 1968 Photos 1964
2/114/15 & 14 overlap 2mm at top but gap at the bottom, some evidence of linear distortion
- 2/114/16 E +8mm N OK but mosaic larger
Detail OK Indonesia boundary covered
Map 1968 Photos 1967
- 2/115/1 E -5mm N OK but mosaic larger
Detail OK Indonesia boundary covered
Map 1968 Photos 1967
TAPANG not TAPONG
- 2/115/2 Area too small to compare, should be joined to 3/115/14
- 2/115/5 & 9 E -4mm N OK
Detail OK Indonesia boundary covered
Map 1968 Photos 1967
- 3/112/15 E OK N OK
Detail OK
Map 1973
3/112/15 & 2/112/3 overlap 4mm and 15 is 5mm East. Note part of coastline missing at SW corner of sheet on what would be 3/112/14.
- 3/112/16 E OK N OK
Detail OK
Map 1972
3/112/16 & 2/112/4 overlap by 6mm

3/113/9* E OK N OK
Detail OK
Map 1968 Photos 1967

3/113/13* E +11 N -3mm
Detail acceptable but some problems in reconciling river
Map 1973

3/113/15* E -10mm N -10mm
Detail, top corner of sheet that would be on 4/113/15 is missing
Map 1967 Photos 1959 & 1961

3/114/1 E +3mm N -3mm
Detail OK
Map 1967 Photos 1961/2

3/114/2 E +2mm N -2mm
Detail OK
Map 1967 Photos 1061/2

3/114/3 E +2mm N +2mm
Detail OK
Map 1967 Photos 1961/2

3/114/4 E OK N -1mm
Detail OK
Map 1967 Photos 1961/3

3/114/5 E +6mm N +2mm
Detail OK
Map 1967 Photos 1961/3
3/114/5 & 1 overlap

3/114/6 E +6mm N +4mm
Detail OK
Map 1967 Photos 1961 & 63
3/114/6 & 2 overlap and 114/6 & 7 overlap

3/114/7 E -6mm N -5mm
Detail OK
Map 1967 Photos 1961 & 63

- 3/114/8 E +3mm N -5mm
Detail OK
Map 1967 Photos 1963/4
- 3/114/9 E OK N -2mm
Detail OK
Map 1967 Photos 1963/4
3/114/9 & 114/5 overlap
- 3/114/10 E OK N -5mm
Detail OK
Map 1967 Photos 1963/4
3/114/10 & 6 overlap
- 3/114/11 E +2mm N -3mm
Detail OK
Map 1968 Photos 1964
3/114/11 & 7 overlap
- 3/114/12 E +3mm N -2mm
Detail OK
Map 1968 Photos 1964
3/114/12 & 8 overlap
- 3/114/13 E +4mm N -6mm
Detail OK
Map 1968 Photos 1963
- 3/114/14 E +3mm N -6mm
Detail OK
Map 1968 Photos 1963
- 3/114/15 E +7mm N -11mm
Detail OK
Map 1968 Photos 1964
- 3/114/16 E +8mm N -12mm
Detail OK
Map 1968 Photos 1964
- 3/115/1 E +7mm N +2mm
Detail OK
Map 1968 Photos 1964
4/115/13 & 3/115/1 overlap 32mm and 3/115/1 & 4 edge gap

- 3/115/2 E +14mm N OK
Detail OK
Map 1967 Photos 1964
3/115/2 & 4/115/14 overlap 30mm
- 3/115/3 E +7mm N OK
Detail OK
Map 1967 Photos 1964
3/115/2 & 3 overlap 6mm, 3 is 7mm North also evidence of overall scale difference, 4/115/15 & 3/115 3 overlap 10mm
- 3/115/5 E +14mm N -8mm
Detail OK
Map 1967 Photos 1964
3/114/8 & 3/115/5 edge does not match gap?
- 3/115/6 E +14mm N -10mm
Detail OK
Map 1967 Photos 1964
- 3/115/7 E +6mm N OK
Detail OK Indonesia boundary covered
Map 1968 Photos 1964
3/115/6 & 7 overlap 4mm and 6 is 12mm North, evidence of scale difference, and edge of 7 with 3 is suspect
- 3/115/9 E +4mm N +7mm
Detail OK
Map 1967 Photos 1964
3/115/9 & 3/114/12 sheet 9 is 7mm North, 3/115/9 & 5 overlap 20mm and 9 is 10mm West
- 3/115/10 E +5mm N +7mm
Detail OK
Map 1968 Photos 1964
3/115/6 & 10 overlap 21mm and 10 is 12mm West
- 3/115/11 E +7mm N +7mm
Detail OK boundary covered
Map 1967 Photos 1966
3/115/11 & 7 overlap 5mm and 11 is 3mm West, 11 & 10 edge fit not good, 11 is 3mm North

- 3/115/13 E +15mm N OK
Detail OK
Map 1966 Photos 1964
3/115/13 & 16 gap, 13 & 9 edge suspect , gap?
- 3/115/14 E +14mm N OK
Detail OK
Map 1968 Photos 1966
3/115/13 & 14, 13 is 14mm North 115/14 and 2/115/2 cut lines do not match also there is an overlap of 7mm and 14 is 22mm East
- 3/115/15 E +14mm N OK
Detail OK Indonesia boundary covered
Map 1968 Photos 1966
3/115/15 & 14 overlap 6mm,
- 4/113/12 & 8 E +6mm N -5mm
Detail OK
Map 1961 Photos 1958
- 4/114/4 and
4/114/8 not combined sheets but here treated as one
E -4mm N OK
Detail OK Brunei boundary appears to be well covered to the West and partially covered to the East but there is more data on the original strip imagery
Map 1973 Photos 1958 & 1973
114/4 & 8 edge overlaps 3mm and 4 is 10mm West also the cut lines do not agree, this on two sheets with no other sheets to match to either side, sheet corner 114 degrees 45 minutes East on sheet 114/4 is in error or the map is 22mm out. 114/8 & 114/12 overlap 5mm
- 4/114/9 E +9mm N +2mm
Detail OK
Map 1962 Photos 1958
4/114/9 & 4/113/12 overlap
- 4/114/10 E -2mm N -3mm
Detail OK
Map 1963 Photos 1958

- 4/114/12 E -15mm N -2mm
Detail OK
Map 1963 Photos 1958
4/114/12 & 4/115/9 cut line does not match
- 4/114/13 E OK N -6mm
Detail OK
Map 1963 Photos 1958-61
- 4/114/14 E OK N -7mm
Detail OK Brunei boundary covered
Map 1963
- 4/114/15 E OK N OK
Detail OK but note that some of the rivers are in error on the map, Brunei boundary OK, (two versions of the sheet available)
Map 1963 Photos 1958-61
- 4/114/16 E -1mm N +3mm
Detail OK Brunei boundary covered
Map 1966 Photos 1958-66
- 4/115/2 + /1 E +12mm N-3mm
Detail OK
Map 1962 Photos 1958
- 4/115/3 E +4mm N +11mm
Detail OK
Map 1973
4/115/2 & /3 overlap 10mm and 3 is 11mm North, 115/3 and /15 overlap 18mm.
- 4/115/4 E +4mm N +4mm
Detail OK
Map 1981
4/115/3 & /4 gap 3mm, 115/4 & 5/115/16 overlap 18mm
- 4/115/6 E +13mm N -14mm
Detail OK Some of Brunei boundary missing but covered on the strips
Map 1963 Photos 1960
- 4/115/7 E +4mm N -6mm
Detail OK
Map 1974
4/115/7 & 6 overlap 10mm and 7 is 12mm N of 6

- 4/115/8 E +10mm N -5mm
Detail OK
Map 1972 Photos 1958 & 1966
115/7 & 8 gap?
- 4/115/9 E -4mm N -9mm
Detail OK, this is the area known not to be covered between the border with Brunei, there is additional detail on the strips and the gap is not considered extensive.
Map 1963 Photos 1958-59
- 4/115/10 E OK N-11mm
Detail OK
Map 1972 Photos 1960-64
4/115/9 & 10 and 115/10 & 6 edges do not agree possible gaps. a substantial area of Brunei boundary is missing but cut line on 115/6 would indicate data available on the strips, cut lines do not match.
- 4/115/11 E -4mm N +5mm
Detail OK
Map 1970 Photos 1960 & 64
4/115/10 & 11 overlap 8mm and 11 is 1.7mm North with some evidence of scale difference. 115/11 & 115/7 overlap 19mm and 7 is 7mm East
- 4/115/12 E -4mm N +9mm
Detail OK Indonesia boundary covered
Map 1974
115/12 & 8 overlap 18mm and 8 is 19mm East
- 4/115/13 E +5mm N -18mm
Detail OK
Map 1968 Photos 1960 & 67
- 4/115/14 E +3mm N -16mm
Detail OK
Map 1968 Photos 1963
115/3 & 4 slight gap
- 4/115/15 E -3mm N +3mm
Detail OK
Map 1970
115/14 & 15 overlap by 7mm and 15 is 24mm North

- 4/116/1 E +5mm N +3mm
Detail OK
Map 1974
116/.1 & 5/116/13 overlap 11mm and 13 is 10mm East
- 4/116/2 E +6mm N +7mm
Detail acceptable
116/2 & 14 overlap 14mm and 14 is 8mm to East. 116/3 & 2 possible gap
- 4/116/3 E -5mm N OK
Detail OK
Map 1974
116/2 & 3 overlap 14mm and 2 is 12mm to North, 116/3 & 5/116/15 overlap 8mm and 15 is 20mm East
- 4/116/5 E +11mm N -3mm
Detail OK
Map 1974
- 4/116/6 E +6mm N OK
Detail OK
Map 1974
- 4/116/9 E -3mm N +6mm
Detail OK Indonesia boundary covered
Map 1970 Photos 1968
116/9 & 12 non aligned cut line, slight displacement and gap, 116/9 & 5 overlap 17mm and 5 mis 15mm to East
- 4/116/10 E -8mm N +7mm
Detail OK Indonesia boundary covered
Map 1970 Photos 1978
116/10 & 6 overlap 15mm and 6 is 20mm to East
- 4/116/11 E -6mm N -4mm
Detail OK Indonesia boundary covered
Map 1971
116/10 & 11 gap
- 4/116/12 E -3mm N OK
Detail OK alignment of masking misses some of the Indonesia border but is on the strips.
Map 1974

- 4/117/1 E -2mm N +1mm
Detail OK
Map 1973
- 4/117/2 **117/2 & 5/117 14 overlap 23mm and 14 is 11mm East**
Other checks carried out in previous QC visit
Map 1976
- 4/117/3 E +6mm N +3mm
Detail OK
Map 1972
117/2 & 3 possible gap
- 4/117/4 E -1mm N +4mm
Detail OK
Map 1972
- 4/117/5 E +6mm N -5mm
Detail OK
Map 1972
117/5 & 9 overlap 14mm and 5 is 11mm East
- 4/117/6 E OK N -3mm
Detail OK
Map 1970 Photos 1964 and 68
SUNGAI TIAGAU not TIANGAN, 117/6 & 10 overlap 13mm and 6 is 6mm to East
- 4/117/7 E +10mm N OK
Detail OK
Map 1981
- 4/117/8 E +9mm N OK
Detail OK
Map 1972
TINGKAYU not TIANGKAYU, 117/4 & 8 slight gap
- 4/117/11 E -5mm N +4mm
Detail OK
Map 1978
- 4/117/12 E +2mm N OK but mosaic larger
Detail OK
Map 1977

- 4/117/15 E +6mm N -6mm
 Detail OK part of Indonesia border missing may be on strip
 Map 1978
- 4/117/16 E +4mm N OK
 Detail OK
 Map 1976
- 4/118/1 E OK N -7mm
 Detail OK
 Map 1972
11/1 & 5/118/13 overlap and 13 is 7mm East
- 4/118/2 E -2mm N OK
 Detail islands unreliable due to problems of shadow and coast line
 Map 1980
118/2 & 3 overlap 7mm, edge with 5/118/14 has shift East of 6mm for 118/14 and some lack of conformity
- 4/118/3 E -4mm N +15mm
 Detail OK
 Map 1980
Edge with 5/118/15 some overlap and unconformity, 118/15 is 17mm East
- 4/118/4 E -8mm N OK
 Detail OK
 Map 1987
Edge with 5/118/16 overlaps 3mm and 16 is 20mm East
- 4/118/5 E -9mm N -11mm
 Detail OK
 Map 1974 Photos 1970
- 4/118/6 E -7mm N -9mm
 Detail OK island edges unreliable - shadow
 Map 1970 Phtos 1968/70
- 4/118/7 E +2mm N -2mm
 Detail OK but island edges unreliable- shadow
 Map 1975

- 4/118/8 Island included on map 4/118/7, no precise check possible.
 Detail OK
 Map 1975 Photos 1961
- 4/118/9* E OK N OK
 Detail OK
 Map 1975 Photos 1961
- 4/118/10* E -5mm N +9mm
 Detail OK
 Map 1978
- 5/115/4 E OK N OK
 Detail OK
 Map 1972
- 5/115/7 E -6mm N OK
 Detail OK
 Map 1961 Photos 1961
- 5/115/9 Island included on a map as an inset and measured comparison not possible
 Detail, evidence of changes on island
 Map 1975
- 5/115/12 E +5mm N OK
 Detail OK
 Map 1972 Photos 1960/1
- 5/115/13 Island not possible to check
- 5/115/15 E OK N OK
 Detail OK
 Map 1973
- 5/115/16 E +3mm N -7mm
 Detail, extensive changes in course of Sungai Pegalan but otherwise OK
 Map 1972 Photos 1960/1
115/15 & 16 evidence of gap along edge
- 5/116/1 E +4mm N +10mm
 Detail OK, note that land reclamation in Kota Kinabalu has changed coast line
 Map 1972 Photos 1958 & 61
5/116/1 & 6/116/13 overlap 25mm

- 5/116/2 E -6mm N +11mm
Detail OK
Map 1981
5/116/2 & 6/116/14 overlap 20mm
- 5/116/3 E +7mm N +2mm
Detail, given extreme heights is OK but *in earlier discussions it was agreed that strip O 62 be mapped to the extreme edge in the North in order to minimise the area lost to shadow on Mount Kinabalu, this has not been done. Shadow ends at sheet edge and makes for a strange sheet join, a note on the sheet could have explained.*
Map 1970
5/116/3 & 2 edge gap up to 17mm, 116/2 is 13mm to North; 5/116/3 & 6/116/15 overlap 10mm
- 5/116/4 E +7mm N OK
Detail OK
Map 1973
5/116/4 & 6/116/16 overlap 9mm
- 5/116/5 E OK N -5mm
Detail OK
Map 1974
- 5/116/6 E +2mm N -3mm
Detail OK but severe road errors on map
Map 1974
- 5/116/7 E +11mm N OK but mosaic larger
Detail OK
Map 1973
BARAMBANG not BERAMBANG, 5/116/7 & 6 gap along edge
- 5/116/8 E +13mm N OK
Detail OK
Map 1980
- 5/116/9 E +11mm N OK but mosaic larger
Detail OK
Map 1981
5/116/9 & 5 overlap 10mm ; 5/116/9 & 115/12 have a 7mm gap

- 5/116/10 E OK N OK
Detail, very hilly but drainage OK
Map 1974
5/116/10 & 6 overlap 10mm
- 5/116/11 E +14mm N OK but mosaic larger
Detail OK
Map 1978
SINARUN not SINARU; 116/11 & 8 overlap 2mm and 8 is 12mm to East
- 5/116/12 E +10mm N +5mm
Detail OK
Map 1973
5/116/12 & 9 overlap 2mm and 9 is 12mm East
- 5/116/13 E +10mm N -5mm
Detail OK
Map 1981
5/116/13 & 5/115/16 gap of 7mm and 116/13 is 10mm to North
- 5/116/14 E +7mm N OK
Detail OK
Map 1980
5/116/14 & 15 edge gap
- 5/116/15 E +12mm N OK
Detail OK
Map 1973
5/116/15 & 116/1 minor overlap 1mm
- 5/116/16 E +12mm N OK
Detail OK
Map 1973
- 5/117/1 E +12mm N OK
Detail OK extensive changes to course of S. Labuk
Map 1974
117/1 & 116/4 gap of 5mm; 117/1 & 6/117/13 25mm overlap
- 5/117/2 E +9mm N -2mm
Detail OK
Map 1974
5/117/2 & 6/117/14 overlap 20mm

- 5/117/5 E +14mm N -4mm
Detail OK but major river changes S.Liwagu
Map 1973
5/117/5 & 5/116/8 116/8 is 7mm North
- 5/117/6 E +14mm N -6mm
Detail OK
Map 1973
- 5/117/11 E +2mm N OK but mosaic larger
Detail OK
Map 1973
- 5/117/12 E +3mm N OK
Detail OK
Map 1979
5/117/12 & 118/9 edge mismatch not parallel?
- 5/117/14 E +3mm N OK
Detail OK
Map 1974
- 5/117/15 E +7mm N -5mm
Detail OK
Map 1972
5/117/15 & 4/117/4 overlap 18mm; 117/15 & 117/14 gap 5mm
- 5/117/16 E +6mm N -5mm
Detail OK
Map 1972
5/117/16 & 118/13 overlap 7mm; 117/16 & 4/117/4 overlap 17mm
- 5/118/9 E OK N +4mm
Detail OK
Map 1980
Map name BILIT not SUNGAI KRETAM BESAR
- 5/118/10 E -1mm N +4mm
Detail OK
Map 1974
SUNGAI KRETAM BESAR not TOMANGGONG

- 5/118/11 E -8mm N +1mm
Detail some inconsistency of Sungai Segama between 46' and 53' East, with 4-5mm local displacement, insufficient information/detail to attribute cause.
Map1974
TOMANGGONG not N.BORNEO COMPILATION PLO; 5/118/10 & 11 overlap 8mm
- 5/118/12 E -5mm N -4mm
Detail OK
Map 1974
- 5/118/13 E OK N OK but mosaic larger
Detail OK
Map 1979
- 5/118/14 E OK N OK but mosaic larger
Detail OK
Map 1979
Name not N. BORNEO COMPILATION PLO
- 5/118/15 E +6mm N -2mm
Detail, there is very little detail to fit but the bottom half fits well to the rivers as does the top half, but not both together!
Map 1972
- 5/118/16 E +6mm N OK
Detail OK
Map 1972
- 5/119/9 & 10 E -6mm N OK but mosaic larger
Detail OK
Map 1972
5/119/9 & 5/118/12 overlap
- 5/119/13 E -6mm N -5mm
Detail OK
Map1984
5/119/13 & 118/16 overlap 14mm , and 118/16 is 4mm North
- 6/116/10 E OK N +7mm
Detail OK but note that in this relatively flay area a best mean fit is all that is possible, the relative positions of the islands in particular is not good
Map 1961 Photos 1958

6/116/12 E +6mm N +4mm
Detail OK
Map 1979

6/116/13 E -5mm N +3mm
Detail OK but substantial changes in drainage
Map 1972 Photos 1959-60

6/116/14 E OK N OK but mosaic larger
Detail OK
Map 1961 Photos 1958

6/116/15 E OK N -3mm
Detail Kota Kinabalu sheet therefore excessive height distortion, given that this is inevitable, the fit is acceptable, see comments on 5/116/3 regarding mosaicing of shadows
Map 1973
116/14 & 15 sheet 14 is 4mm North

6/116/16 E +3mm N -5mm
Detail OK
Map 1972

6/117/1* E -4mm N +6mm
Detail OK
Map 1971

6/117/2* Islands with very little detail , almost empty sheet
Map 1981

6/117/5* E OK N -4mm
Detail OK
Map 1981

6/117/6* E +2mm N +3mm
Detail OK
Map 1981

6/117/9 E -1mm N -3mm
Detail OK
Map 1972

6/117/10 E -2mm N -3mm
Detail OK
Map 1972

6/117/11 E +2mm N -3mm
Detail OK
Map 1972
TERUSAN not TERUSAM; 117/11 & 10 minor overlap.

6/117/13 E +3mm N -2mm
Detail OK but severe height distortion
Map 1972

6/117/14 E +2mm N -2mm
Detail OK
Map 1972

6/117/15 E +7mm N OK
Detail OK along coast but severe distortion occurs in one area which is not attributable to height.
Map 1972
Sheet 117/14 & 15 gap at southern half of sheet indicating not parallel

6/117/16 E OK N OK
Detail OK
Map 1975

7/116/12 E -4mm N -2mm
Detail OK
Map 1976

7/116/15
& 16 E OK N OK
Detail OK
Map 1977

7/117/9 E +2mm N OK
Detail OK
Map 1972
7/117/9 & 116/12 gap of 19mm, this on an island is a major loss of detail

- 7/117/10 E +6mm N OK
Detail, relative fit of islands not good
Map 1973
- 7/117/13 E +8mm N OK
Detail, relative fit of islands not good
Map 1976
- 7/117/14 E +7mm N OK
Detail OK given problems of relative fit of islands
Map 1976
PULAU MALAWALI not MALAWI

1:100,000 MOSAICS

- 1/110/ NW some turbulence banding
1/111/ NW " " "
1/111/ SW " " " & antenna pattern
2/112/ NE antenna pattern
2/112 NW antenna pattern & some tonal difference between strips
2/113/ NW some tonal banding
3/113/ NE slight turbulence banding
4/114/ SW antenna pattern
4/117/ NE OK
4/118/ NW OK
5/118/ NW OK
5/118/ NE some minor tonal banding
5/118/ SE sheet names to be corrected N. Borneo Compilation PLO
5/118/ SW " " " " " " " " " "
5/119/ SW some minor tonal banding

NOTE: In all cases where a name correction has been noted on the 1:50,000 series, a comparable correction will have to be made on the 1:100,000 mosaic.

