


THE TOPOGRAPHIC MAPPING
OF
THE SOUTHERN PART
IN
THE REPUBLIC OF GHANA
FINAL REPORT

MARCH 2000

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JAPAN INTERNATIONAL, Inc.

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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
SURVEY DEPARTMENT OF GHANA (SDG)

THE TOPOGRAPHIC MAPPING
OF
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INFRASTRUCTURE DEVELOPMENT INSTITUTE
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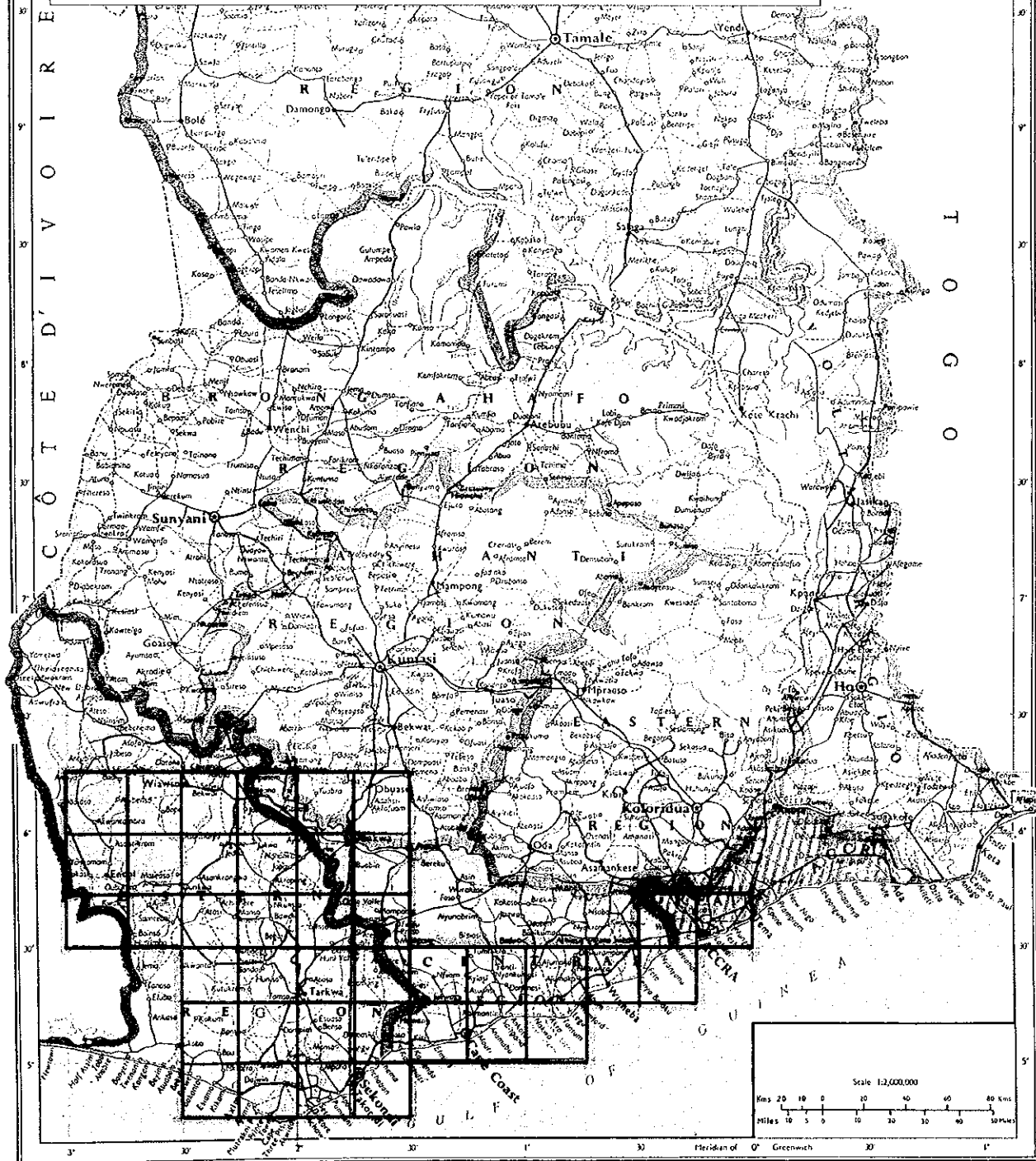
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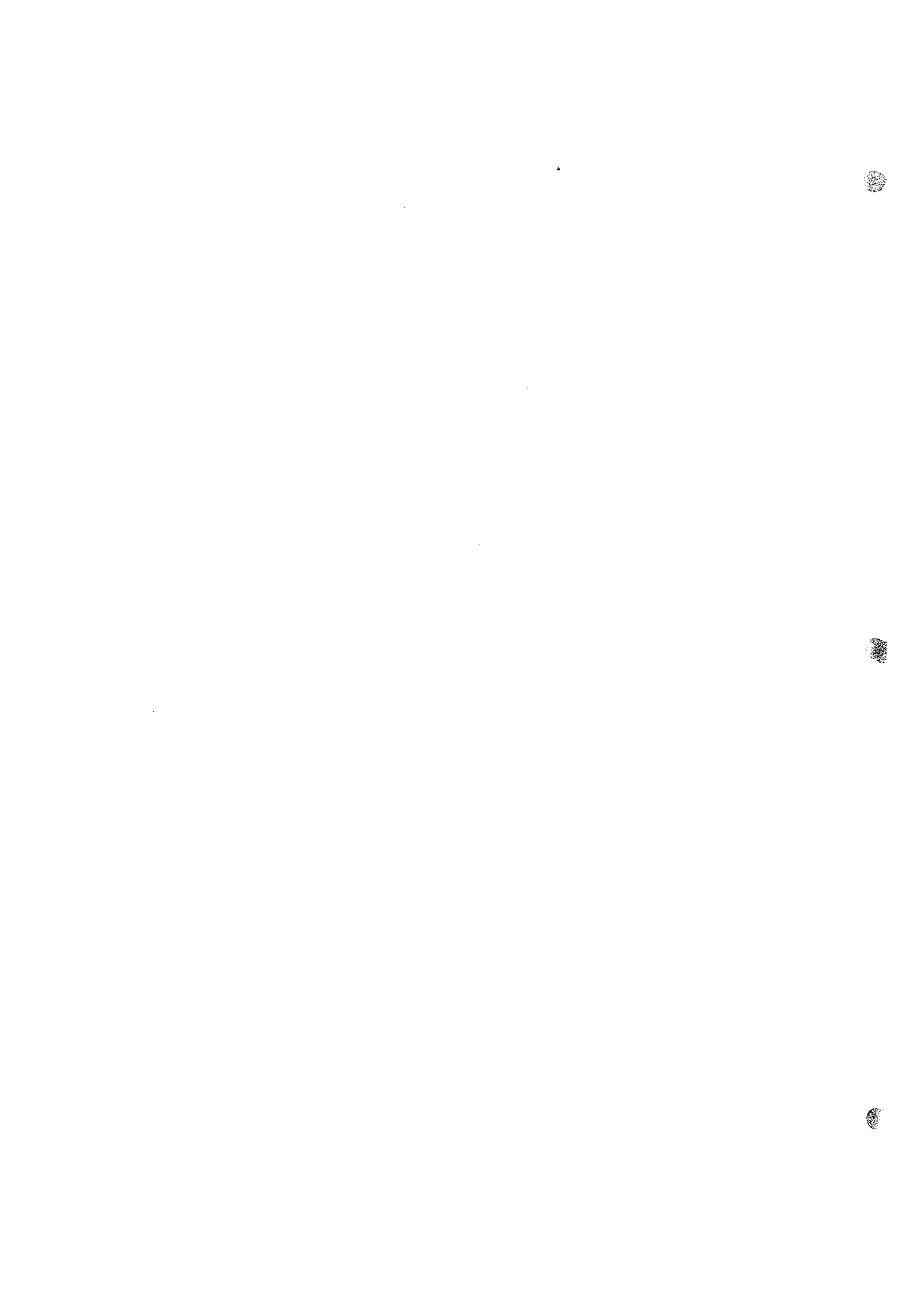
REFERENCE

- Boundaries
 - International
 - Regional
- Regional Headquarters
- District & Sub-District Headquarters
- Roads
 - 1st Class
 - 2nd
 - 3rd & Paths
- Railways

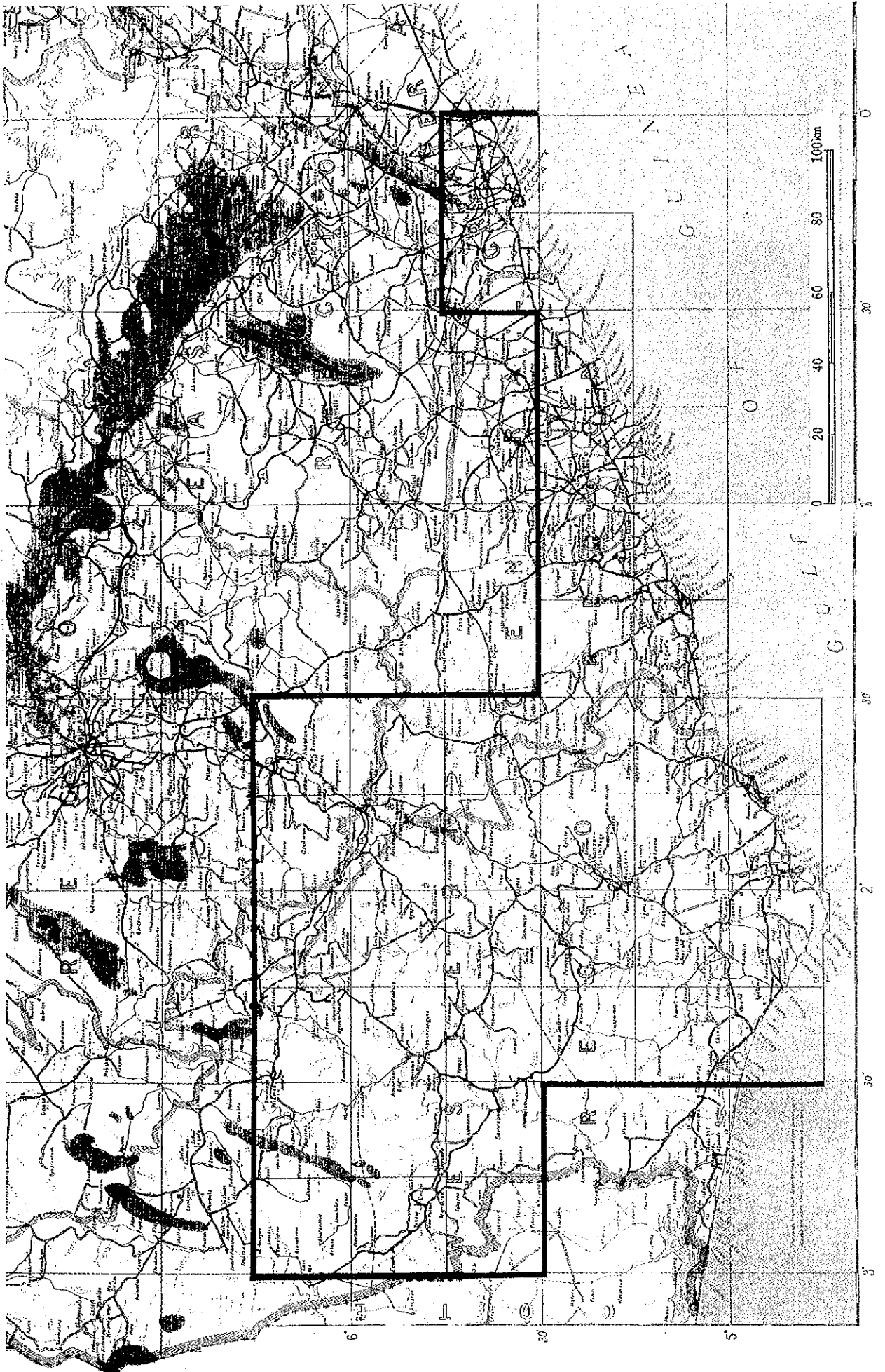
ガーナ国南部地域
国土基本図作成調査対象地域

TOPOGRAPHIC MAPPING OF SOUTHERN PART
OF THE REPUBLIC OF GHANA





TOPOGRAPHIC MAPPING AREA



PREFACE

In response to a request from the Government of the Republic of Ghana, the Government of Japan decided to conduct a study on the Survey for the Topographic Mapping of the Southern Part of Ghana and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Tokihiko Kaminishi of Infrastructure Development Institute (and consist of staff members of Infrastructure Development Institute and Pasco International Inc.) to Ghana, 6 times between from January 1996 and March 2000.

The team held discussions with the officials concerned of the Government of Ghana, and conducted a field survey at the study area. Upon returning to Japan, further studies were made. Then, the final report comprising of 1/50,000 -scale national topographic maps of the study area, together with the digital data and the details of mapping procedures was prepared as the final results of the study.

I hope that the topographic maps and digital data, as well as final report in this study will contribute to the further socioeconomic development of Ghana and to the enhancement of friendly relationship between our two countries.

I wish to express my sincere appreciation to all the parties concerned for their close cooperation extended for this study.

March 2000



Kimio Fujita

President

Japan International Cooperation Agency

Letter of Transmittal

Mr. Kimio Fujita
President
Japan International Cooperation Agency

We are pleased to submit to you the final report of the Survey for the Topographic Mapping of the Southern Part of the Republic of Ghana that has been implemented since 1995 and was completed in March 2000 under a contract to JICA.

This report covers the progress of all works and technical processes implemented during the five years.

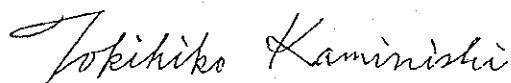
This study was conducted by a consortium organized by the Infrastructure Development Institute and Pasco International Inc. during the period from January 1996 to March 2000. As the results of the study, 1/60,000-scale aerial photos, satellite spot images, 1/50,000-scale topographic maps of the Southern Part of Ghana, and the digital mapping data have been produced.

We hope that this report and these products will be widely used as the basic data of this area and greatly contribute to the further development of Ghana.

Finally, we wish to express our sincere appreciation to the officials concerned of the Government of Japan that have rendered us their guidance and the officials concerned of the Government of Ghana and the Embassy of Japan in Ghana that have offered us their kind cooperation.

Very truly yours,

March 2000



Tokihiko Kaminishi
Team Leader,
Survey Team for the Topographic Mapping
of the Southern Part of Ghana



Executive Summary

1. Study Background

In countries of the world, 1/50,000 topographic maps to cover the entire national land are developed as the basic, standard topographic maps for their national land planning. The 1/50,000 topographic maps representing the actual conditions of the national land in detail are one of the important national land infrastructures. They are used as the very fundamental information source for establishing the master plans and various programs such as development of the socioeconomic systems, environmental conservation, urban and rural development, and promotion of industrial development.

The existing 1/50,000 national topographic maps possessed by Ghana were created with the assistance from Canada and the United Kingdom using the aerial photographs taken for the years from 1972 to 1975. More than 25 years had already passed since these existing maps were produced, but the topographic maps have not been updated. In particular, by the expansion of the city areas including Accra and the changes in land utilization, the actual conditions were very different from the existing maps. In addition, the foot unit was used to represent the heights in the existing maps. In this nation adopting the "c.g.s" unit system, it was also necessary to convert the foot unit into the metric unit to indicate the heights in topographic maps.

Under these circumstances, the Government of Ghana requested technical cooperation and technology transfer in the 1/50,000 topographic mapping to the Government of Japan. The request is based on their policy: The national topographic mapping is required urgently to promote development of social infrastructure, regional development and environmental conservation in the southern coastal areas where industrial, agricultural and fishing industries are concentrated and in the northwestern areas where the mining industries including gold are located.

The Government of Japan accepted the request of Ghana, and Japan International Cooperation Agency (hereinafter "JICA") that is the executing agency for technical cooperation dispatched a study team to confirm the contents of the request during the period from March, 1995 to April 1995. The Study Team held discussions with the Survey Department of Ghana (hereinafter "SDG") that is to be the counterpart of the Ghanaian side. The Scope of Work (S/W hereinafter "S/W") for the study area of

approximately 25,500 km² was agreed on March 17, 1995 between both Japan and Ghana.

2. Modification of the Study

Based on the S/W agreed, the study was initiated as an analogue-mapping project. Although the sessions of aerial photography were conducted four times in three years, they completed only about 50% of the study area. In the meantime, the Government of Ghana strongly requested production digital maps with associated technology transfer in addition to the printed maps.

JICA dispatched a study team to clarify the request and treatment of the areas yet to be photographed. After the discussion, it was agreed that the Ghanaian side digitized the existing topographic maps and updated the topographic mapping information using satellite images and other information to produce new geographic data. It was also agreed that digital topographic data was to be prepared for the areas newly photographed. Based upon the agreement, the method of producing maps become totally digital, and technology associated with data processing was agreed to be transferred.

3. The Basic Policies of the Modified Study Implementation

The objective of the Study is to produce basic geographic data. Following policies were set forth in conducting the Study:

- 1) Satellite images, aerial photographs and existing data and information such as existing topographic maps shall be used as much as possible.
- 2) Under the limited work period and budget, the quality of the final results covering the entire study area shall be maintained.
- 3) In order to achieve the policies in 1) and 2), a data acquisition method using satellite images, which is first to be used in international cooperation projects, shall be used. The latest computer technology shall also be utilized in data processing.
- 4) To enhance capability of data processing of the counterpart agency in this study, technology transfer shall be undertaken to SDG engineers, using the hardware and software brought from Japan.
- 5) The Study Team shall maintain close relationship with the counterpart agency, and both sides shall exchange information and resolve issues during the course of the Study.

4. Study Implementation

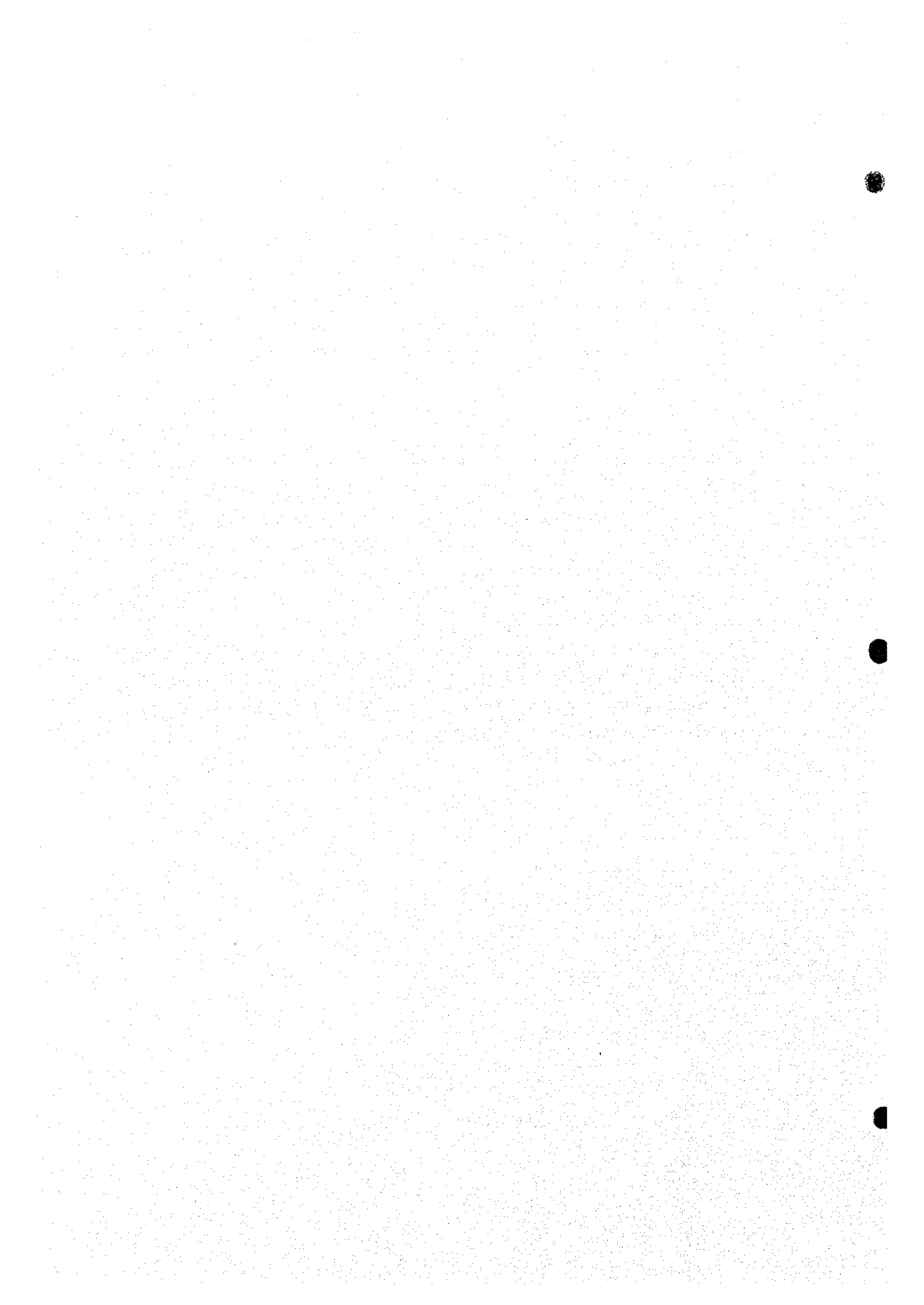
The study implementation was planned for the period of five fiscal years, 43 months. The change of the operation plan was based on the policy of minimizing the study period. With the policy, the final fiscal year of the study was not changed; only seven months were added despite the change of the operation.

The change of the mapping method from analogue to digital augmented the quantity of work in Japan; however, with the dedicated efforts of the team members, the study was completed as planned.

With assistance from the local technical staff, who was familiar with the field conditions, the quality of the work was ensured. At the same time, the objective of technology transfer was achieved as the staff was exposed to opportunities of conducting the work as much as possible. Further, the team members transferred their expert skills to technical staff in SDG using the computer hardware and software used during the study period.

5. Utilization of the Output

The output of the Study could be utilized as the basic data in using Geographical Information System (GIS). The counterpart agency of Ghana already started using the output in applying GIS. The operational trials of GIS have been proved potential of future development of GIS using the output.



1 SURVEY AREA



Main road in the
Cape Coast,
Central Region



Paddy field in the
suburbs of Tema
(under JICA's cooperation)



Road under construction
between Dunkwa
and Wiawso

2 MEETINGS WITH SDG



Technical discussion

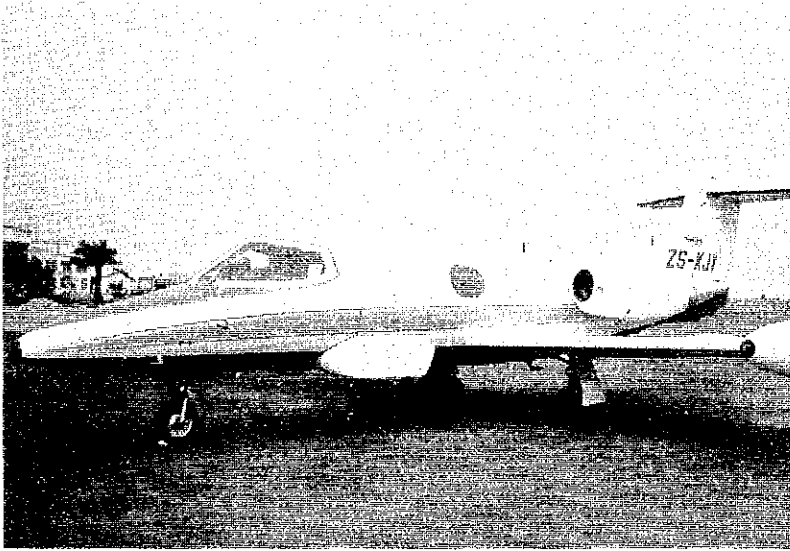


Progress reporting

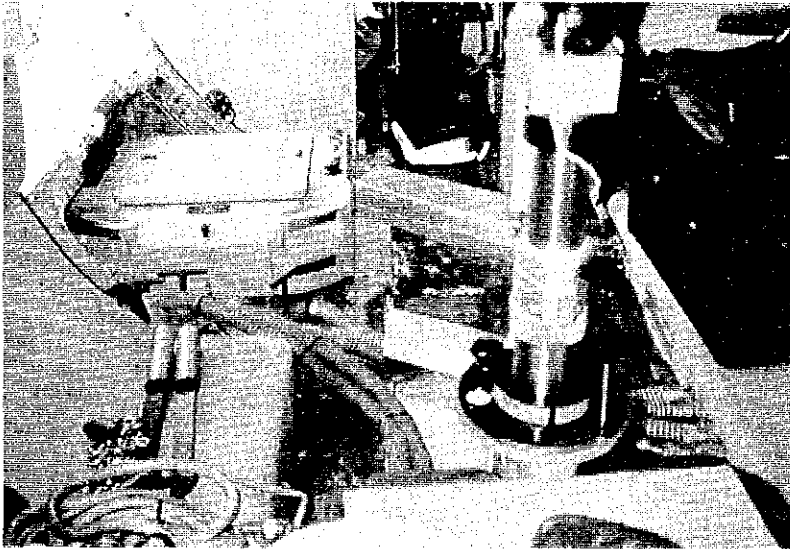


Signing the Minutes
of Meeting

3 AIRCRAFT AND VEHICLES



Aerial survey Aircraft
(Gates Learjet 24)



Aerial Camera
(RMK-A 8.5/23)



Vehicles for field work

4 GPS OBSERVATION



GPS receiver 4000SSE



GPS antenna



Measurement of antenna height

5 SIGNALIZATION AND ECCENTRIC OBSERVATION



Signalization
(GCS 112)



Leveling
(by Digital Level)



Eccentric observation
using Planetable

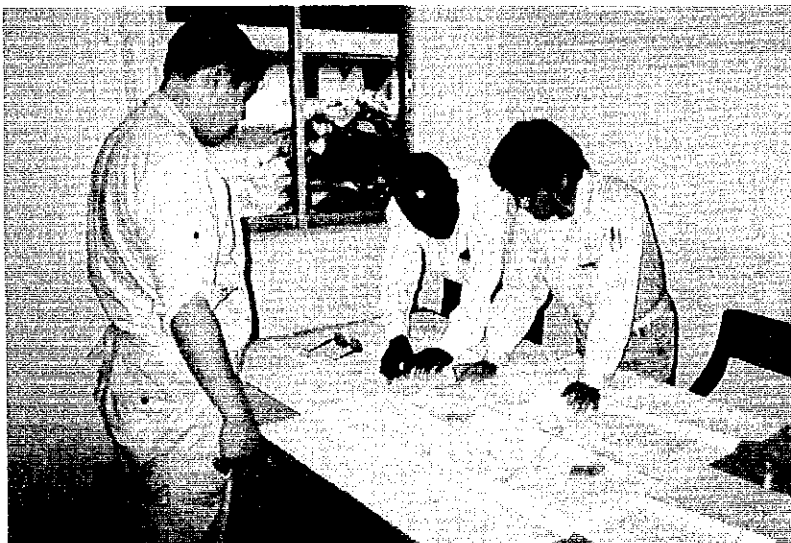
6 OFFICE WORK



Photo interpretation



Checking of existing data



Confirmation of field plan

7 FIELD WORK



Field verification
in the village



- ditto -

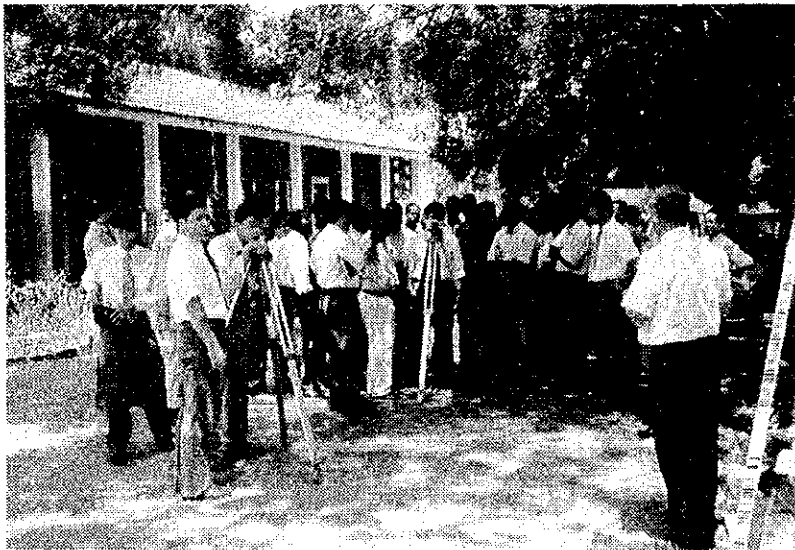


- ditto -

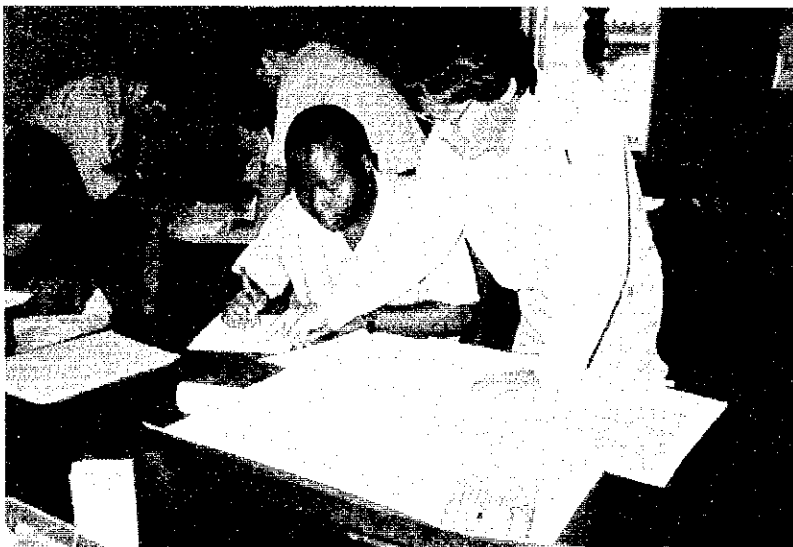
8 TECHNICAL INSTRUCTION



Explanation of total station
to counterparts

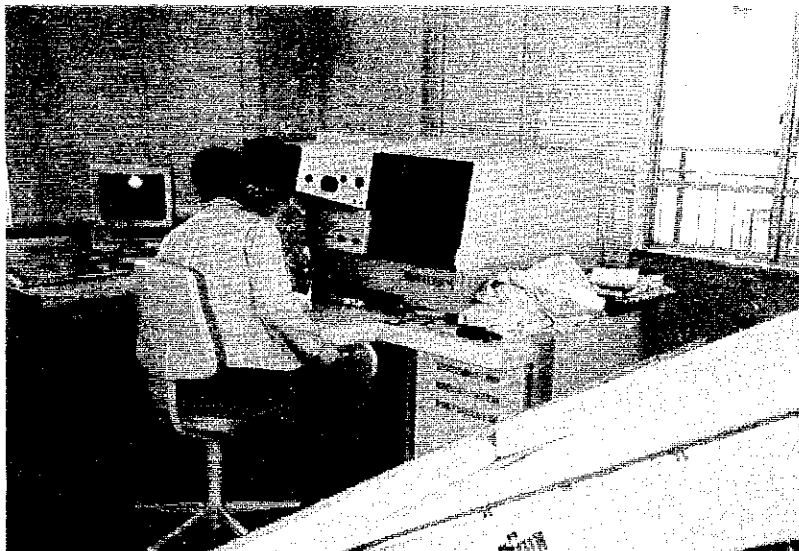


Explanation of Digital Level
to counterparts



Instruction of field
verification

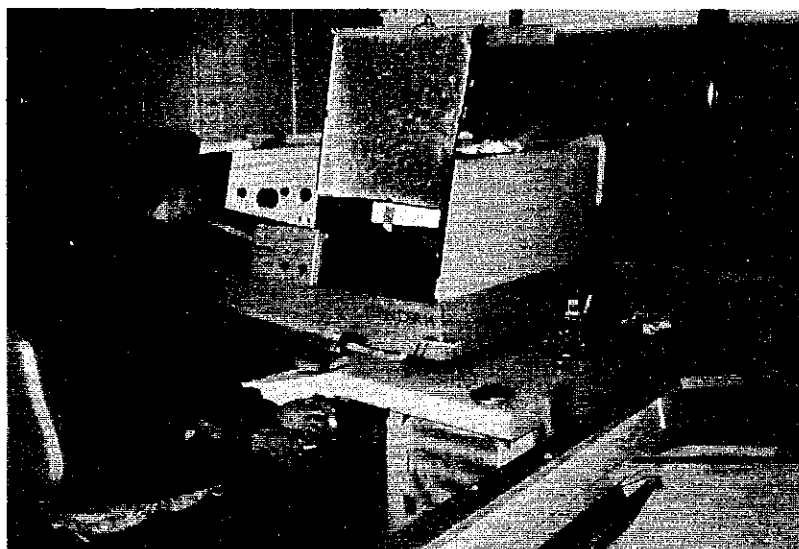
9 STEREO PLOTTING



Analytical Stereo Plotter
(KERN DSR-14)

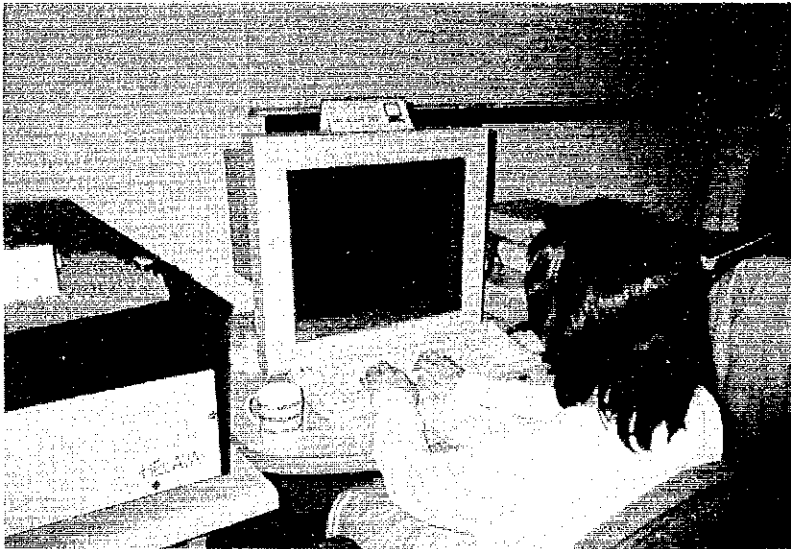


- ditto -
(DAT-EM DMA)

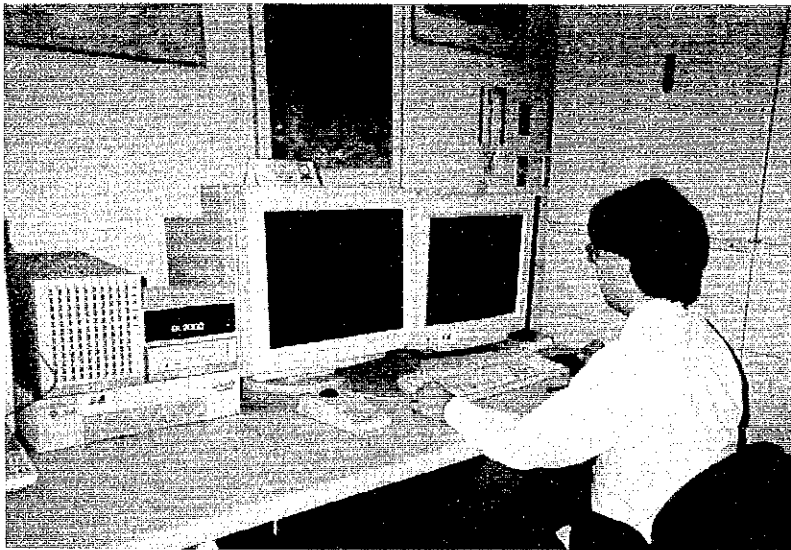


- ditto -
(KERN DSR-14)

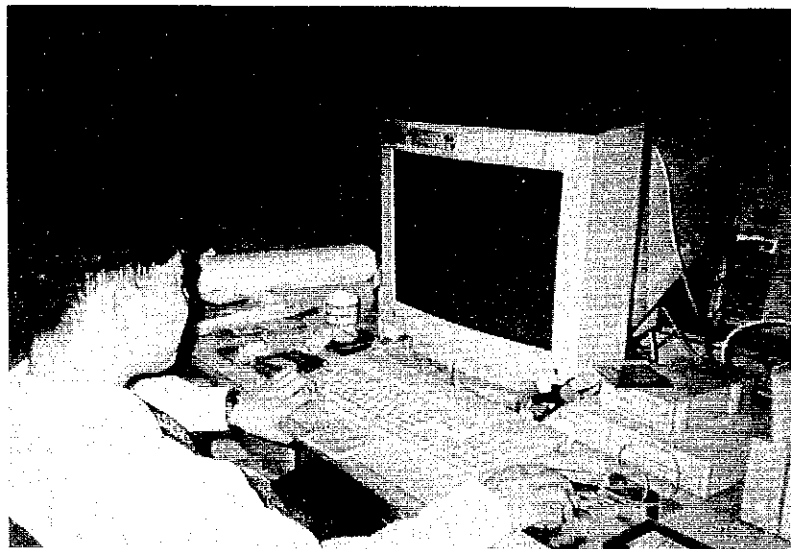
10 COMPILATION



Sun SS20
(Sunmicrosystem)



Ortho Image Processor

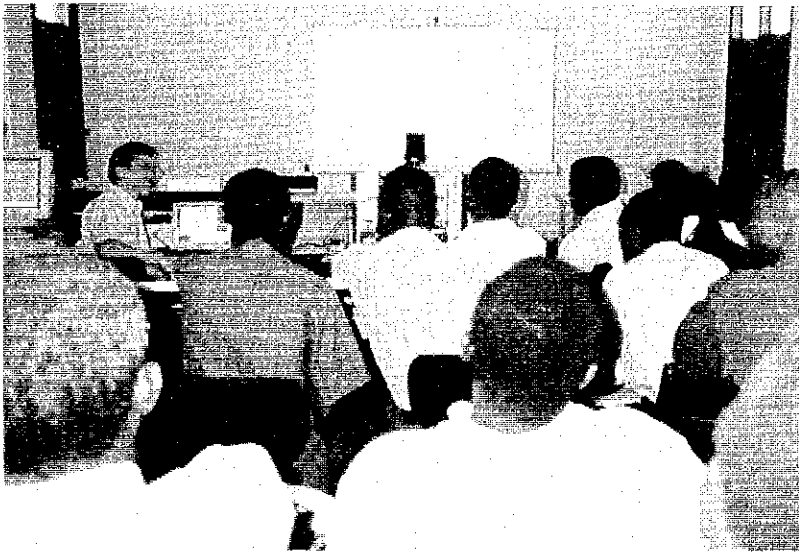


Cartographic Workstation

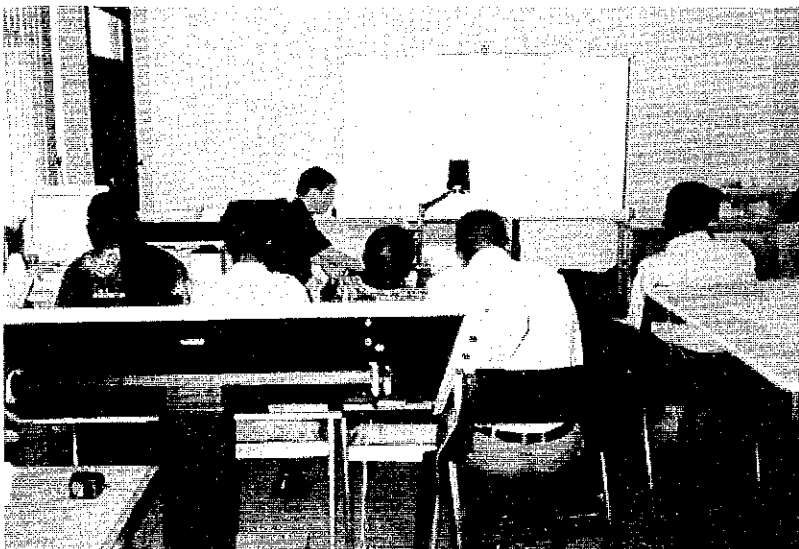
11 TECHNICAL TRANSFER



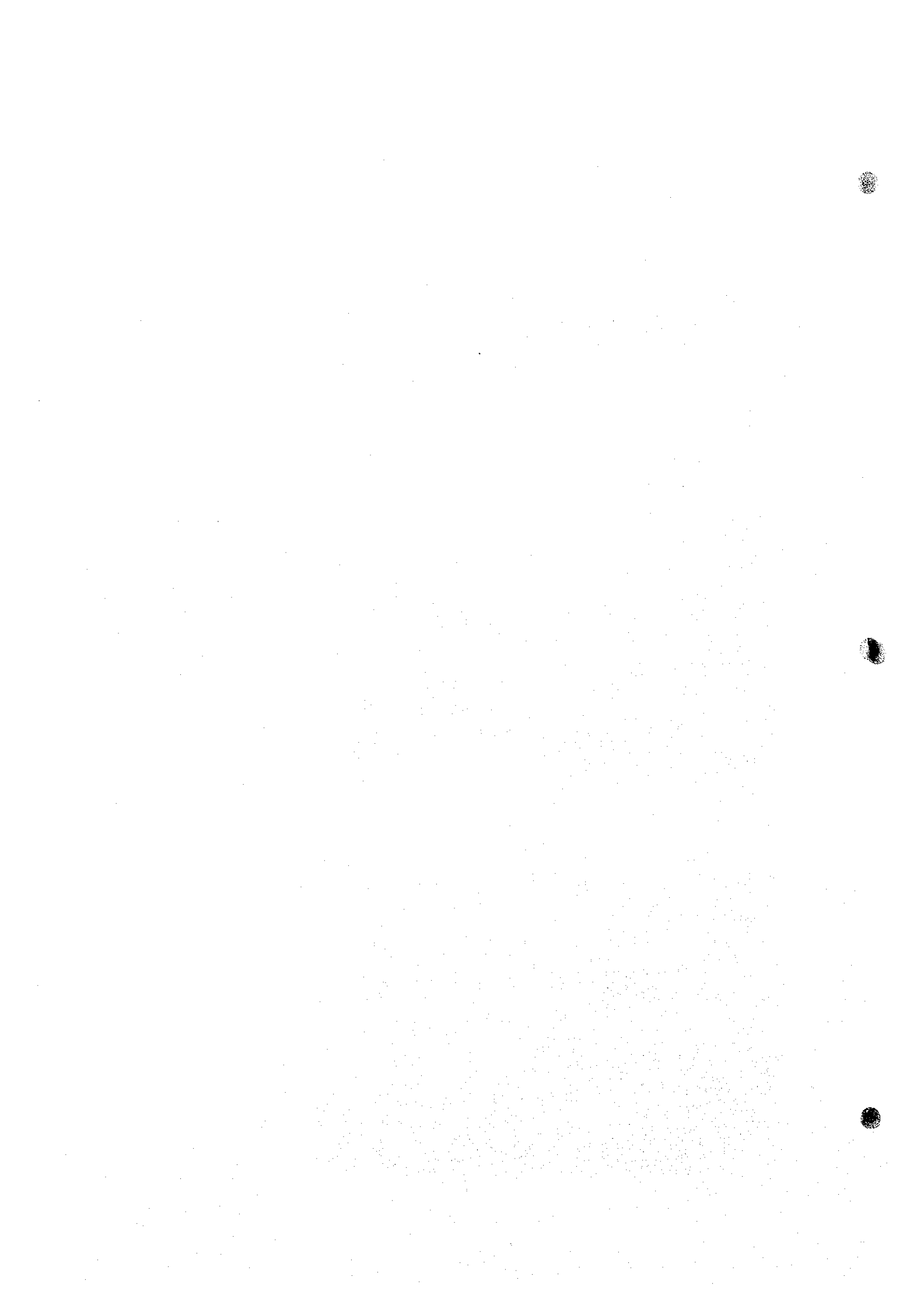
Giving a lecture to SDG counterparts



- ditto -



- ditto -



Final report on the Topographic Mapping of
the Southern Part of the Republic of Ghana

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APPENDIX 1

- List of Abbreviations
 - Ortho-rectified Spot image
 - Updating by Arc/Info
 - Digital Compilation
 - Digital Data Structure and Codes
- Southern Ghana Topographic Mapping Project**

Appendix 2

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(Jan. 20,1997)	
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(Oct. 7,1997)	
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(Mar. 12,1998)	
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(Sep. 1,1998)	
5-8 Minutes of meeting at the end of the 4 th year field work	(224)
(Oct. 19,1998)	
5-9 Minutes of meeting at the start-up of the 5 th year field work	(240)
(Nov. 9,1999)	

