

8. Comments on Fourth Year's Work

The third year's work has been concluded to complete the original manuscripts for the entire project area. The fourth year's work involves cartography and printing of the final products, namely the base maps.

To ensure smooth implementation of the fourth year's work with a view to making the products of high quality, particular attention will be paid in the following respects.

- 1) Every effort will be made to prevent errors and missing data from occurring in the cartographic process. Checking and inspection will be repeatedly performed at each and every part of the process. At the same time care will be taken so that SK engineers will have enough chances to inspect the details, including boundaries and geographical names among others.
- 2) Proof will be made of each map sheet to eliminate errors. At this stage also, inspection by the Kenyan side should be helpful.
- 3) In the process of printing, extra care must be taken to remove defective products.

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1. Chronological Records of Field Work

From January 8, 1990 to March 8, 1990

| | | |
|---------|---------|-------------------------------------------------------------------------------------------------------------------------------|
| January | 8 Mon. | Muraoka, Deputy Leader, and 3 other members left Narita via LH 711 to arrive Frankfurt. |
| | 9 Tue. | Left Frankfurt via LH 580 to arrive Nairobi. |
| | 10 Wed. | Courtesy visit to JICA office and Embassy of Japan. |
| | 11 Thu. | Courtesy visit to SK, meeting on P. O. at FHQ. |
| | 12 Fri. | Meeting with SK on P.O. |
| | 13 Sat. | Preparatory work. |
| | 14 Sun. | Rest (Field Completion team of 8 members left Narita) |
| | 15 Mon. | Meeting with SK (data) |
| | 16 Tue. | preparatory work, Field Completion team arrived Nairobi. |
| | 17 Wed. | Meeting with SK (map symbols). Courtesy visit to SK by the arriving team. |
| | 18 Thu. | Meeting with SK (printing), 2 Field Completion team members moved to Mombasa. |
| | 19 Fri. | Field headquarters and Field Completion team moved to Mombasa. |
| | 20 Sat. | Field Headquarters and camps set up. Preparatory work. |
| | 21 Sun. | Rest |
| | 22 Mon. | Provincial Surveyor Coast, Mombasa, and other local agencies contacted. Preparatory work. |
| | 23 Tue. | Field verification/field completion work started. Minutes of meeting with SK signed. |
| | 24 Wed. | Continuation of field verification/field completion work (camp at Mombasa). Mr. Matsunaga of JICA visited Field Headquarters. |
| | 25 Thu. | Continuation of above (camp at Mombasa). Mr. Matsunaga on inspection tour of field work (Simoni). |

| | | |
|----------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| | 26 Fri. | Continuation of above (Camp at Mombasa) Mr. Matsunaga on inspection tour of field work (Malindi). |
| | 29 Mon. | Field verification/field completion (camp at Mombasa). |
| | 30 Tue. | Continuation of above (camp at Mombasa). |
| | 31 wed. | Drafting and signing of Record of Discussion of small group meeting. |
| February | from 1 Thu. | Field verification/field completion (camp at Mombasa). |
| | to 4 Sun. | |
| | from 5 Mon. | Field verification/field completion (camp at Malindi) |
| | to 11 Sun. | |
| | from 12 Mon. | Field verification/field completion (camp at Voi) |
| | to 21 Wed. | |
| | 22 Thu. | Saito, leader, left Narita. Field verification/ field completion (Camp at Voi). |
| | 24 Sat. | Saito arrived Nairobi. Meeting of team. Continuation of above field work (Camp at Voi). |
| | 25 Sun. | Meeting. |
| | 26 Mon. | Courtesy visit to JICA office and Embassy of Japan. Continuation of above field work (Camp at Voi) |
| 27 Tue. | Meeting with SK on conclusion of field work. Preparation for demobilization. | |
| 28 Wed. | Transfer of map printing technology. Field team moved to Nairobi. | |
| March | 1 Thu. | Drafting of Minutes of Meetings. Data received from SK. Data sorted. |
| | 2 Fri. | Signing of Minutes on conclusion of field work. Data sorted. |
| | 3 Sat. | Data sorting. Preparation for departure. |
| | 4 Sun. | Meeting. 8 field team members left Nairobi via LH 581. |
| | 5 Mon. | Visited agencies concerned to inform the conclusion of work. The field team arrived Frankfurt. |
| | 6 Tue. | Saito, Leader, and 4 other members left Nairobi via BA 054 to arrive London The field team arrived Narita. |
| | 7 Wed. | Saito and group left London via BA 007. |
| | 8 Thu. | Arrived Narita. |

2. Minutes of Meetings with SK
 2-1. Minutes of Meetings at the Outset of Field Work
 2-1-1. On 11th January, 1990

MINUTES OF THE MEETING ON TOPOGRAPHIC MAPPING SOUTH OF LATITUDE 3° SOUTH HELD BETWEEN JICA STUDY TEAM (JST) AND SURVEY OF KENYA STAFF IN THE OFFICE OF THE ASSISTANT DIRECTOR (MAPPING) ON 11TH JANUARY, 1990

PRESENT

| | | |
|----------------------|---|----------------------------------------|
| Mr. J. R. R. Aganyo | - | Asst. Director (Mapping) - Chairman |
| Mr. Albert Odhiambo | - | Supt. Mapping |
| Mr. Joseph Kiboro | - | Principal Photogrammetric Asst. |
| Mr. Joshua Ogutu | - | Chief Cartographic Assistant |
| Mr. Mula | - | Ag. Principal Photolithographic Asst. |
| Dr. Kazuo Muraoka | - | Deputy Leader |
| Mr. Mitsuo Yoshida | - | Mapping Planner |
| Mr. Tadao Hidaka | - | Chief Surveyor |
| Mr. Michimasa Hakai | - | JICA Expert |
| Mr. Akifusa Itabashi | - | JICA Expert |
| Mr. Kombo Mwero | - | Officer-In-Charge, Technical-Secretary |

The meeting started at 14.30 hours as per schedule. The Chairman welcomed the JST staff and a formal introduction conducted.

Soon after the introduction, the Deputy Leader expressed appreciation for the warm welcome accorded to his team and proceeded to briefly outline the work to be done in phase III as per the project document (attachment). He informed the members that the team's exercise was to cover all aspects of field data acquisition.

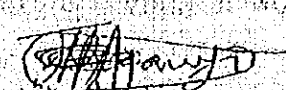

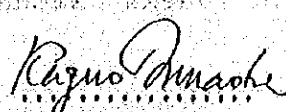
Furthermore the Deputy Leader outlined the necessary procedure to be followed in tackling phase III; phase IV is to be concluded in Japan. Most of the subject deliberated upon came from the project document with specific attention on various issues including:

1. Hatched areas on page 29 (fig.3) of the project document will require field verification on the ground.
2. Survey of Kenya was requested through the Chairman to provide counterparts for every party which will be deployed for verification purposes.
3. As for supporting staff, it was agreed that JST get assistance from the Provincial Surveyor, Coast Province, as has been done before.
4. Proper identification and relevant entry permit to prohibited areas were necessary for all staff participating in the exercise including JST staff. SK was therefore requested to prepare identification cards and seek the necessary entry permission from the relevant departments particularly the one in charge of National Parks.

It was agreed that a follow-up meeting be held on 12th January, 1990.

In addition, the Deputy Leader pointed out that the remaining crew was due on 16th January, 1990. The Leader was, however expected here (Kenya) on 24th February, 1990.

Refreshment were served and the meeting closed at 15.40 hrs.

| | | |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|  MR. J. R. R. AGANYO For: SURVEY OF KENYA TEAM |  Kombo Mwero SECRETARY |  DR. K. MURAOKA For: JICA STUDY TEAM |
| DATE: 23 Jan. 1990 | | |

PLAN OF OPERATIONS
FOR THE
TOPOGRAPHIC MAPPING
OF
SOUTH KENYA
IN THE
REPUBLIC OF KENYA

--- 3rd Year ---

September, 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

PLAN OF OPERATIONS
FOR THE
TOPOGRAPHIC MAPPING
OF
SOUTH KENYA
IN THE
REPUBLIC OF KENYA

I. INTRODUCTION

In response to the request of the Government of the Republic of Kenya (hereinafter referred to as "Kenya"), the Government of Japan (hereinafter referred to as "Japan") decided to conduct the Topographic Mapping of South Kenya in Kenya (hereinafter referred to as the "Study"). Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programmes of Japan, will undertake the Study, in close cooperation with the authorities concerned of Kenya. Survey of Kenya; Ministry of Lands and Housing, (hereinafter referred to as "SK") shall act as counterpart agency to the Japanese study team (hereinafter referred to as the "Team") and also as coordinating body in relation to other governmental and non-governmental organizations concerned of Kenya for the smooth implementation of the Study.

II. OBJECTIVE OF THE STUDY

The objective of the Study is to prepare the 1/50,000 topographic map covering an area of approximately 29,800Km² in South Kenya from east of Long. 37° 45' E to the coast and south of Lat. 3° S to the Kenyan territory of the Tanzanian border as shown in Fig. 1. Main items of the Study are as follows:

1. Aerial photography approximately 29,800Km²
2. 1/50,000 topographic mapping approximately 29,800Km²
43 sheets.

III. SCOPE OF WORK

The scope of work to achieve the captioned objective is stated in a document entitled "Scope of Work for Topographic Mapping of South Kenya in the Republic of Kenya", agreed upon between the Ministry of Lands and Housing and the Japan International Cooperation Agency issued on 19th March, 1987, in Nairobi, Kenya (hereinafter referred to as "S/W").

The study started in 1987. In view of the results and progress of the first year's study, coverage of the scope of work shall be modified as follows:

Aerial Photography, Leveling, Geodetic Control Point Survey, Aerial Signal and Pricking, Field Verification, Stereo Plotting, Field Completion, Drafting and Printing.

The Volume of the Study is tabulated in Table 1.

Table 1 Volume of the Study

| Item | | |
|----------------------------------|-------------------------------|----------------------------------------------|
| Aerial photography | approx. 29,800Km ² | scale 1/60,000 (whole project area) |
| Leveling | approx. 976Km | minor order leveling (including pricking) |
| Geodetic control Point Survey | 10 points | satellite geodesy |
| Aerial signal | 40 points | |
| Pricking | approx. 500Km | existing bench marks |
| Field verification | approx. 29,800Km ² | |
| Aerial triangulation | approx. 757 models | |
| Plotting and Compilation | approx. 29,800Km ² | |
| Field completion | approx. 29,800Km ² | |
| Drafting | approx. 29,800Km ² | |
| Printing | 43 sheets | 1,000 copies each |
| | | in 6 colours 500 copies each |
| | | in 7 colours 500 copies each |

IV. WORK PLAN

The entire work shall be carried out under a four-year programme starting from October, 1987, and accomplishing in March, 1991. It shall consist of the following four phases in accordance with the time schedule shown in Fig. 2.

1. Phase I (First Year, 1987): Aerial Signal, Aerial Photography,
Pricking and Leveling

1 - 1. Aerial Signal

To secure the proposed map accuracy, the accuracy of horizontal control point shall be not more than

$0.07 \text{ mm} \times 1/\text{plotting scale} (= 0.07 \text{ mm} \times 50,000 = 3.5\text{m})$.

For horizontal control of photographs for aerial triangulation, 40 points of existing 1st and 2nd order triangulation and traverse points shall be used. The distribution plan is shown in Fig. 1. Aerial signals shall be set up on these proposed photo-control points.

1 - 2. Aerial Photography

Black and White panchromatic aerial photography shall be carried out in dry season with a super-wide angle camera ($f=8.8\text{cm}$) in two missions.

1 - 2 - 1. Mission I

For pricking of existing bench marks and along proposed leveling routes, aerial photography shall be carried out in a form of strip courses for approximately 1,500 line Km along these leveling routes at a scale of 1/40,000. This mission is done for the efficiency of the time schedule.

1 - 2 - 2. Mission II

For mapping, the proposed mapping area of approximately $29,800\text{Km}^2$ shall be flown at a scale of 1/60,000.

1 - 3. Pricking.

For vertical control of aerial photographs for aerial triangulation and mapping, existing bench marks shall be pricked (approximately 500Km). Pricking of proposed leveling routes (approximately 976Km) shall also be done for the same purpose at the time of leveling work. Twice enlargement of 1/40,000 aerial photograph shall be used in the field and later pricked points shall be transferred onto the 1/60,000 aerial photograph when necessary.

1 - 4. Leveling.

To secure the proposed map accuracy, the accuracy of vertical control points shall be not more than $0.07 \times \text{contour interval} (= 0.07 \times 20\text{m} = 1.4\text{m})$.

For vertical control of photographs for aerial triangulation and mapping, existing 1st and 2nd order bench marks shall be used. The distribution of existing bench marks, however, is not sufficient for aerial triangulation and mapping. Consequently, minor order leveling shall be carried out to supplement existing bench marks. Minor order leveling of the accuracy of $5\text{Cm} \times \sqrt{S}$ (Where S is the route length in Km.) shall be carried out for approximately 976Km along main roads or national park boundaries where leveling work is found feasible, starting from and closing to existing bench marks. (Fig. 1)

Marking shall be done by utilizing conspicuous ground features or setting up marks every 2Km in average.

Pricking shall be done on aerial photographs for the vertical control for aerial triangulation and mapping on the above points, and at knick points of topography along leveling routes at the time of leveling work.

Prior to the execution, reconnaissance shall be carried out for proposed leveling routes to allocate marks and for existing bench marks to find out if it is necessary to recover them in order to use them as given for the minor order leveling.

2. Phase II (Second Year, 1988), Aerial Photography, Leveling, Geodetic Control Point Survey, Field Verification, Aerial Triangulation, Stereo Plotting and Compilation

In view of the results and progress of the Phase I's study, work plan for this Phase shall be modified from the original.

2 - 1. Aerial Photography

Of the aerial photography covering the project areas of about 29,800Km² at a scale of 1:60,000, about 3,000Km² which were not successful in the first year's flight shall be flown (Fig. 3)

2 - 2. Leveling

It was found that among existing leveling routes, almost all bench works were destroyed or lost along the route along coast. Minor order leveling shall be executed along this route for about 250Km² to establish photo control points.

2 - 3. Geodetic Control Point Survey.

Of the existing geodetic control points, three dimensional measurement for 5 missing points and height measurement for 4 points shall be executed by satellite geodesy. One extra point shall be newly established by satellite geodesy for the sake of aerial triangulation.

2 - 4. Field Verification.

Prior to field survey for verification of aerial photographs, reconnaissance study (photo-interpretation) shall be carried out using aerial photographs and reference data collected.

In compliance with the map style and its application rule, selection of items to express on the map and topographic information related to classification of ground features shall be verified and objects which are hard or impossible to interpret on the aerial photograph shall be clarified in the field. The key to photo-interpretation needed for mapping shall be prepared. Geographical and administrative names shall be collected by SK.

2 - 5. Aerial Triangulation.

To obtain coordinates of pass points and tie points, aerial triangulation shall be carried out by analytical method using 1/60,000 aerial photographs, comparators and electronic computers. Approximately 757 models shall be adjusted by block adjustment method.

The residual of the ground control points after adjustment and discrepancy at tie and pass points between adjacent models shall be not more than 1.4 per mil of the flight height to be adjusted. For example, if the flight height is 5,400m, the discrepancy shall be $5,400\text{m} \times 1.4 \text{ per mil} = 7.6\text{m}$ at least for both planimetry and altitude.

2.6 Stereo Plotting and Compilation

Stereo plotting shall be carried out by 1/60,000 aerial photograph and stereo plotting machine at the scale of 1/50,000 using the results of aerial triangulation and those obtained by field verification. Intermediate contour shall be plotted at 20m intervals. 10m of supplementary half interval contour shall be plotted for flat area, if necessary. The photogrammetric spot height shall be plotted taking the topography and distribution of ground features and control points into consideration.

Results shall be compiled in the format of the sheet lines of 15' X 15'. Along the northern boundary of the Study area lie the area mapped by JICA in the eastern part and that by Canada in the western part. Along the southern boundary to Tanzanian territory, the Ordnance Survey, United Kingdom, is executing mapping. The connection of maps among these maps shall be taken into consideration. Necessary data for the connection, such as pricked diapositives, results of aerial triangulation, copies of original manuscript of maps, etc., shall be obtained through SK. The discrepancy of connection to existing maps shall be adjusted in principle. If it is found difficult to tie, however, the treatment shall be discussed with SK.

This work shall be continued to Phase III.

3. Phase III (Third Year, 1989): Stereo Plotting and Compilation
(continued) and Field Completion
(including Field Verification)

3 - 1. Stereo Plotting and Compilation (continued)

A part of the stereo plotting and compilation works shall be continued to this phase.

For the areas covered by aerial photography in Phase II and not verified in the field, plotting and compilation shall be done without field verified data. For such areas, field verification shall be executed at the time of field completion. The areas are shown in Fig. 3.

3 - 2. Field Completion

Topography, ground features, vegetation, etc., which cannot be properly identified on the aerial photographs during plotting and compilation works, shall be verified in the field and inscribed on the copies of the compiled manuscript printed on the synthesized polyester sheets. Administrative and geographical names and administrative boundaries etc. shall be verified, confirmed and indicated on the paper copy of the compiled manuscript by SK.

4. Phase IV (Fourth Year, 1990). Drafting and Printing

4 - 1. Drafting

Based on the field completed compiled manuscript (original manuscript), negative scribing and preparation of masks and sheets for marginal information for printing plate making shall be carried out on stable polyester bases for 6 and/or 7 colour separation. Map style and symbols shall be discussed with SK. These sheets shall be composed so that one colour may be in one sheet for the sake of printing plate making (preparation of composite negative). A composite positive shall also be prepared consisting mainly of linear elements for the maintenance (revision) of maps.

4 - 2. Printing

Making of printing plate shall be carried out using 1/50,000 composite negatives by photo-lithography.

Printing shall be carried out in 6 and/or colours by the offset printing machine. Number of copies to be printed shall be 1,000 for each map. Specifications and size of printing paper shall be decided after discussion with SK.

5. Work Schedule

Work schedule is shown in Fig. 2.

V. PLAN OF OPERATIONS FOR PHASE III (THIRD YEAR, 1989)

The study for Phase III comprises laboratory work and field survey. The field survey consists of the field completion for the whole area and field verification for a part of the field which was not field verified. The period of the field works shall be from 8th January, 1990 to 8th March, 1990 (60 days).

The work is as shown in Fig. 2 and the volume is as follows:

| | |
|--------------------|------------------------------------------------|
| Field completion | : 29,800 Km ² |
| Field verification | : 3,000 Km ² |
| Plotting | : 1:50,000, 18,325 Km ² (15 sheets) |
| Compilation | : 1:50,000, 18,325 Km ² (15 sheets) |

1. Preparations in the office

1 - 1. Planning

Chief engineer and engineers in charge of respective items shall prepare detailed plan for the efficiency of work.

1 - 2. Preparation of equipment and material for field survey

Followings shall be executed :

- a. Preparation of the survey equipment and material necessary for field survey.
- b. Pre-arrangement of necessary procedures for export and import of equipment and material out of Japan to Kenya.

1 - 3. Preparation of sample of printed sheet of map.

In order to help discussions of the matter concerning drawing and printing of the map with SK, a sample of printed sheet of map shall be prepared in advance.

2. Laboratory Work

Plotting and compilation are the continuation from Phase II and shall be completed in this Phase.

2 - 1. Plotting (Restitution)

Using the results of aerial triangulation and field verification, necessary items for representing on the map shall be measured and plotted by stereo plotting machine and plotted manuscript of the topographic map shall be prepared.

For the areas not verified in the field, the plotting (and compilation) must be carried out by the deduction from the photo-interpretation in surrounding areas. At the time of field completion the result of photo-interpretation must be checked with great care for this areas.

Specifications for plotting are as follows:

Plotting scale : 1:50,000

Area : 18,325Km² (shown in Fig. 1)

Number of sheets : 20 sheets

Projection : UTM

Plotting machine : not less than 2nd class.

Map index is shown in Fig. 1, where area plotted in Phase II is surrounded by shaded lines. The work for this Phase is for the remaining part.

2 - 1 - 1. Material.

For restitution, stable polyester sheet shall be used.

2 - 1 - 2. Neat lines.

Neat lines shall be 15' X 15'.

2 - 1 - 3. Plotting.

Near lines, control points, grid lines and pass points and tie points obtained from aerial triangulation are plotted using automatic coordinategraph. The maximum discrepancy shall not exceed 0.2 mm on the map.

2 - 1 - 4. Orientation.

a. After absolute orientation of the photographs; the discrepancy between the plotted points and their model points shall be not more than 0.3 mm on the map.

b. For orientation of height, pricked leveling points shall be used as many as possible for the sake of accuracy of height.

2 - 1 - 5. Restitution

a. Restitution shall be executed in accordance with the map style and its application rule in the order of linear elements, like roads, rivers, railways, etc., buildings, vegetation and contour lines.

b. Planimetry and contour lines are restituted on separate sheets.

c. Items are classified by different colours on the plotted manuscript as follows:

Black : double line road, railway, building, linear object, vegetation symbol.

Red : trail, designating point, enclosure, small object, covering

Green : vegetation boundary, path in garden

Blue : contour

Violet : shore line, river, lake, fish-pond, salt-field, water-plant

d. Intermediate contour shall be 20 m and half interval

contour lines of 10 m shall be supplemented according to

topography. Care must be taken for the representation of

micro topography, the project area being rich in various

types of ground features and topography like hill, plain,

forest, wadi, cultivated land, etc.

2.5.1.6. Measurement of spot height

a. Spot height shall be measured photogrammetrically at

mountaintop, saddle, intersection of roads, distinct

knick points of topography etc.

b. Spot height shall be distributed taking the topography

into consideration.

2 - 1 - 7. Tying

Map tying shall be made among adjustment sheets and also to existing maps such as;

- a. existing 1/50,000 topographic map along the northern edge of the project area,
- b. 1/50,000 topographic map being worked by the Ordnance Survey along the western and southern borders to Tanzania.

Connection to existing sheets shall be made in principle. However, if it is found difficult to tie, the treatment shall be discussed with SK.

3 - 2. Compilation.

- a. On the basis of the plotted manuscript, compilation shall be carried out using the results of field verification and materials collected. The work area and volume are the same for those of plotting and shown in Fig. 1.
- b. If any doubtful point arises during compilation, it shall be noted to clarify at the time of field completion.
- c. Planimetry and topography (contour) are compiled on the same sheet. Annotation items shall be compiled on a separate sheet using plotted manuscript and data obtained by field verification.
- d. Details of compiled items are as follows:
 - . roads are shown by symbolised roads and name and number are inscribed, when applicable. Breadth of roads in town shall be 0.4 mm on the map.
 - . Railway is shown by center line of track both for single and double-tracks.

. Generalization of town is followed after the application rule of map symbols.
Buildings represented by dots are thinned out according to circumstances.
As it is generally difficult to interpret gas and pipeline on the photograph, they shall be represented in reference to the data submitted by SK.
Value of astatic declination shall be submitted by SK.
Oil lines shall not be represented on compiled manuscript.
Inscription of destination shall be done by SK.

e. Data sheets

Roads

Roads are classified by different colours.

- Red solid line : all weather paved surface roads
- Green solid line : all weather soft surface roads
- Yellow solid line: dry weather roads

Vegetation

For vegetation such as, forest, bamboo, bush etc, needed to prepare mask, data sheet is prepared by classifying them by different colours.

- forest : green
- bush : blue
- bamboo : yellow
- plantation: brown

| | | |
|---------------------|--------------|---|
| Data sheet for road | paper | 2 |
| " | vegetation | 2 |
| " | water system | 2 |

b. Preparation of material

. Items to clarify for the areas plotted and compiled with only photo-interpretation (without field verification)

. Doubtful points arisen during plotting and compilation.

. Materials to discuss the specifications of final products with SK.

c. Shipment of materials for the technical transfer in printing.

2 - 2. Discussion with SK

2 - 2 - 1. Preparation

Before arrival of the main team to Kenya, deputy leader and other 3 staffs shall arrive in Nairobi to prepare for their reception. The main duties are as follows. Of those, there are many items to be indebted to the cooperation of SK.

a. To discuss plan and execution of operations with SK concerning field completion. Items to discuss and to be confirmed are as follows:

- i. Map style and its application rule, compiled manuscript and tying to the existing map,
- ii. Administrative names, place names and destination names,

- iii. Data concerning names of following items:
 public building, church, mosque, road, railway,
 mountain, river, park, etc.,
- iv. Administrative, cadastral and national park
 boundaries,
- v. Name and/or number of each map sheet,
- vi. Marginal information and legend.

- b. To provide rangers, watchmen, laborers and drivers,
- c. To announce to authorities concerned,
- d. To ask SK to assign counterpart personnel,
- e. To ask SK to obtain credentials or identification cards
 to the Team members,
- f. To ask SK to issue permit to enter into private pro-
 perties and national parks to execute survey work when
 necessary.

2 - 2 - 2. Provision of Materials for Printing.

In accordance with the request of the SK, JICA will provide
 with following materials:

Printing paper 50,000 sheets

Printing plate 280 sheets

(P.S.plate, positive type)

Printing ink 200 Kg

Blanket 4 rolls

Chemicals etc.

JST shall explain the materials and their use.

2 - 2 - 3. Discussion on the plan of operations for Phase IV.

As this is the last occasion to meet each other, the matters concerning drafting and printing shall be discussed based on the "Draft Plan of Operations for Phase IV" attached to this document.

2 - 3. Preparatory works in Kenya.

Besides the aboves, followings shall be dealt with chiefly by the Team:

- a. To prepare to establish headquarters and sub-camps in the field.
- b. To receive shipped equipments, machinery and other materials.
- c. To purchase equipments, machinery and other materials in Nairobi.
- d. To hire vehicles.

2 - 4. Field completion

- a. Confirmation of doubtful points arisen while in plotting and compilation

Doubtful points shall be verified in the field.

For important points, surveying shall be executed by using plain tables, when necessary.

- b. Supplementary study of the area of which aerial photographs were not verified in the field.

Important ground features, such as roads, public establishments, etc., shall be confirmed in the field and supplementary surveying shall be executed, when necessary.

c. Confirmation of annotations

Annotations which cannot be verified in the office by SK shall be verified in the field with SK counterparts.

d. Revision of secular change

Secular change in ground features after taking aerial photographs will not be revised in principle. However, for the items considered important to revise, survey shall be executed after consulting with SK.

3. Preparation of original manuscript of map.

After returning to Japan, original manuscript of map shall be prepared by arranging compiled manuscript using field-verified data. Followings shall be arranged for drafting and printing.

- a. Field completed original (original manuscript of map)
- b. Results of supplementary surveying of changed part.
- c. Data for boundaries (administrative, cadastral etc.)
- d. Data for annotation (administrative, geographical, etc.)
- e. Data for road (classification, name, destination, etc.)
- f. Data submitted by SK (oil line, etc.)
- g. others

VI. REPORTING

The progress report of Phase III shall be prepared.

VII. ORGANIZATION OF THE TEAM

Organization of the Team is as follows:

| Duty | Member | Number for a party | Number of parties | Total |
|-----------------|-----------------------------|--------------------|-------------------|-------|
| Leader | Japanese engineer | | | 1 |
| Deputy-leader | " | | | 1 |
| Mapping planner | " | | | 1 |
| Chief-engineer | " | | | 1 |
| Mechanic | " | | | 1 |
| | driver | | | 1 |
| | vehicle | | | 1 |
| Field | Japanese engineer | 2 | 4 | 8 |
| Completion | counterpart | 1 | 4 | 4 |
| | laborer | 4 | 4 | 16 |
| | driver | | | 8 |
| | vehicle(including 2 trucks) | | | 8 |

VIII. WORK SCHEDULE

Work schedule is shown in Fig. 4.

IX. FINAL PRODUCTS AND MATERIALS

Final products and materials of Phase III (3rd year) are as follows:

1. Stereo plotting and compilation
 - a. Plotted original 28 sheets
 - b. Map showing control point distribution 28 sheets
 - c. Record of orientation 1 set
 - d. Annotation data 28 sheets
 - e. Vegetation data 28 sheets
 - f. Road data 28 sheets
 - g. Water system data 28 sheets
 - h. Marginal information data 28 sheets
 - i. Others 1 set
2. Field completion
 - a. Original manuscript of map (field completed manuscript) 43 sheets.
 - b. Copies of compiled manuscript on which boundaries, place name, etc. are verified by SK.
 - c. Various data sheets revised by field completion
 - d. Aerial photographs with field-verified data.

FIG - I Map Index

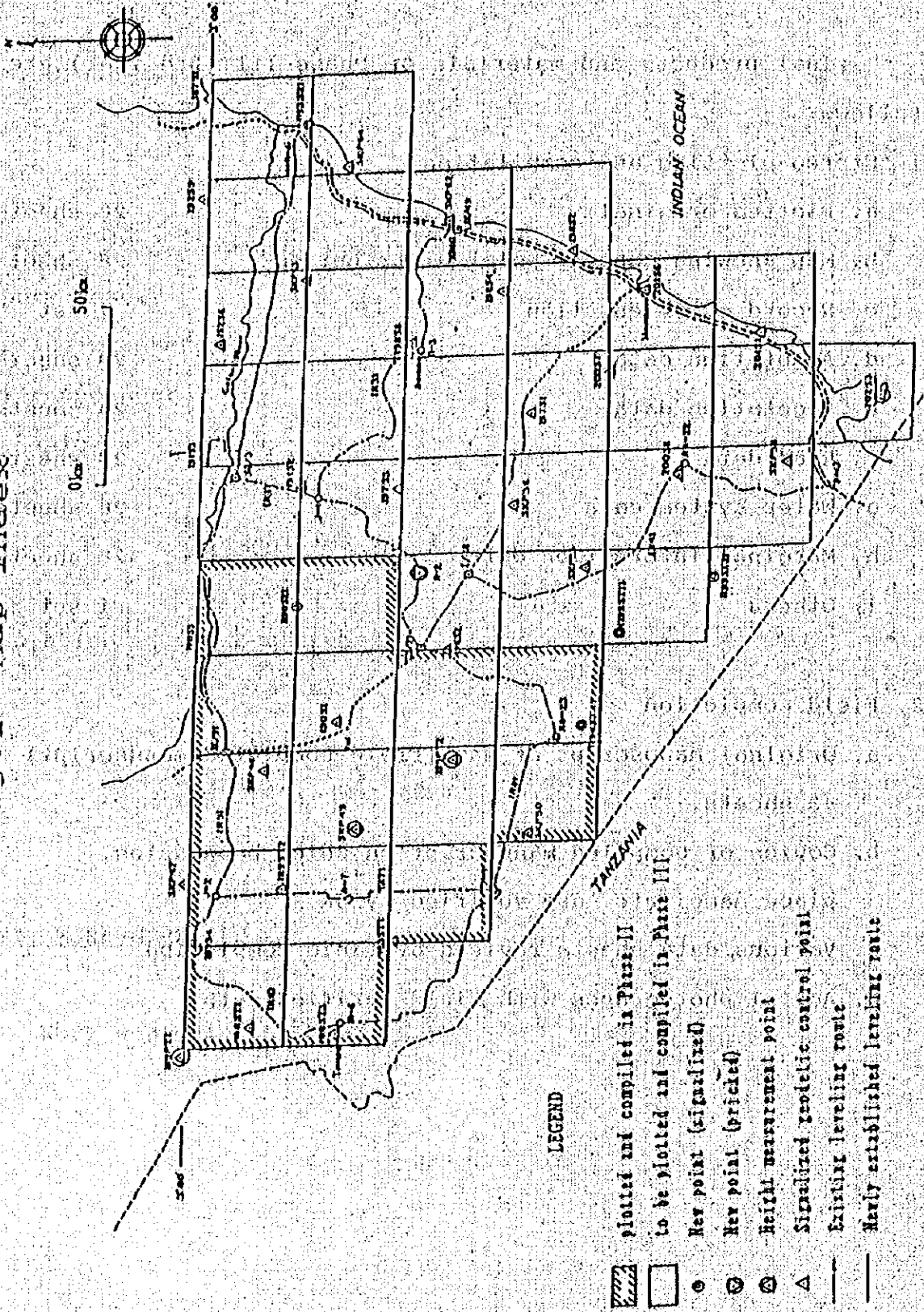
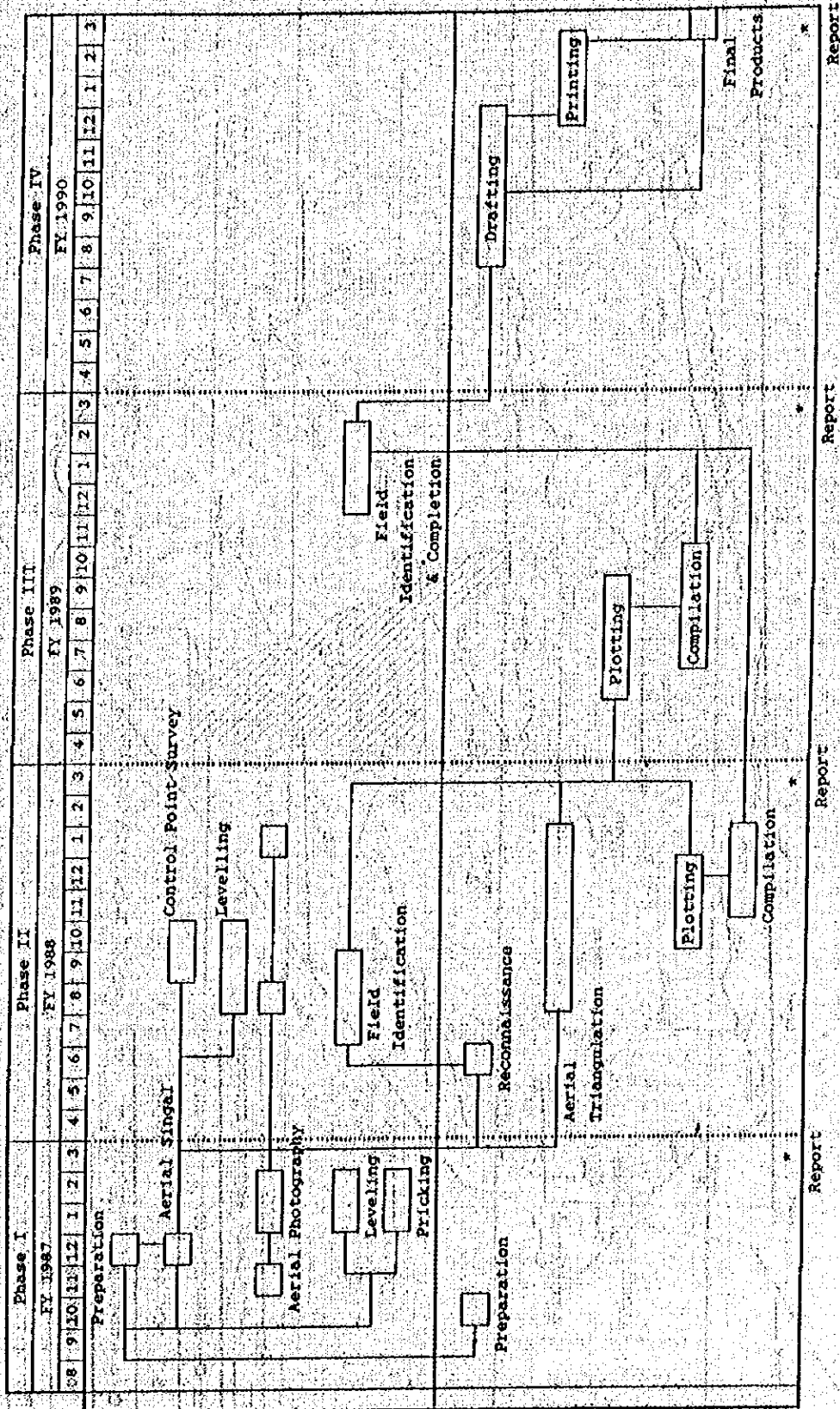


Fig. 2 WORK SCHEDULE



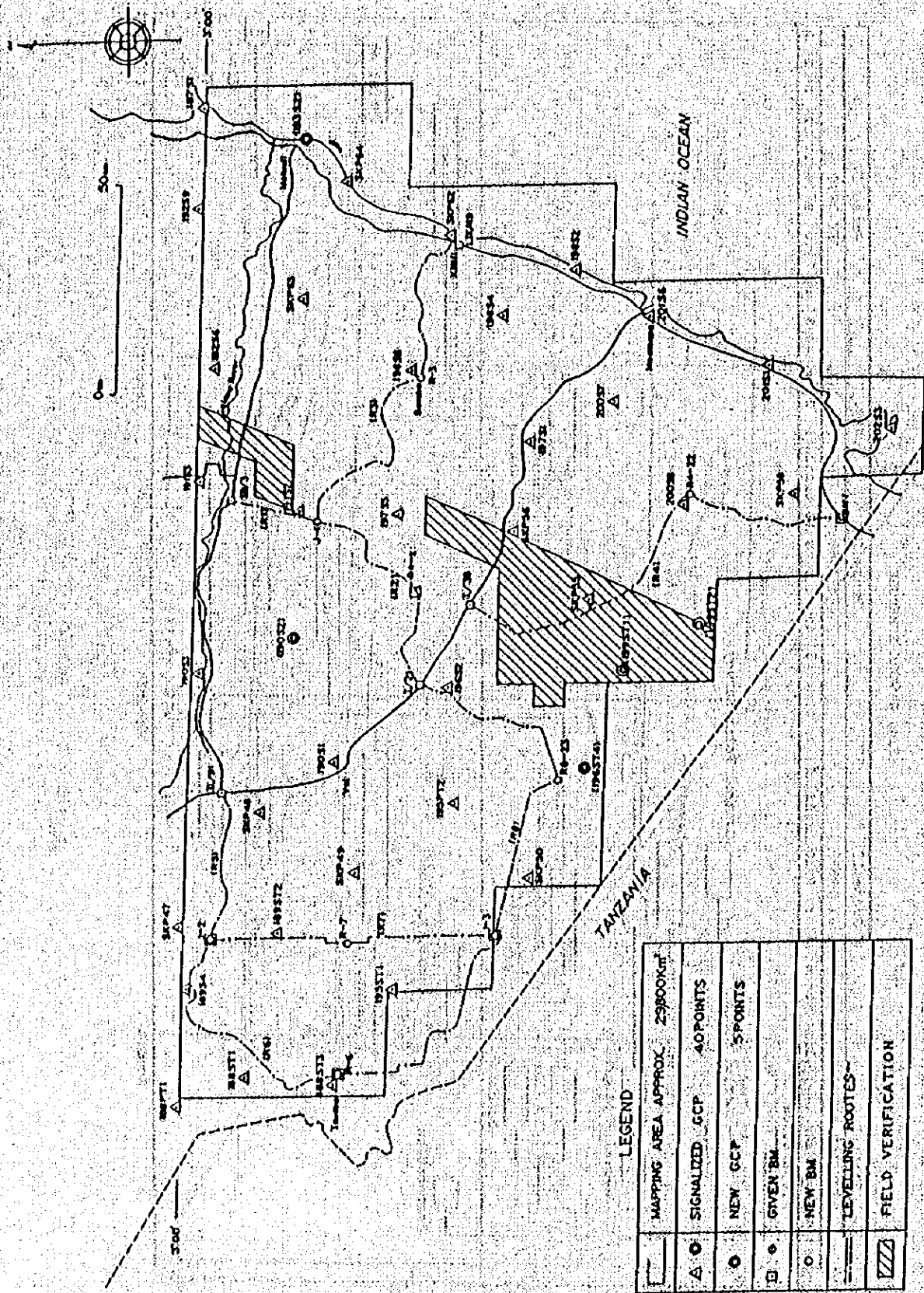
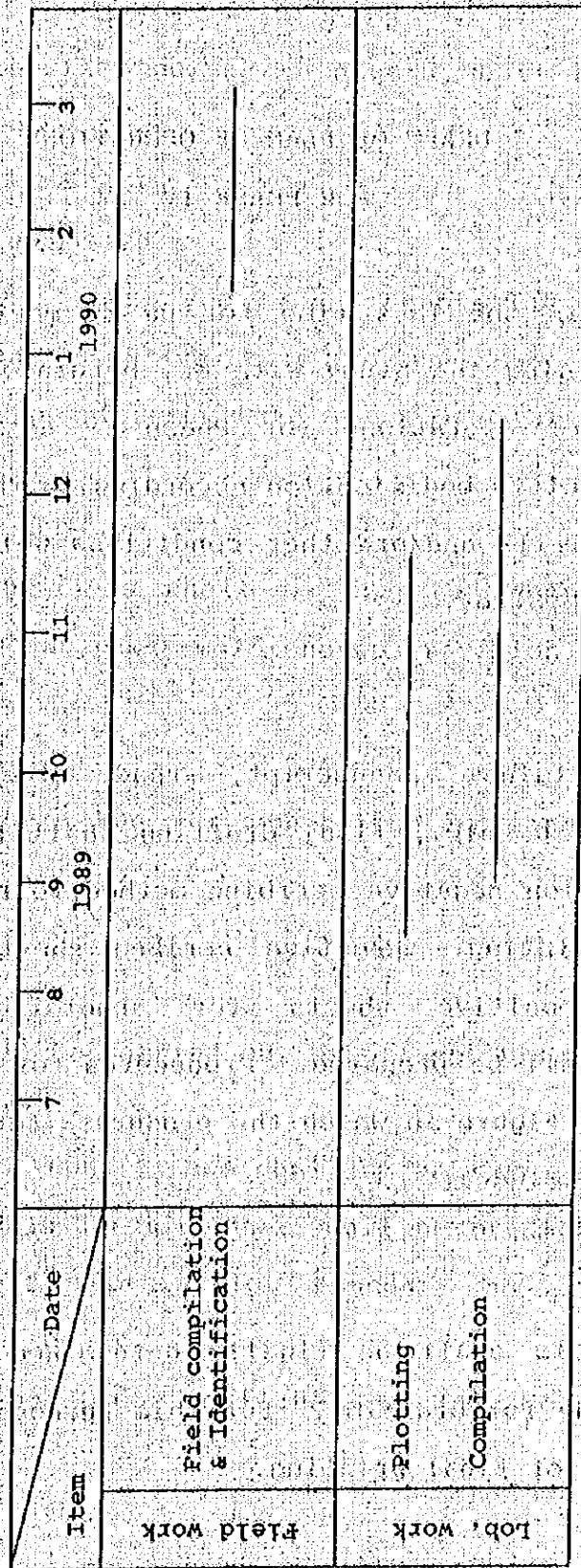


Fig. 3 AREAS FOR FIELD VERIFICATION

Fig. 4 Work Schedule for Phase III



DRAFT OF PLAN OF OPERATIONS
FOR PHASE IV

As this is the last time for us to meet and discuss the matters concerning the Study with SK, herein is tentatively set up the plan of operations for Phase IV as follows. It is, however, subject to modification according to the progress of the Study of Phase III and/or other conditions which may affect the progress of the Study.

1. Drafting

Using original manuscript, road classification data, annotation sheet, etc., final drafting shall be carried out by colour separation negative scribing method to be ready for making plates for printing. Negative scribed sheets, negative mask sheets and positive sheets for annotation and marginal information shall be prepared. Procedure for drafting is shown in the annexed figure in which the procedure for plate making and printing are included.

1 - 1. Map style

Map symbols shall be finally determined after discussion with SK in time for drafting. For this purpose JST shall submit a sample sheet of final printing.

1 - 2. material.

Stable synthesized polyester sheets shall be used for all cartographic works.

1 - 3. Composite negative.

Scribed sheets, mask sheets and annotation sheets shall be composed into one negative film so that one colour may be included on one sheet for the sake of plate making and printing.

1 - 4. Composite Positive

Composite positives shall be prepared composed of mainly linear elements to help map maintenance (revision).

1 - 5. Connection

Care shall be taken for connection of each sheet between adjacent ones.

2. Printing.

Printing shall be carried out by off-set printing machine in 6 and/or 7 colours;

The sheets for general use shall be printed in 6 colours and the sheets for administrative use shall be printed in 7 colours with over-print of sub-district boundary on the sheets for general use by 7th colour.

Before printing, proof shall be read and the approval of SK shall be obtained.

2 - 1. Plate making.

Printing plates shall be prepared by photo-lithography by using composite negatives.

2 - 2. Printing.

Printing shall be carried out by off-set printing machine in 6 and/or 7 colours. Number of copies shall be 1,000 for each sheet.

general sheet 6 colours 500 copies each

administrative sheet 7 colours 500 copies each

3. Work Schedule

Work schedule is shown in Fig. 2 of the main text.

4. Reporting

At the end of Phase IV, comprehensive report shall be prepared including the progress and the results of the Study.

5. Final Products and Materials.

a. Drafting

a set of scribed original 43 sheets

b. Printing

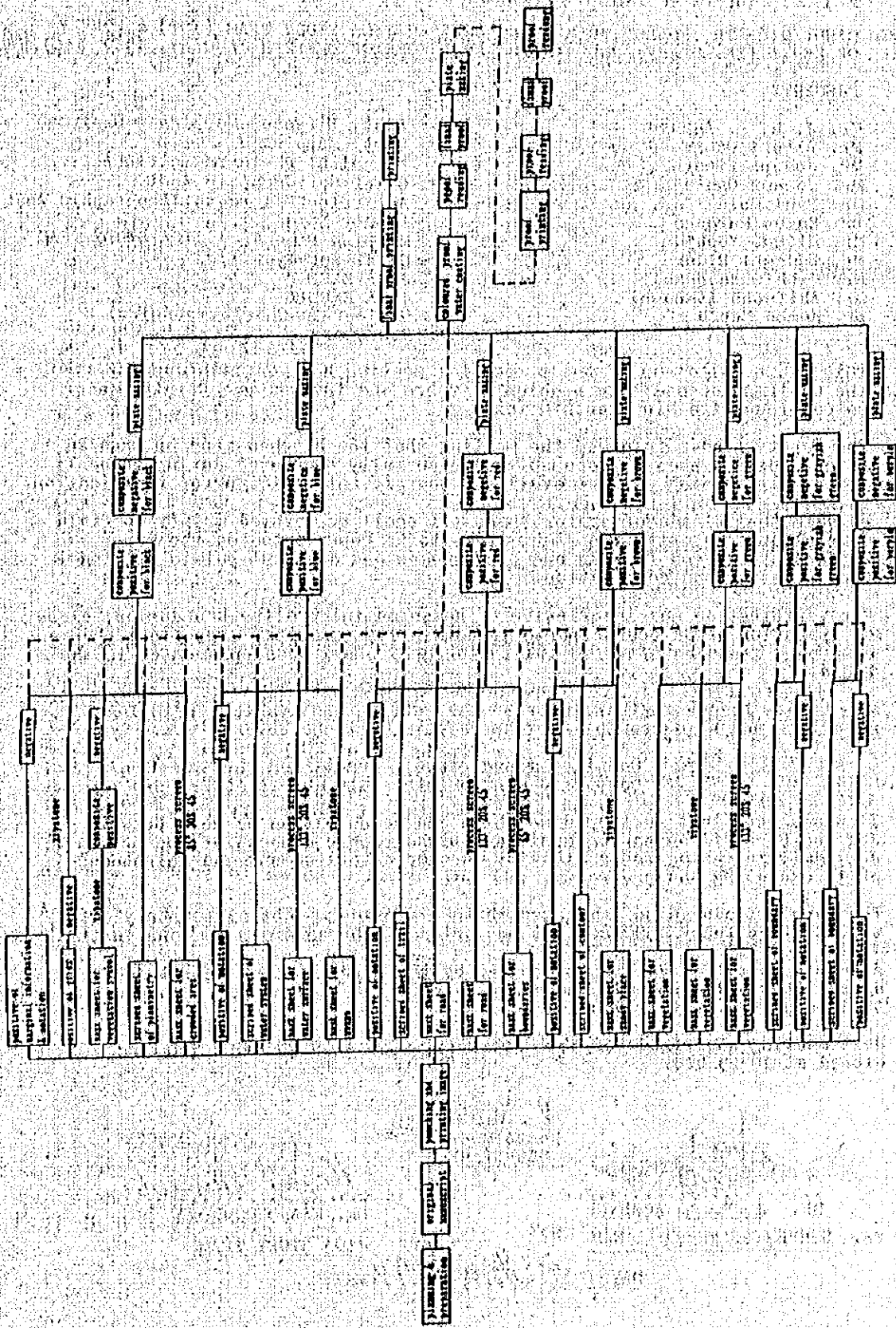
Printed map in 6 colour 43 sheets
500 copies each

Printed map in 7 colour 43 sheets
500 copies each

c. Report

Final report 20 copies

SCHMATIC DIAGRAM FOR DRAFTING AND PRINTING



2-1-2. On 12th January, 1990

MINUTES OF THE FOLLOW-UP MEETING BETWEEN JICA STUDY TEAM (JST) & SURVEY OF KENYA (SK) STAFF, HELD IN THE AKA'S OFFICE ON 12TH JANUARY, 1990 (2) JMA

PRESENT

| | |
|-----------------------|-------------------------------------------|
| Mr. J. R. R. Aganyo | - Asst. Director Mapping - Chairman |
| Mr. Albert Odhiambo | - Supt. Mapping |
| Mr. Joseph Kiboro | - Principal Photogrammetric Asst. |
| Mr. Joshua Ogutu | - Chief Cartographic Asst. |
| Mr. Paul Muiia | - Ag. Principal Photolithographic Asst. |
| Dr. Kazuo Muraoka | - Deputy Leader |
| Mr. Mitsuo Yoshida | - Mapping Planner } JICA STUDY TEAM |
| Mr. Tadashi Hidaka | - Chief Surveyor } |
| Mr. Michimasa Nakai | - JICA EXPERT |
| Mr. Akifusha Itabashi | - JICA EXPERT |
| Mr. Kombo Mwero | - Officer-In-Charge Technical - Secretary |

This was a follow-up of the preceding meeting held on 11th January, 1990. The Chairman opened this session at 9 hrs and invited the Deputy Leader to continue with his presentation.

The Deputy Leader informed the meeting that the hatched area on page 26 (fig. 1) of the project document had been fully completed during phase II and sample sheets would be available to relevant officers for ratification.

He said that field survey for phase III shall be devoted mainly to field completion to clarify important items to be represented on the map-topography, ground feature and place names and doubtful points arising from plotting and compilation.

For verification and inscription of names administrative boundaries, close co-operation of SK counterparts is cordially requested. Important change of ground features after aerial photography shall be supplemented in the field.

The Deputy Leader further informed the meeting that various printing materials had been brought for the whole area to be covered viz.

Compiled manuscripts; annotation sheets;
Composite manuscripts; data sheets for roads

It was agreed that further discussion and consultation be held between JST and SK staff on cartographic and lithographic aspects of the project. JST admitted taking responsibility in camp establishment and maintenance while executing the programme.

The Deputy Leader also requested that SK provide cadastral boundary data by end of February 1990 so that inclusion of the same may be done in time.

A sample sheet for Voi was presented by the Deputy Leader and it was agreed that fill-ups and annotation corrections be done for each sheet that is already fairly done.

Next meeting was fixed for 17th February, 1990 at 9.30 hrs. Meeting closed at 10.29 hrs.

K. Mwero
Kombo Mwero
SECRETARY

Kazuo Muraoka
DR. KAZUO MURAOKA

.....
MR. J. R. R. AGANYO
For: SURVEY OF KENYA TEAM

For: JICA STUDY TEAM

DATE: 23 Jan. 1990.

2-1-3. On 17th January, 1990

MINUTES OF THE MEETING BETWEEN JICA STUDY TEAM (JST) AND SURVEY OF KENYA (SK) HELD IN THE AIM'S OFFICE ON 17TH JANUARY, 1990

PRESENT:

| | | | | |
|----------------------|---|-----|---|------------------------------------------|
| Mr. J. R. R. Aganyo | - | AIM | - | Chairman |
| Dr. Kazuo Muraoka | - | | - | Deputy Leader |
| Mr. Mitsuio Yoshida | - | | - | Mapping Planner |
| Mr. Tadashi Hidaka | - | | - | Chief Surveyor |
| Mr. Hideo Ishibashi | - | | - | Surveyor |
| Mr. Yoshihiro Azuma | - | | - | " |
| Mr. Minoru Ohnaka | - | | - | " |
| Mr. Yutaka Kokufu | - | | - | " |
| Mr. Minoru Arai | - | | - | " |
| Mr. Norio Goto | - | | - | " |
| Mr. Makoto Tsujimoto | - | | - | " |
| Mr. Koji Yanagimachi | - | | - | " |
| Mr. Michimasa Nakai | - | | - | Japanese Expert |
| Mr. Akifusa Itabashi | - | | - | " |
| Mr. A. Odhiambo | - | | - | Supt. Mapping |
| Mr. D. A. Ohabeda | - | | - | Principal Photolithographic Asst. |
| Mr. D. Kimando | - | | - | For Principal Photogrammetric Asst. |
| Mr. J. Ogutu | - | | - | Chief Cartographic Assistant |
| Mr. P. Mula | - | | - | Chief Photolithographic Asst. |
| Mr. C. A. Kimele | - | | - | Senior Cartographic Asst. |
| Mr. Kombo Mwere | - | | - | Officer-In-Charge, Technical (Secretary) |

JICA STUDY TEAM

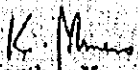
The meeting was held in the AIM'S Office and started at 9.30 hrs.

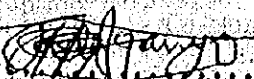
Opening the meeting, the Chairman welcomed all the participants particularly the Surveyors from Japan. Soon after the introduction from both sides the Deputy Leader (JST) announced that departure to the working area would be immediate and that the field staff anticipate to complete data collection within a period of one month. During the same meeting the Deputy Leader issued six copies of the project report for phase II to the Chairman.


It was agreed that JST and SK experts meet in smaller groups and discuss technical details regarding the project.

Again the issue of SK counterparts was discussed and it was agreed that the officers selected be ready for field work. Action Mr. Ogutu.

The meeting ended at 10.00 a.m.


Kombo Mwere
SECRETARY


MR. J. R. R. AGANYO
For: SURVEY OF KENYA TEAM


DR. K. MURAOKA
For: JICA STUDY TEAM

DATE: 23rd Jan. 1990