



**Report on Topographic Mapping Project
for
East Kenya Area, Republic of Kenya**

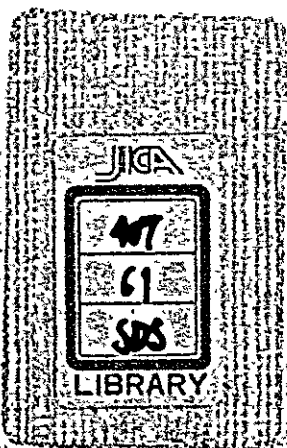
(First Year)

Signalisation

Selection of Traverse Points

March 1976

Japan International Cooperation Agency



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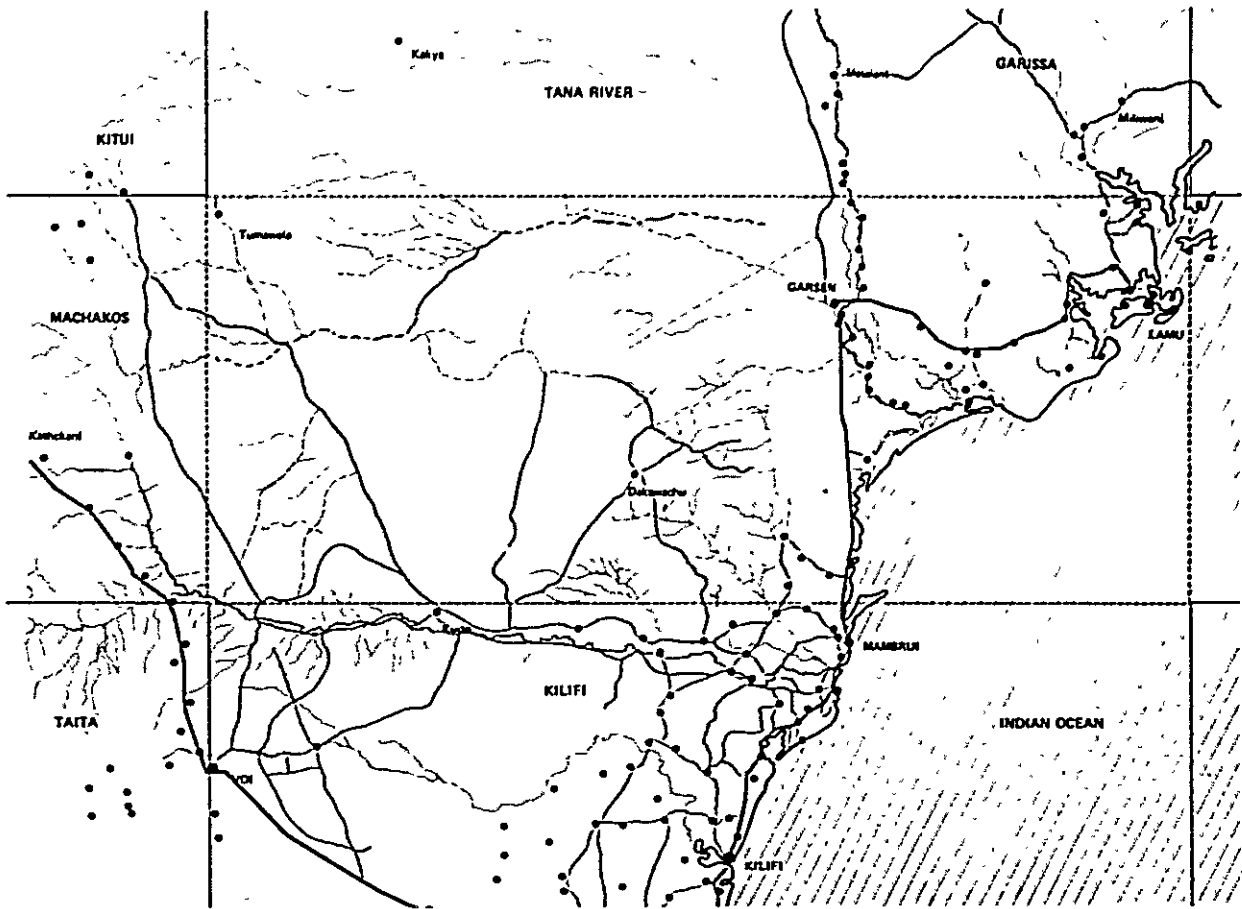


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Location Map of Project Area



Road
 Sea and River
 Project area

LETTER OF TRANSMITTAL

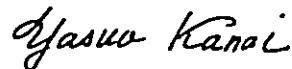
Mr. Shinsaku Hogan, President
Japan International Cooperation Agency

The Report on the First Year Survey Work of the Eastern Area of Kenyan Topographic Mapping Project, conducted during f.y. 1975 in compliance with your request, is herein submitted to you.

In this report are clarified the details of the First Year Survey Work (signalisation and selection of traverse points). I feel confident that the results of the survey conducted during the period as well as the Japanese survey techniques employed will greatly contribute to future development plans for the eastern part of Kenya and to improvement of the Kenya's own survey techniques.

I hereby express my heartfelt gratitude to Mr. Omondi, Director of the Survey of Kenya, Ministry of Land and Settlement of the Kenyan Government, the Ministry's personnel, the officials of the Japanese Embassy in Kenya, and Mr. Murakoshi, Head of the Nairobi Office of the Japan International Cooperation Agency, and other staff members who cooperated with us during the period of the survey and aided us in drawing up this report. At the same time, it is my hope that conditions permit the survey projects of the second and subsequent years to be conducted without delay.

March 1976



Yasuo Kanai

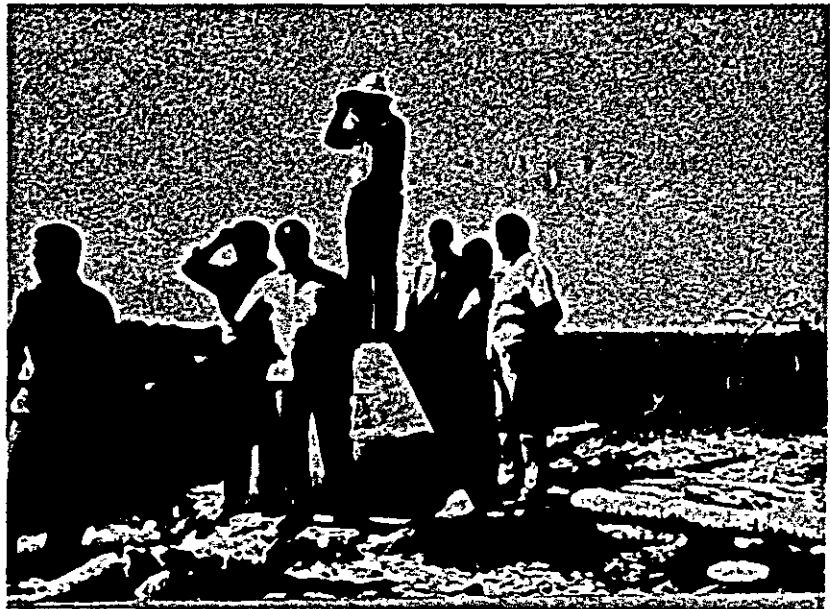
*Leader, Topographical Mapping Group of the East Kenya Area, KENYA
International Engineering Consultants Association*

CONTENTS

1.	SUMMARY OF WORK	13
	1.1 Objective	13
	1.2 Project Area	13
	1.3 Period	13
	1.4 Work Classification and Workload	13
	1.5 Weather Conditions during Period of Survey ..	13
2.	PREPARATIONS FOR SURVEY	13
	2.1 Consultation with the Kenyan Government ...	13
	2.2 Encampment	14
	2.3 Transportation of Vehicles and Equipment ...	14
	2.4 Hiring of Field Assistants	14
	2.5 Organisation of Survey Teams	14
3.	SIGNALSATION	15
	3.1 Reconnaissance	15
	3.2 Signalisation	15
4.	SELECTION OF TRAVERSE POINTS AND SIGNALISATION	16
5.	PROGRESS OF SURVEY ACTIVITES	16
	5.1 Co-operation in the Conduct of Work	16
	5.2 Maintenance of Vehicles	16
	5.3 Procurement of Materials	17
	5.4 Communications and Liaison	17
	5.5 Road Conditions	17
	5.6 Understanding of Local Officials toward the Topographic Mapping Project	17
	5.7 Set-up of Sub-camps	17
	5.8 Car Accident	18
	5.9 Chartering of Boat	18
	5.10 Sanitary Conditions	18
	5.11 Wild Animals	18
	5.12 Field Inspection	18
	5.13 Survey of Existing Bench Marks	19
	5.14 Results of Measurement of the Height of Existing Control Points	19
	5.15 Receipt of DOS Results	19
6.	CALCULATIONS AND ARRANGEMENTS	19
	6.1 Calculations of Eccentric Points of Signals	19
	6.2 Preparation of Description of Points	19
7.	SURVEY WORK FOR THE SECOND AND SUBSEQUENT YEARS	
	7.1 Meeting with Members of the Survey of Kenya	19
	7.2 Levelling	20
	7.3 Traversing	20
	7.4 Others	20
	APPENDED DIAGRAMS	23



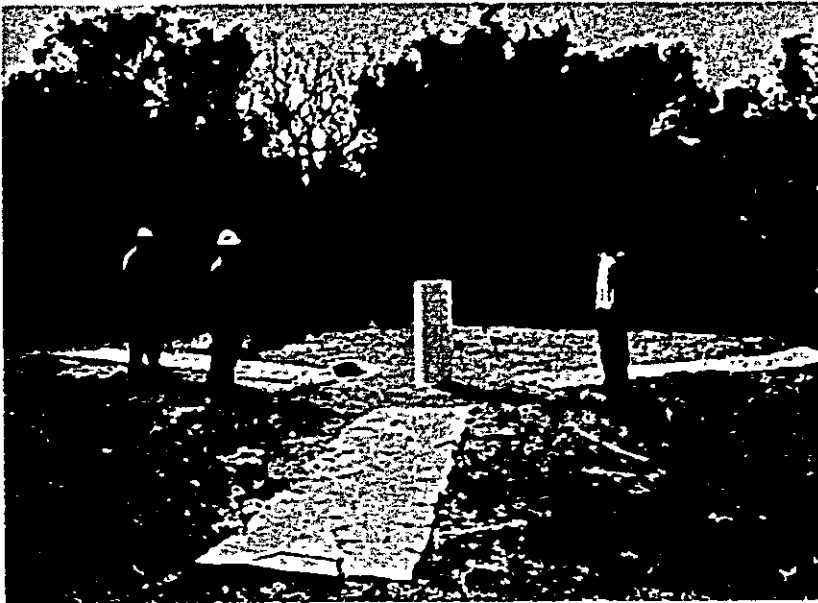
Sub-camp at Bodhei



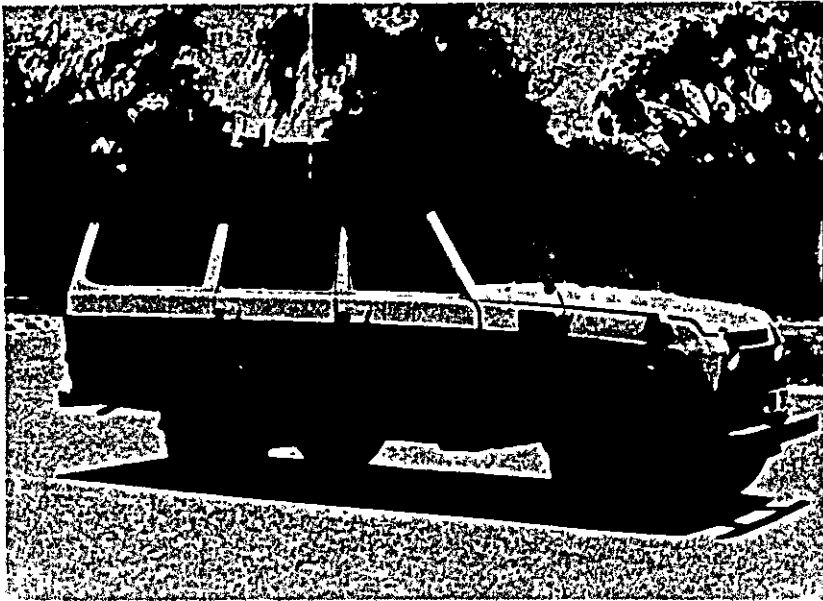
*Inspection of field operations by
high officials of Survey of Kenya*



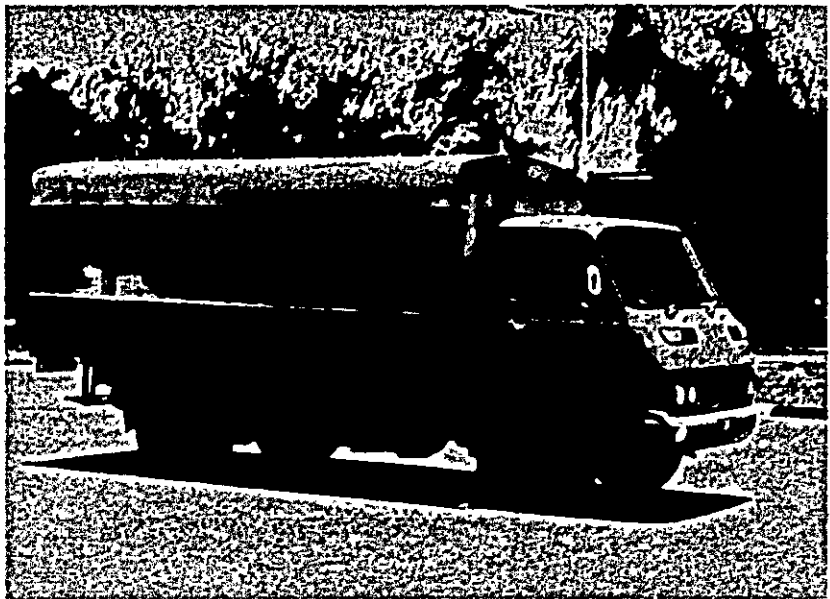
*Preparation of materials for
aerial signals at base camp*



Location of signalisation



Vehicles used: Toyota Land Cruiser

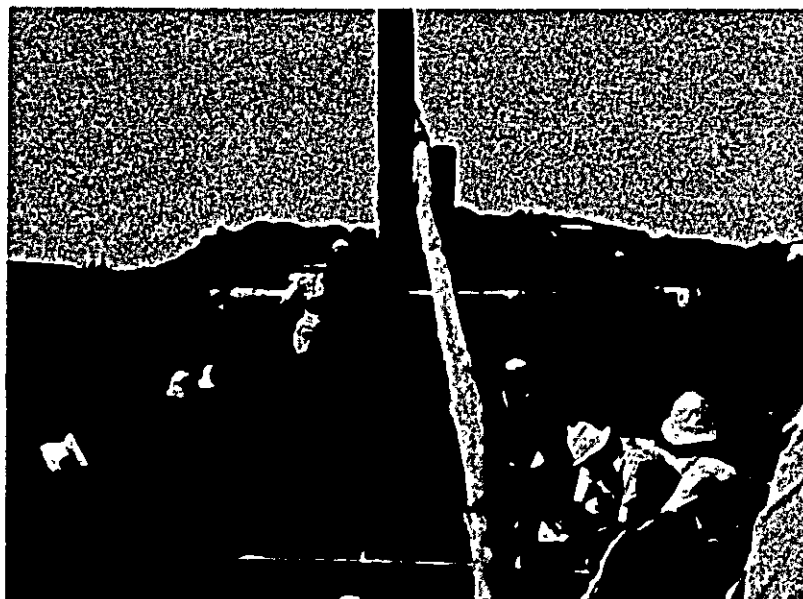


Isuzu 3-ton truck



Repairing eleventh flat tyre of the day

Signalisation at control points on the coast of the Indian Ocean and a nearby island in the eastern part of the survey area (chartering a boat)



*A road in the bush
Many trees have been knocked down by elephants, requiring clearing using a chain saw.*



Crossing the River Galana



1. SUMMARY OF WORK

1.1 Objective

Implementation of the field survey (Phase I) scheduled as the first-year portion of the map preparation project for the eastern area of Kenya (scale: 1:50,000), launched in 1975 as a technical co-operation programme between the Republic of Kenya and Japan.

1.2 Project Area

Eastern part of Kenya (Tsavo, Lamu, Malindi) extending over approximately 27,000km² (See appended diagrams)

1.3 Period

From: November 27, 1975

To: March 5, 1976

(Covers from date of the advance party's departure from Japan to date of their return to Japan. Two members (Tsuruki and Sugita) alone postponed their return to Japan until March 26, 1976.)

1.4 Work Classification and Workload

- i) Signalisation 64 points
 - Existing control points 58 points
 - Newly established control points 6 points
- ii) Traverse points selected 6 points
- iii) Survey of existing first-order bench marks

1.5 Weather Conditions during Period of Survey

	Nov.	Dec.	Jan.	Feb.	Mar.	Total	%
Fair	4.0	24.5	20.5	23.0	4.0	76.0	76.0
Cloudy	0	5.0	8.0	6.0	1.0	20.0	20.0
Rain	0	1.5	2.5	0	0	4.0	4.0
Total	4.0	31.0	31.0	29.0	5.0	100.0	100.0

(Note) Days with localized rainfall (there were four or five such days every month) are included in the 'Cloudy' category in the table above.

2. PREPARATIONS FOR SURVEY

2.1 Consultation with the Kenyan Government

Prior to commencing the survey, several meetings were held between the Japanese survey party and their Kenyan counterparts at the headquarters of the Survey of Kenya from December 1 to December 4, 1975.

On this occasion, in accordance with the proposed "scope of work," mutual consent regarding which had already been reached between the Survey of Kenya and the preliminary survey team dispatched from February through March 1975 from the Japan International Cooperation Agency (JICA), the Japanese party requested that they be afforded certain

conveniences by the Kenyan Government, in view of the fact that this was the first year of the project. Those present at the meetings were:

(From Kenya)

R. Omondi, Director of the Survey of Kenya
W. J. Absaloms, Acting Director of the Survey of Kenya
F. Muuthia of the Mapping Section

(From Japan)

Kazuo Muraoka, Councillor of the Geographical Survey Institute, and Chairman of the Work Supervisory Committee
Hiroshi Kimura, Staff of the Social Development Cooperation Bureau (JICA)
Yasuo Kanai, Leader of the Mapping Group
Yoshihiro Iijima, Chief Surveyor
Kiyoto Hayakawa, Co-ordinator
Tohru Fujita, in charge of liaison

Also present were Mr. Minami Ichikawa, First Secretary at the Japanese Embassy in Kenya, and Mr. Toshio Murakoshi, Head of the Nairobi Office of JICA.

2.2 Encampment

The Base Camp was set up in the suburbs of Malindi. Since preliminary negotiations had been under way through the mediation of the Survey of Kenya, as requested of JICA's Office in Nairobi, there were no problems involved in utilizing the rented private house as the office building. The Base Camp was established immediately after part of the advance party reached Malindi on December 6. The mailing address of the Base Camp was P.O.Box 119, Malindi, Kenya.

2.3 Transportation of Vehicles and Equipment

Six station wagons (Toyota Land Cruiser) and two trucks (Isuzu Elf) which had been purchased by JICA were leased to the party from JICA's office in Nairobi on December 1, 1975. The trucks were transported by land from Dar es Salaam in Tanzania by Mr. Sugita, a member of the party, after completion of field operations for the southern link-road project of Tanzania. They reached Nairobi on December 9, although trouble was encountered in clearing customs at the border between Tanzania and Kenya. Materials and equipment sent from Japan and those procured in Nairobi (including camping equipment) were loaded on the vehicles and transported by land to Malindi by members of the party on December 16.

2.4 Hiring of Field Assistants

Field assistants were employed through the Labour Office in Malindi. Extra workers were hired from time to time directly at the Base Camp and sub-camps.

2.5 Organisation of Survey Teams

The survey party was organised into the following four teams.

Team 1: Fumio Ohdaira and Akira Oikawa
Team 2: Yutaka Kyakuno and Norifumi Nagashima
Team 3: Kiminori Muraishi and Eiichi Taguchi
Team 4: Takashi Aoki and Muneo Tsuruki

3. SIGNALISATION

3.1 Reconnaissance

Starting on December 22, road networks and planned sites for sub-camps were first surveyed by Teams 1 and 2 (eastern section) and Teams 3 and 4 (western section), using Land Cruisers.

3.2 Signalisation

i) Problems with existing control points

The field survey revealed the following problems with the existing control points.

(See appended Diagram 1.)

Lost points	167ST1, 180T7, BPST1, 2, 4, 5	6 points
Uncertain points	177ST2, 180TT3, 180TT10	3 points
Overtured points	167ST3, 169ST1, 175S9, 179TT3, 184S2	5 points
Broken points	175S12, 183S1, 183S9	3 points
	Total	17 points

Lost and uncertain control points were replaced for purposes of signalisation, with other existing points. As for the overtured and broken points, since the exact positions at which they had been set could be identified, signalisation were conducted at those positions.

ii) Method of signalisation

The shape and size of signals were determined in accordance with the specifications as shown in appended Diagram 2. Appropriate materials were selected according to the conditions of the site.

Namely,

- At rocky places, the shape of the signal was drawn in white paint.
- At places where signalisation points permitted access by vehicles, concrete blocks painted white (or applied with lime) were laid in the shape of a signal.
- At places where it was possible to convey signal materials to the site by human labour, crushed white lime was laid in the shape of a signal and white lime powder applied thereto.
- In areas difficult of access such as on hills along the coast and in the bushes, lumber was laid in the shape of a signal, and white paint or lime powder applied thereto.

iii) Eccentricity of signals

Eccentric signalisation points were as follows.

- Points where signalisation was impossible – 3 points
165ST2, 165ST3, 180ST3
- Points where a signal was set up but a separate eccentric station was installed – 2 points
180ST1, 186ST3

(Note) Those points where signals were very unlikely to appear on photos due to halation while photographing.

iv) Number of signals

As scheduled, 58 signals were installed for existing control points including two new points established by DOS (Directorate of Overseas Survey, Ministry of Overseas Development), i.e. 177T1 and 177ST4. Six signals were installed at newly established

traverse points. As reserve points, signals were installed at DOS 47 (eccentric point for 166ST1), DOS 49 (eccentric point for 167ST3), DOS 51, DOS 66 besides 180T8. (See appended Diagram 3.)

4. SELECTION OF TRAVERSE POINTS AND SIGNALISATION

Initial plans called for six traverse points to be newly established. DOS established three control points in the northern part of the Tsavo East National Park between January and March 1976, and employed a 20m bilby steel tower in its surveys. Since these DOS points were available, no new traverse points were selected in the northern part of the park, and signals were set up at the DOS points.

In the Lamu Area flourish tropical trees such as palms rising as high as 15~20m, rendering difficult the establishment of traverse points on the originally scheduled route. Therefore, traverse points were selected so as to enable establishment as near to the route as possible. Assuming the height of the observing tower to be 15~20m, the number of new points on the traverse route is five, with an average distance of approximately 14km. Two signals were installed in the Lamu area.

Since in the Tsavo East National Park, situated in the center of the survey range for the year, the density of control point distribution was low and the existing point (177ST2) uncertain, it was decided to set up new traverse points within the park. This area is covered with bush, and two new routes and five new points were selected based on the assumption that a 15m high observing tower be installed at each new point. Signals were installed at four of these five points. (See appended Diagram 4.)

The above new traverse routes were determined as a result of reconnaissance made with Mr. Suda, the supervisor.

5. PROGRESS OF SURVEY ACTIVITIES

5.1 Co-operation in the Conduct of Work

- i) Co-operation extended by the Japanese survey team's Kenyan counterpart, Mr. J. Owino, Mombasa Provincial Assistant Surveyor, Survey of Kenya, and Mr. E. Monyoro, a staff member, were dispatched from the Survey of Kenya to assist in performing the survey work at the Base Camp and sub-camps during the period specified by the Japanese survey party.
- ii) Co-operation extended by game scouts
Since most of the survey area is a wildlife preserve, the survey personnel exposed themselves to great danger when conducting the survey. For this reason, two game scouts dispatched from the Game Scout Office attended the survey personnel during all field operations. Two extra scouts were called for when field operations required two or more operating teams.

5.2 Maintenance of Vehicles

Thanks to the efforts of Mr. Sugita, a professional mechanic, none of the brand-new vehicles posed serious problems in actual operation despite rough use over bad roads day after day. However, flat tyres were caused from time to time by thorns. This is because operational requirements frequently necessitate travel by vehicles over untrodden paths in

the bush. As a means of preventing blowouts, 7.00-16 (6-ply) tyres with which the Land Cruisers were originally equipped were replaced with 7.50-16 (8-ply) tyres, one-grade higher. In order to protect equipment and materials, a *special body* was attached to the cargo portion of one of the trucks. Also, a roof carrier was mounted on each Land Cruiser so as to enable them to carry long materials and equipment. It was not until the end of almost all field activities that all the vehicles were equipped with a roof carrier.

5.3 Procurement of Materials

Operational materials were mainly procured at Malindi. Those materials which could not be obtained in sufficient quantities at Malindi (i.e., auto parts, cement, paint, lime, etc.) were ordered from Mombasa. Almost all other materials and daily necessities were available at Malindi.

5.4 Communications and Liaison

Although a telephone was installed at the Base Camp, telephone communication with Nairobi, Mombasa, and Japan was seldom possible. Therefore, there was no alternative but to use telegrams or the mail. Liaison between the Base Camp and sub-camps was made directly by word-of-mouth.

5.5 Road Conditions

The work period this year coincided with the dry season, and hence the roads were seldom harmed by rainfall. Generally, however, the road network was poor with most roads unpaved and rugged. Thus, to ensure efficient field operations, as many sub-camps as practicable were set up.

5.6 Understanding of Local Officials toward the Topographic Mapping Project

Prior to commencement of actual survey operations, various publicity activities were conducted to obtain the general understanding of local officials and inhabitants. Namely,

- Notification in writing from the Survey of Kenya down to sub-divisions through governors of the provinces concerned, for the purpose of making the project known
- *Courtesy visits and explanation by the survey party of the work to local officials*
- Explanation of work at the Base Camp
- Official parties at which requests were made for co-operation by local officials and inhabitants
- Preparation of identification cards

As this was the first year of the project, the purpose and nature of the survey were not completely understood by the local officials and inhabitants.

5.7 Set-up of Sub-camps

Sub-camps were set up as near as possible to human habitations to ward off danger from wild animals and poachers. Field operations at each sub-camp were conducted on a seven- to 10-day basis, taking into consideration the problem of logistic support for water, gasoline, operational materials and provisions, as well as maintenance of the physical condition of workers in the harsh natural environment of tropical areas.

Sub-camp sites were Garsen, Tsavo, Mutomo, Galana (Kasave), Mokowe, Asa, and Bodhei. Temporary loadings were also made at several other places.

5.8 Car Accident

On February 9, in transit from the Base Camp at Malindi to a sub-camp at Galana, a Land Cruiser overturned at a place about 50km from Malindi. Mr. Tsuruki, who was driving the car, and four other passengers (local assistants) were immediately given first-aid treatment at the District Hospital at Malindi. That night, they underwent radiographs at the Coast General Hospital at Mombasa. Since Mr. Tsuruki was seriously injured, he was sent to the Catharine Bibby Hospital for complete rest. After that, his condition improved rapidly, and he returned to Japan on March 26. He is now undergoing medical treatment. His fellow assistants were found to have merely sustained slight bruises in the accident. Hence, they returned to the camp to resume work. The damaged car was repaired at a repair shop at Mombasa.

5.9 Chartering of Boat

Boats were chartered at Malindi and Lamu to facilitate operations on the Tana Delta and the islands around Lamu. Since government-owned boats could not be leased on a long-term basis, a motor boat of approximately 5 tons (accommodating 20 to 30 passengers) was chartered mainly from Lamu through the mediation of the District Commissioner. When surveying distant sites (for example, it took four hours to sail from Lamu to Faza), the survey personnel slept aboard the boat.

5.10 Sanitary Conditions

- i) Since malaria prevailed in the survey area, it was made sure that the party members took preventive drugs.
- ii) It is reported that schistosomes abound in the rivers (especially, the Tana River) and swamps in the area. Therefore, direct contact with untreated water was avoided as far as possible. After returning to Japan, all the members were subjected to careful examination at the Tokyo University Medical Research Institute. Results of the examination were negative.
- iii) Fortunately, the survey party seldom encountered snakes with deadly poison, such as the cobras, green snakes and black snakes that abound in the area, possibly because it was the dry season.

The dry season is the hottest period in Kenya, and the temperature reaches as high as 46°C inland in direct sunshine. Nevertheless, the party members were generally in good physical condition. A party member who was stung by a scorpion suffered no serious ill effects.

5.11 Wild Animals

Wild animals such as elephants, rhinoceroses, buffalos and lions living in the Tsavo East National Park, north of the Galana River, are quite fierce, a fact which necessitated special precautions. The number of game scouts was increased for field operations in this area, and no individual was permitted to work alone when away from the vehicle.

5.12 Field Inspection

Mr. W. J. Absaloms, Acting Director of the Survey of Kenya, and Mr. F. M. Kasyi, Mombasa Provincial Surveyor, visited the site for field inspection from January 14 through 16. On January 14, a meeting was held at the Base Camp. On January 15 and 16, they

inspected the field operations on the site.

5.13 Survey of Existing Bench Marks

Inside the survey area lie two existing levelling routes: Route 47 running from Mambrui (15km north of Malindi) up to Garissa via Galole, and Route 48 running from Mambrui, passing through the Tsavo East National Park and Mutha, to Ikutha.

A survey of monuments was conducted, as existing bench marks shall be used for operations in the coming years. It was discovered that only a single bench mark, F.B.M. (MAMBRUI), maintained perfect condition. Though two bench marks, (47)-21 and (48)-15, still remained, they could not be effectively used, judging from the shape of the monuments. Other bench marks were determined to be lost. The levelling route between Mombasa and Nairobi will be available, since it employs railway facilities, which are permanent structures.

5.14 Results of Measurement of the Height of Existing Control Points (See appended Diagram 5)

The results obtained by the Survey of Kenya in height measurement of existing control points include: (1) control points whose heights were obtained by adjustment, (2) points whose heights were obtained from two or three given points, (3) points in coastal areas or on islands whose height was measured by barometric elevation because of the difficulty of levelling, direct or indirect. Also included were those points whose height could not be calculated at the Survey of Kenya due to a significant divergence on the long-range traverse route.

These were the following 10 points:

177ST1	177ST3	180T8	184ST1	184S2
184S3	186ST2	186ST3	192S9	BPST3

5.15 Receipt of DOS Results

It is planned that computations of survey results of the newly established points are to be conducted in England, to be completed in this fall. The results thereof will be furnished to the Japanese Survey Party by the DOS Headquarters through the Survey of Kenya.

6. CALCULATIONS AND ARRANGEMENTS

6.1 Calculations of Eccentric Points of Signals

Computations of eccentric points of signals were conducted using the U.T.M. co-ordinate based on the results of examining existing control points.

6.2 Preparation of Description of Points

The description of new traverse points was completed, with the exception of the results.

7. SURVEY WORK FOR THE SECOND AND SUBSEQUENT YEARS

7.1 Meeting with Members of the Survey of Kenya

On February 13, the Japanese survey party met with Mr. W. J. Absaloms, Acting Director of the Survey of Kenya (Mr. R. Omondi, Director, was out of town) at the Field

Headquarters of the Survey of Kenya to learn the intentions of the Survey of Kenya regarding the survey activities for the second and subsequent years, especially the specifications for traversing and levelling. Present at the meeting were Noriaki Suda, Chief of the Third Geodetic Section, Geodetic Division of the Geographical Survey Institute, acting as supervisor, Yasuo Kanai, Leader of the Mapping Group, and Takahiro Iijima, Chief Surveyor. Exerpts of the meeting's conclusion follow:

The procedure of work and the form to be taken by field notes and computation books shall be in conformance with the proposals of the Japanese party. The degree of accuracy shall conform to the requirements specified in the Survey Manual furnished by the Survey of Kenya. The type of buried monuments to be employed as traverse points shall also be in accordance with the Survey Manual. The monuments for second-order bench marks may be either surface or underground.

Since these points are to be used by the Survey of Kenya in the future, it is necessary to prepare operational specifications in Japan prior to initiation of the second year survey and submit them for approval by the members of the Kenyan survey team.

7.2 Levelling

As mentioned earlier, since there is only one bench mark, FMB (MAMBRUI), available for use inside the survey area, it is necessary to establish levelling routes for the purpose of forming a levelling network. Also, the levelling route must be determined taking into consideration the advisability of installing bench marks in the area for the development of the Tana River basin.

It is desired that the survey work be started in June or shortly thereafter, when the rainy season is over and the climate is the most favourable of the year.

7.3 Traversing

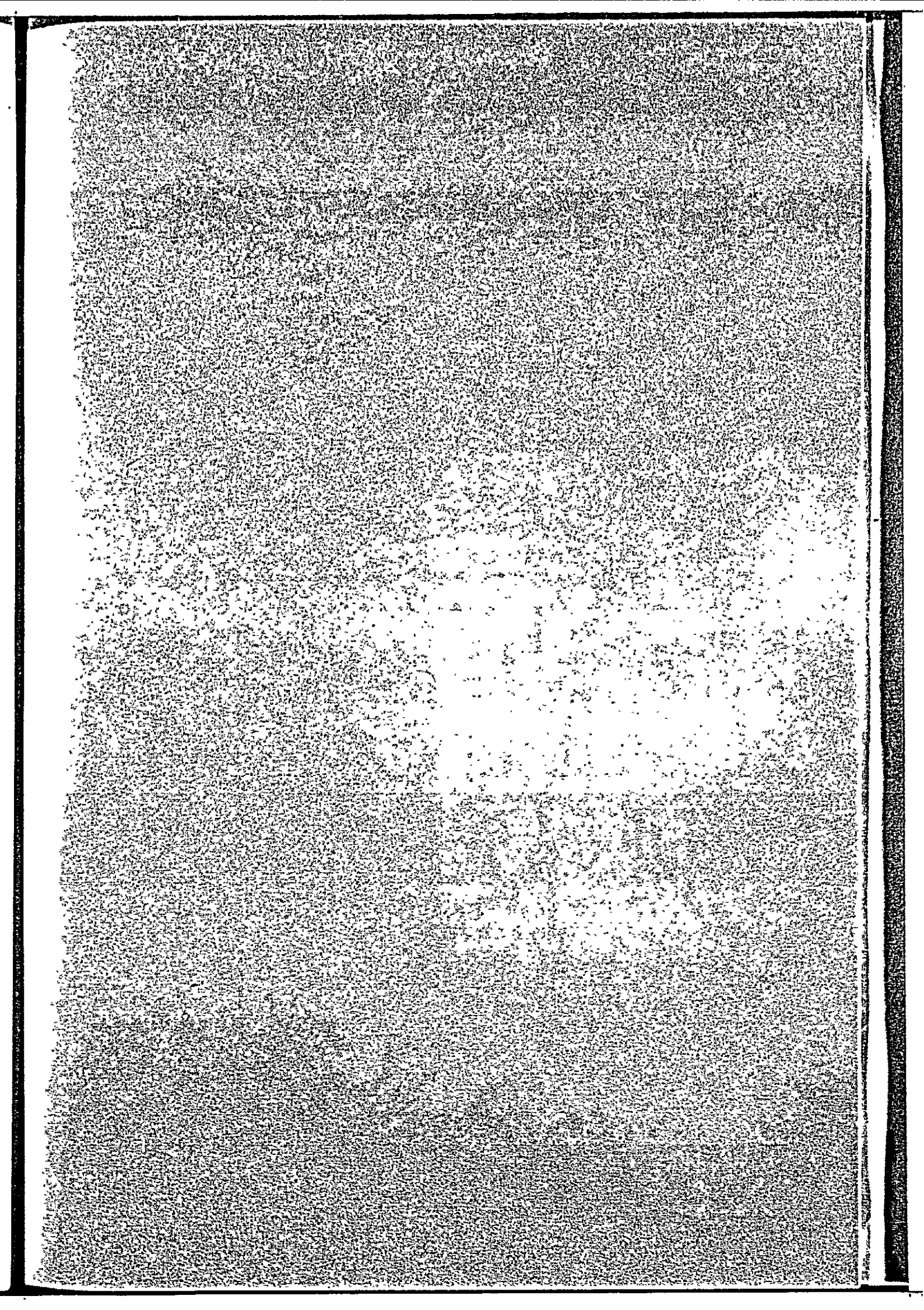
As mentioned above, a high observing tower must be installed in order to survey the newly established traverse points. DOS reports that a certain steel-frame maker in Nairobi, although small, will be able to provide a tower up to approximately 10m in height. However, they have no experience in the manufacture of such an observing tower, though they do have experience in radio towers. Consequently, it would be far preferable to have an experienced manufacturer make the tower in Japan and have it shipped to Kenya.

7.4 Others

Radio equipment:

Communication between the Base Camp, the sub camp and the area to be surveyed is quite difficult, and dangerous animals abound. It is therefore imperative that a wireless be employed.

Note: Because of circumstances connected with licensing, considerable time elapses from the time an order for the radio is placed and receipt thereof. We have applied through the Survey of Kenya with the Kenya Post Office for permission to utilize the frequency of 4.055 or 6.908 MHz.



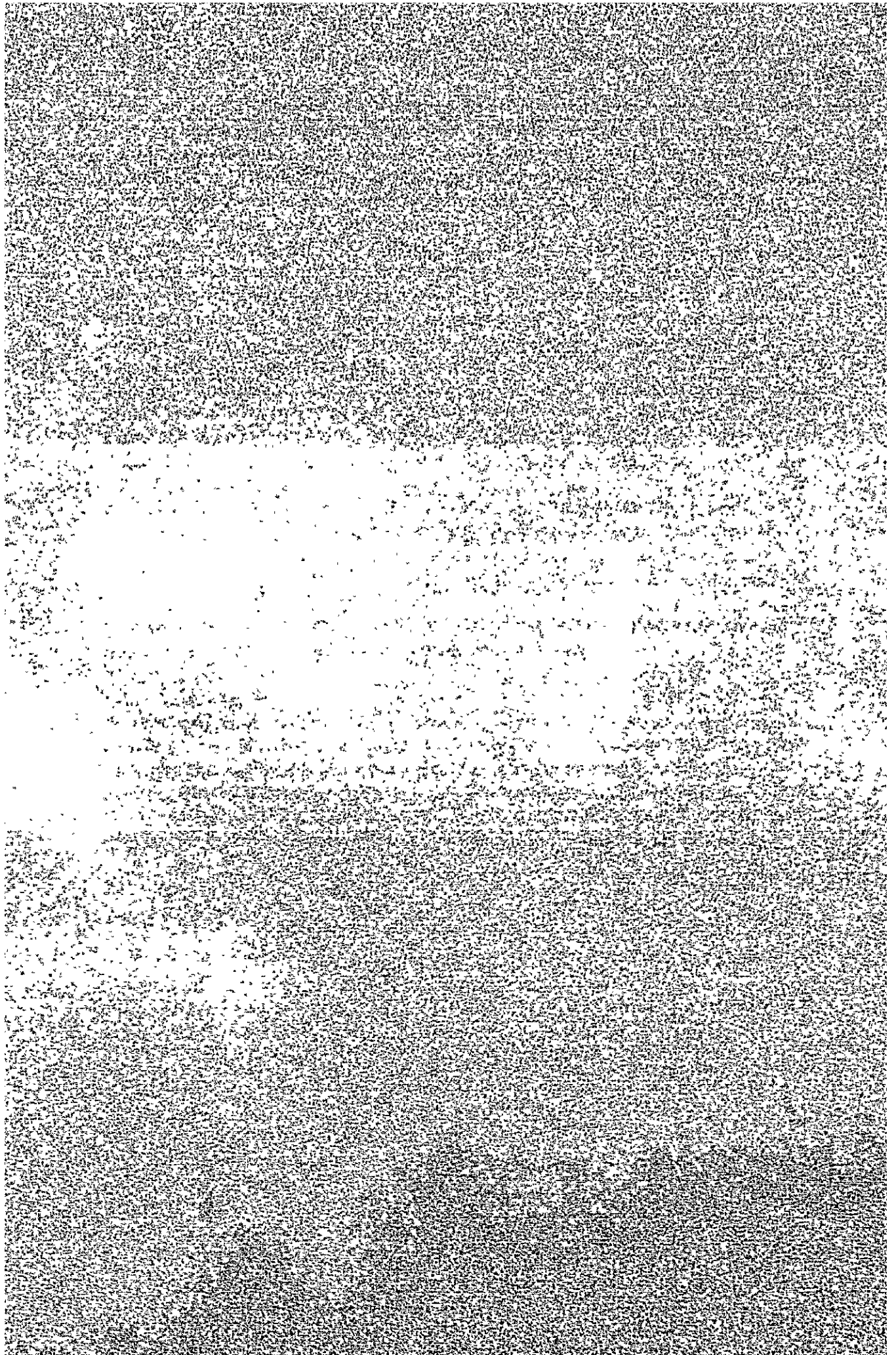


Diagram 1

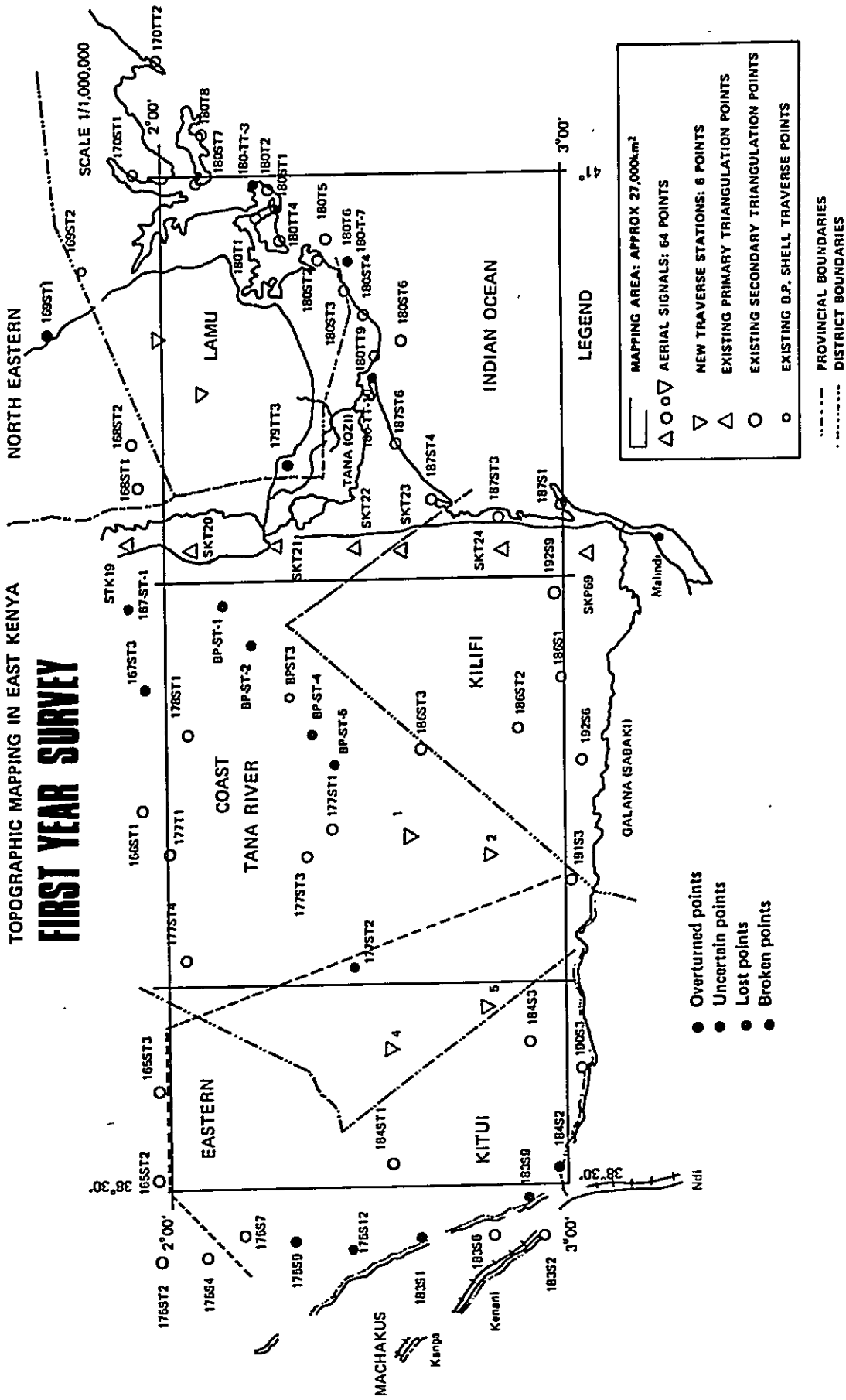


Diagram 4

TOPOGRAPHIC MAPPING IN EAST KENYA
FIRST YEAR SURVEY

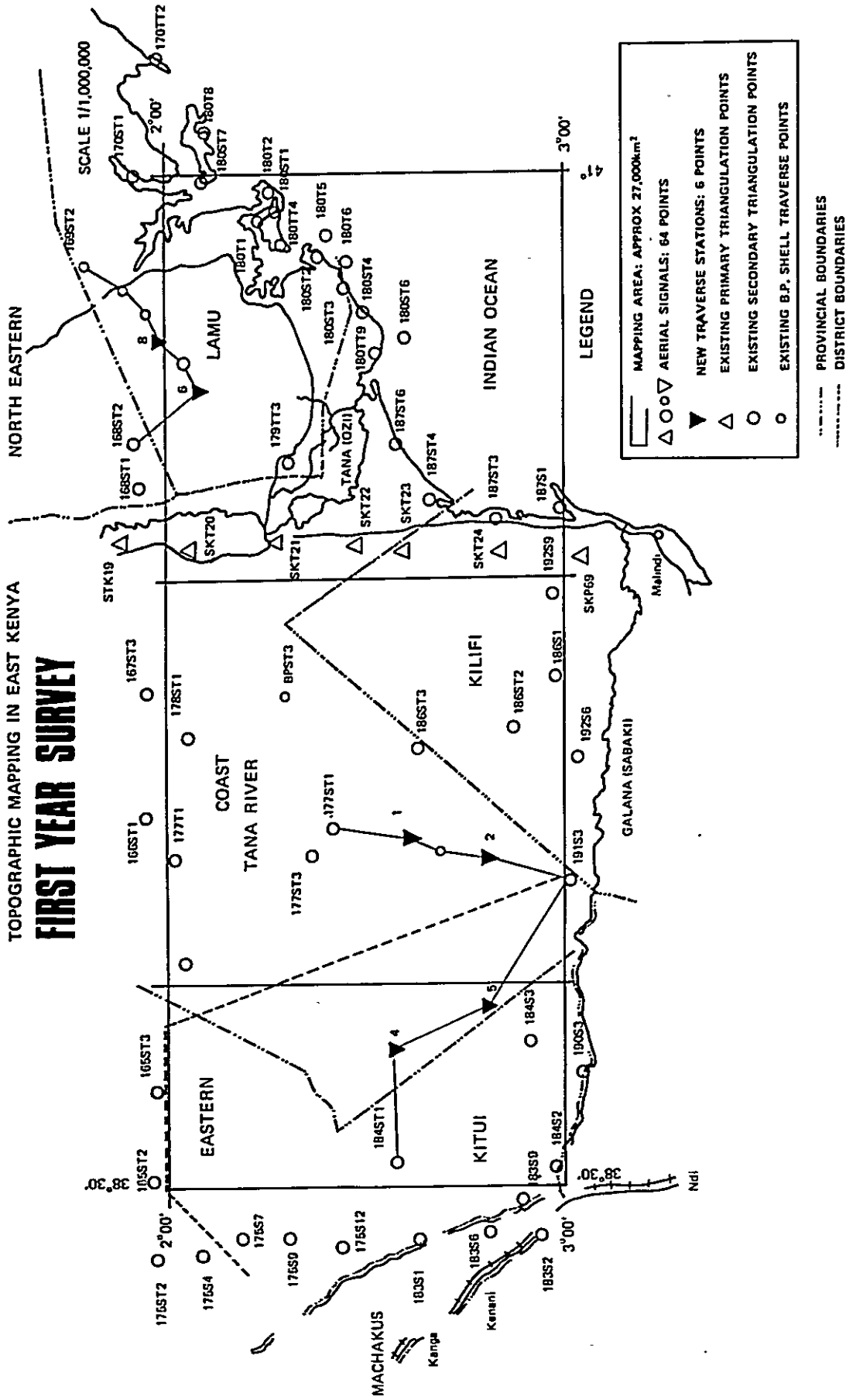
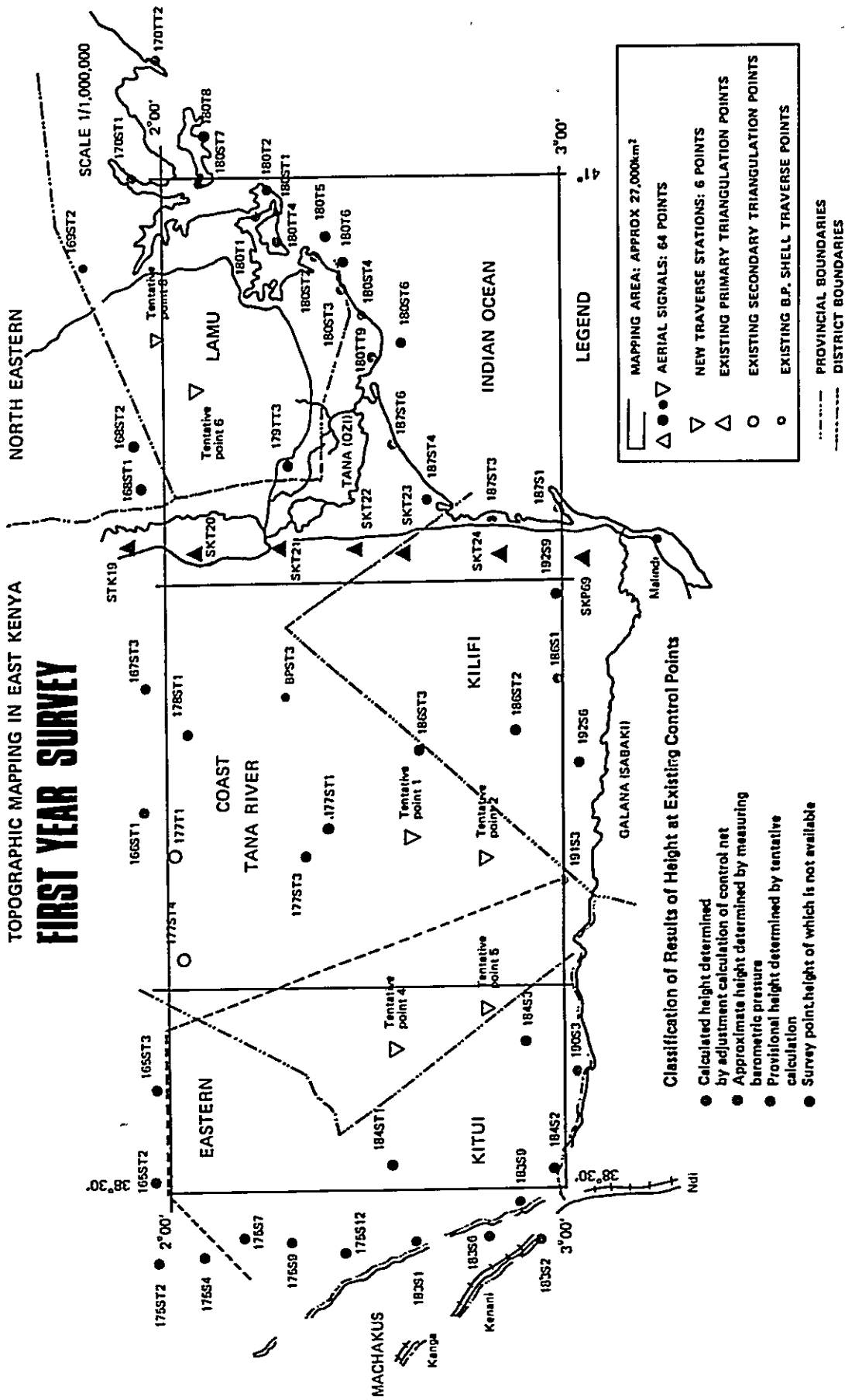
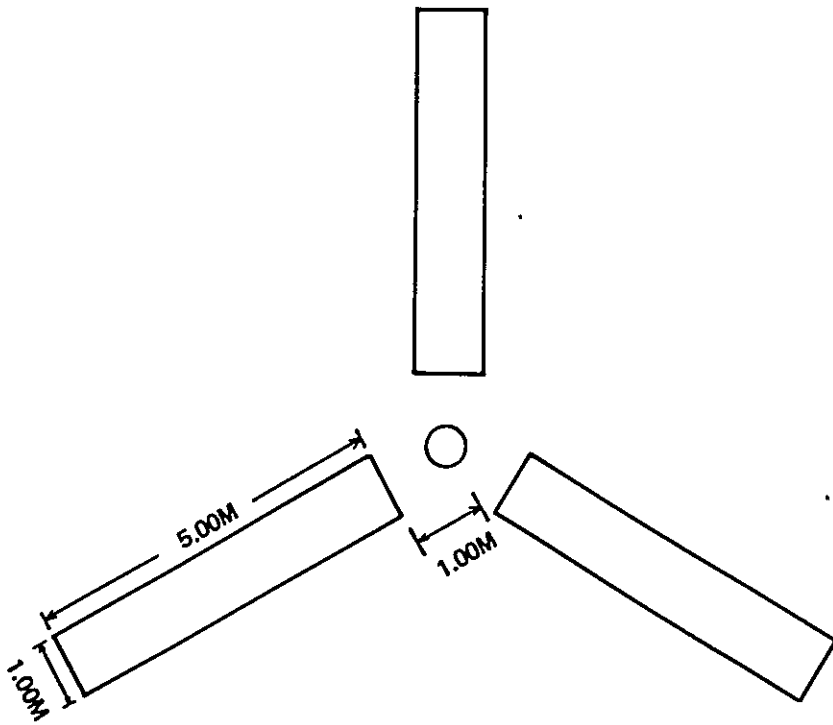


Diagram 5

TOPOGRAPHIC MAPPING IN EAST KENYA FIRST YEAR SURVEY



AERIAL SIGNAL



S=1:00
UNIT=M

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS.

Station: 180.ST.1

Date: 9-2-76

<p>Instrument Ht metres Signal Ht. 147 (180-ST-1-1)</p> <p>0.35</p>	Notes on observing	Observer: T. Aoki
	Conditions:	Booker: N. Nagashima
		Reduced: N. Nagashima
		Checked: T. Aoki
		Ins. No. T3 83104
	Weather: Cloud	
	Visibility: Good	

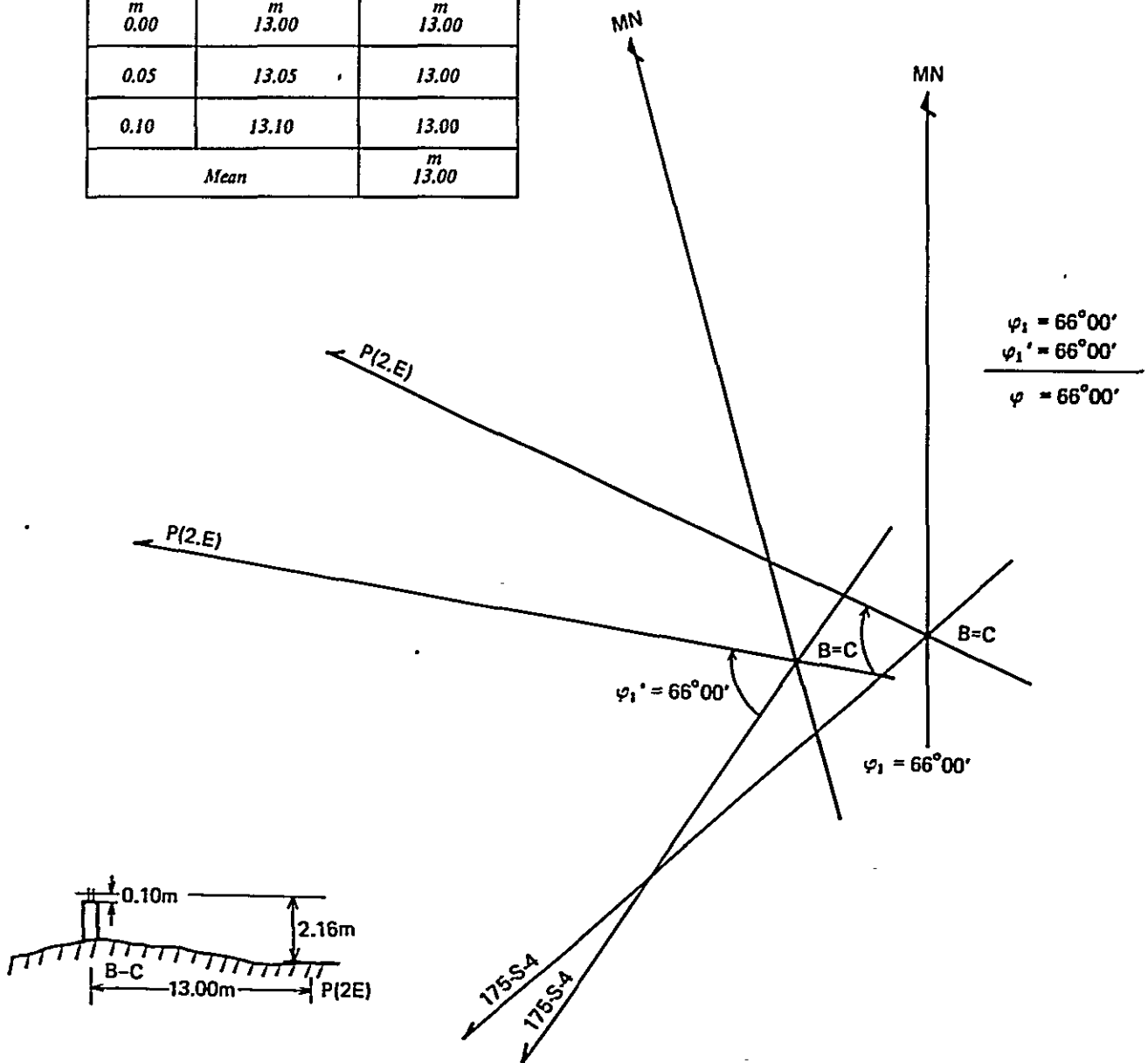
Sta Page of

Station	Face	Signal	Time	Reading			Mean	Reduced. Read'g			Remarks	
				A	B							
180.ST.1-E	L	Helio	13:30	90	34	14, 2	15, 8	30, 0				
	R			89	22	32, 4	31, 9	64, 3	1	11	25, 7	
				179	57			34, 3				
180ST.1-E	R			89	22	32, 1	31, 5	63, 6				
	L			90	34	15, 2	15, 1	30, 3	- 1	11	26, 7	
				179	57			33, 9				
							MEAN =	- 1	11	26, 2		
							Z =	91	11	26, 2		
180.T.1	L	Helio		90	12	38, 4	38, 0	76, 4				
	R			89	44	6, 9	5, 1	12, 0	- 0	29	4, 4	
				179	57			28, 4				
							Check					
180.T.1	R			89	44	4, 7	4, 9	9, 6				
	L		13:40	90	12	43, 6	43, 8	87, 4	- 0	29	17, 8	
				179	57			37, 0				
							MEAN =	- 0	29	11, 1		
							Z =	90	29	11, 1		

OBSERVATION SHEET OF ECCENTRIC ELEMENTS

Station No.	165-ST-2 (165ST2E)		Operated by	F. Odaira
Date	7-1-'76		Checked by	T. Aoki
	Distance	Ins. Height	Division	Targets Height
1		0 ^m . 10	0.00	2 ^m . 16
2		0 . 10	0.0	2 . 16
3		0 . 10	0.0	2 . 16
Mean	^m 13.00	0 ^m . 10	^m 0.0	^m 2 . 16

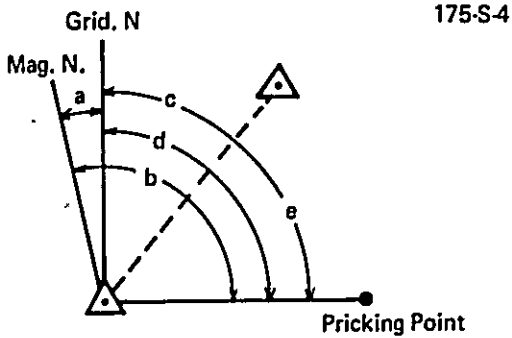
B.S	F.S	Re
^m 0.00	^m 13.00	^m 13.00
0.05	13.05	13.00
0.10	13.10	13.00
Mean		^m 13.00



COMPUTATION OF COORDINATES & HEIGHTS

STATION: 165-ST-2
(165-ST-2-E)

Computed by: *E. Taguchi*
Checked by: *Y. Kyakuno*



Azimuth	237° 09' 49"
Convergence	- 0 0 58

Variation (a) or Dir. Angle (c)	237° 9'
Included Angle (b or e)	66 00
Dir. Angle (d)	303 9

COORDINATES		HEIGHTS	
Dis.	^m 13.00	Dis.	^m 13.00
Dir. Angle (d)	303° 9'	Division tan θ	0.0
Sin (d)	-0.83724	Diff.	^m 0.0
Cos (d)	+0.54683	Ins. Height	+0.10
ΔE	^m -10.88	Targets Height	-2.16
ΔN	^m +7.11	Diff. of Elevation (ΔH)	-2.06
Main Point (E)	+448. 670.36 ^m	Main Point (H)	^m 541.29
ΔE	-10.88	ΔH	-2.06
Pricking Point (E')	+448 659.48	Pricking Point (H')	539.23
Main Point (N)	+9 780 383.33 ^m		
ΔN	+7.11		
Pricking Point (N')	+9 780 390.44		

Obs Sheet No.	Set of	Set of	Set of	Set of	Set of	Set of	Diagram & Remarks.
Date/Time	h m	h m	h m	h m	h m	h m	
9-2-76 / 13 h 42 m							
Type of Target Hella							
Theodolite No. T383104							
Observer T. Aoki							
Conditions . Good							
From R O 180-T-1							
To S in 180-ST-1-B							
Rounds	Reobs	vv	Reobs	vv	Reobs	vv	
1	48	7 0 5 0 2					
2	48	9 0 3 0 1					
3	49	6 0 4 0 2					
4	49	5 0 3 0 1					
5							
6							
7							
8							
9							
10							
11							
12							
Sum ϵ_{vv}	196	7 0 6					
Mean $\epsilon_{vv}/n(n-1)$	49	2 0 0					
Std Angle							
σ_m Std	0						
Diff Sets	1						
Accepted Angle	174	58	49				
ABSTRACT OF HORIZONTAL ANGLES.							Station. 180-ST-1
Date Abstracted by 5-2-76 T. Aoki							Checked by T. Aoki
File Page No							Sin page of

