PART V. MARITIME TRANSPORT

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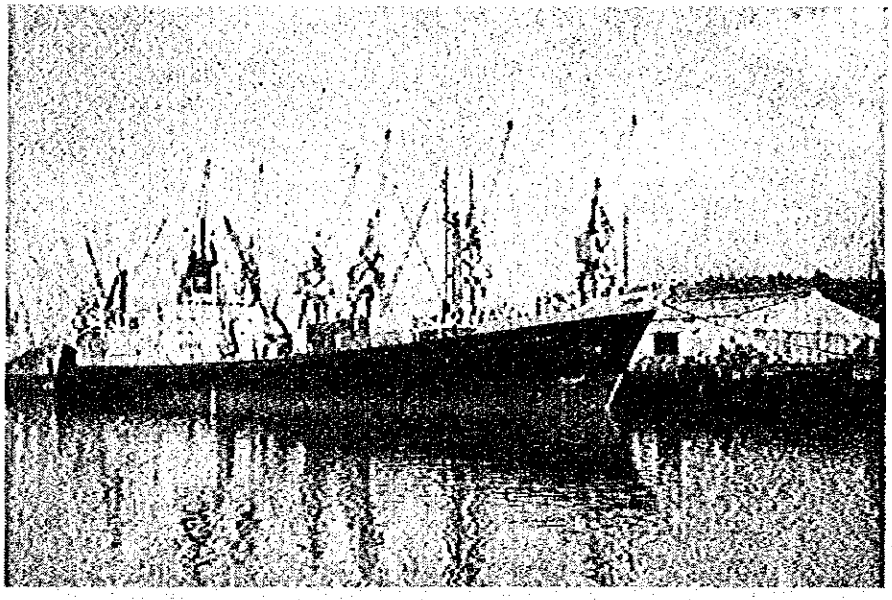


1. Present Condition

1.1 Historical Background

In 1966 four governments of East Africa decided to establish a joint shipping line and the Eastern African National Shipping Line (EANSL) was inaugurated with initial capital of K£ 360,000. Since its inception, the Company has enjoyed a successful and prosperous operation, particularly during the boom period of 1975/76 when its authorised capital was increased to K£ 6 million and its owned tonnage reached 6 vessels, operating mainly on East Africa/Europe liner trade. Unfortunately, the Company began to experience acute financial problems due to the reverse international economic situation, and finally in March 1980 announced its liquidation and termination of activity.

Since then, Kenya has had no shipping line of its own and all cargoes to and from the country have been transported by foreign flag veseels. The purpose of this study is to examine the validity of setting up a new Kenyan National Shipping Line and further to suggest a wide range of equitable ways to secure the required tonnage. In this study we will take up bulk carriers and tankers as well as liner vessels.

1.2 Current Status

1.2.1 Quantity of Export/Import Cargoes

Quantity by principal commodity per year for exports and imports is shown in Tables 1-2-1 and 1-2-2.

From the export table, we can see coffee, tea and canned goods are major items in the general cargo group, and cement in bulk is the biggest item in the bulk dry cargo group. For imports, crude oil remains by far the biggest item, and in the general cargo group fertiliser, iron and steel, and manufactured articles are the main categories.

According to our investigation, UK/Continent countries are taking 40.21% of the total exports from Mombasa, featuring 78.5% of coffee, 60.0% of tea and 72.4% of canned goods. As a source of imports to Kenya, UK/Continent countries account for 51% of the total quantity, excluding oil.

These figures include transit cargoes to and from landlocked countries (Table 1-2-3). The importance of these transit cargoes is to be recognised as they represent, for example in 1981, 18.95% of the total exports and imports of general cargo through Mombasa port.

1.2.2 Containerisation

Containerisation is developing throughout the world at a surprisingly high speed and Kenya cannot remain outside of this worldwide trend. Table 1-2-4 outlines the number of containers handled at Mombasa port. Although the present level of containerisation in Kenya is still comparatively low, the rate of growth as shown in this table is worth attention. Moreover, most of the cargo to and from Mombasa can be containerised and container cargo will continue to grow every year to the maximum handling capacity of Mombasa

port and inland depots. This aspect must be carefully considered at the time of future planning of fleet programs.

1.2.3 Number of Ship Arrivals

The number of vessels arriving at Mombasa per year is as per Table 1-2-5. From various information we obtained unofficially, we estimate 700 general cargo ships, 50 bulk carriers, 100 container ships and 50 RO /RO ships.

Table 1-2-1 Principal Commodities Exports

000-DWT

COMMODITIES	1977	1978	1979	1980	1981
Coffee	302	275	259	234	256
Tea	96	101	111	91	91
Maize	8	24	159	1	-
Cashew Nuts	4	2	2	8	9
Beans, Peas, Pulses	19	12	7	9	5
Oil Cake	7	2	4	2	-
Oil Seeds	8	10	13	-	-
Wattle Extract	13	10	12	12	12
Cotton	11	14	5	6	4
Sisal	25	27	26	36	40
Hide & Skin	13	13	13	8	14
Tinned Fruits, Veg. & Juice	57	56	50	51	54
Lube Oil in Drums	25	22	26	26	7
Scraps	4	2	4	2	1
Soda Ash	98	148	114	98	57
Blister Copper	2	1	-	-	-
Zambia Copper	1	-	-	-	-
Other Mineral Ores	10	1	2	8	1
Cement (in bags)	65	9	37	29	55
Others	120	103	121	183	122
TOTAL GENERAL CARGO	888	832	1,047	902	728
Dry Bulk Cargo					
Soda Ash (in bulk)	-	-	82	98	70
Cement (in bulk)	533	523	426	460	530
Cement Clinker	42	29	81	14	42
Fluorspar	111	104	78	97	106
TOTAL BULK DRY	686	656	590	571	748
Molasses	41	38	65	79	107
Bulk Oils	40	100	174	361	937
Bunkers	380	176	235	158	230
TOTAL BULK LIQUIDS & OIL	461	314	474	598	1,274
TOTAL BULK EXPORT	1,147	970	1,064	1,169	2,022
GRAND TOTAL	2,035	1,802	2,111	2,071	2,750

Source: "Annual Bulletin of Port Statistics, 1981" K.P.A.

Table 1-2-2 Principal Commodities Imports

000 DWT

Commodity	1977	1978	1979	1980	1981
Lubricating Oil	7	6	5	6	4
Pipes & Fittings	10	15	6	5	6
Sugar	38	53	57	2	12
Rice	-	-	-	25	9
Gunnies	20	17	5	9	17
Railway Materials	8	39	32	10	5
Fertilizer (in bags)	108	100	37	145	178
Salt (in bags)	28	28	-	16	25
Iron & Steel	188	205	160	216	136
Vehicles Tyres & Spares	60	75	43	72	34
Agric. & Other Machinery	12	16	13	14	25
Wheat (in bags)	2	1	2	15	10
Maize (in bags)	-	-	-	43	60
Chemicals (Insecticides)	3	1	2	9	5
Paper	9	6	9	9	6
Tallow & Oils (in drums)					
Cases	13	15	8	13	10
Malt	8	12	1	2	-
Others	518	609	539	625	598
TOTAL GENERAL CARGO	1,032	1,198	919	1,236	1,140
Coal	57	61	62	46	91
Wheat (in bulk)	33	88	34	78	154
Maize (in bulk)	-	-	-	444	335
Gypsum	22	15	29	47	62
Fertilizer (in bulk)	7	10	8	5	27
Salt (in bulk)	15	37	27	15	37
Burnt Ore	11	25	-	23	13
Sulphur	20	-	-	-	-
Loose Bauxite	-	2	-	-	2
Iron Ore	-	1	-	-	-
TOTAL BULK DRY	165	239	160	658	721
P.O.L.	2,571	2,732	2,761	3,387	3,496
Palm Oil	38	45	49	61	57
Tallow	3	7	3	10	11
Alkane	2	2	3	4	2
Crude Coconut Oil	2	1	-	-	1
Linseed Oil	-	-	4	-	-
Turpentine	1	1	-	1	-
Chemical (Polyovorand)	-	1	1	4	1
TOTAL BULK LIQUIDS	2,617	2,789	2,821	3,467	3,568
GRAND TOTAL	3,814	4,226	3,900	5,361	5,429

Source: "Annual Bulletin of Port Statistics, 1981" K.P.A.

Table 1-2-3 Transit Traffic

PARTICULARS		1977	1978	1979	1980	1981
UGANDA:	Imports	103,070	75,982	82,279	112,102	49,875
	Exports	165,836	113,844	143,748	115,409	131,847
	Total	268,906	189,826	226,027	227,511	181,722
TANZANIA:	Imports	785	5,478	1,681	261	386
	Exports	709	55	39	176	274
	Total	1,494	5,533	1,720	437	660
BURUNDI:	Imports	910	5,775	20,049	16,751	23,772
	Exports	5,864	273	415	158	83
	Total	6,774	6,048	20,464	16,909	23,855
RUANDA:	Imports	61,172	82,089	69,804	56,592	79,945
	Exports	21,661	23,401	47,055	30,959	38,826
	Total	82,833	105,490	116,859	87,551	118,771
SUDAN:	Imports	15,160	4,106	3,314	4,482	7,769
	Exports	192	352	107	-	-
	Total	15,352	4,458	3,421	4,482	7,769
ZAIRE:	Imports	22,670	6,790	5,382	7,682	8,449
	Exports	53,169	52,663	24,230	11,234	8,811
	Total	75,839	59,453	29,612	18,916	17,260
ZAMBIA:	Imports	573	1,878	54	372	3,851
	Exports	4,382	-	32	1,873	-
	Total	4,955	1,878	86	2,245	3,851
SOMALIA:	Imports	-	-	147	8	-
	Exports	-	-	-	-	-
	Total	-	-	147	8	-
TOTAL:	Imports	204,340	182,098	182,710	198,250	174,047
	Exports	251,813	190,588	215,626	159,809	179,841
GRAND TOTAL		456,153	372,686	398,336	358,059	353,888

Source: "Annual Bulletin of Port Statistics, 1981" K.P.A.

Table 1-2-4 Container Traffic Analysis: 1977–81
Number and TEU of Containers (By Status)

CONTAINER PARTICULARS		1977	1978	1979	1980	1981
A. IMPORTS	Loaded	1,479	2,907	3,896	10,312	12,327
	Empty	834	1,802	4,116	5,228	9,646
	TOTAL	2,313	4,709	8,012	15,540	21,973
B. EXPORTS	Loaded	1,358	2,718	5,066	10,892	16,034
	Empty	570	1,240	1,341	3,298	3,609
	TOTAL	1,928	3,958	6,407	14,190	19,643
C. Trans-shipment	Loaded	154	192	572	332	710
	Empty	235	234	194	323	340
	TOTAL	389	426	766	655	1,050
D. TOTAL	Loaded	2,991	5,817	9,534	21,536	29,071
	Empty	1,639	3,276	5,651	8,849	13,595
	TOTAL	4,630	9,093	15,185	30,385	42,666
E. TOTAL	TEU	4,500	8,961	15,147	30,660	44,083
F. % OF GROWTH OF TEU			99	69	102	43

Source: Basically KPA

Table 1-2-5 Ship Arrival Rate (Dry Cargo Deep Sea and Coasters only)

YEAR / MONTH	Number of Arrivals				
	1977	1978	1979	1980	1981
January	113	106	88	94	59
February	84	106	79	87	66
March	100	115	86	90	71
April	88	105	80	78	73
May	89	114	83	96	80
June	87	95	87	87	72
July	93	98	79	86	73
August	94	89	80	81	75
September	89	100	78	96	82
October	97	96	78	93	76
November	100	90	85	69	67
December	99	83	82	81	71
TOTAL	1,133	1,197	985	1,038	865
Monthly Average	94	98	82	87	72
1st Quarter	295	327	253	271	196
2nd Quarter	264	314	250	261	225
3rd Quarter	276	287	237	263	230
4th Quarter	296	269	245	243	214

Source: "Annual Bulletin of Port Statistics, 1981" K.P.A.

2. Maritime Transport Plan

2.1 Validity of Kenyan National Shipping Line (Analysis on Quantity)

2.1.1 Tankers

Kenya imported 3.3 million tonnes of crude oil in bulk in 1980 and 3.5 million tonnes in 1981. According to information we obtained from EAOR, a total of 53 oil tankers arrived at Mombasa in 1980 and 43 in 1981. Average vessel size was between 60,000 and 80,000 TDW due to the port's restriction on draft and length and this restriction will remain unchanged within the foreseeable future.

If the Company should purchase and operate one 80,000 TDW tanker on consecutive voyages for the Gulf/Mombasa trade, the total quantity to be carried would be about 1.4 million tonnes, which corresponds to about 40% of the total import quantity.

2.1.2 Bulk Carriers

The cargoes that can be carried on bulk carriers at present are cement and soda ash, however, the quantity is still too small to justify having such carriers. Haulage of these cargoes must be studied in relation to utilisation of liner vessels or coastal ships of smaller size. Meantime, the establishment of a steel mill in 1990 is under study, and if this program is materialised transportation of a certain portion of iron ore by a Kenyan flag vessel will become essential in order to secure reliable and stable ways of transport.

2.1.3 Liner Vessels

By summarising import and export cargo through Mombasa port by respective countries and by converting value to revenue tonnes, we obtained Table 2-1-1. If the company can secure 40% of the total quantity on each line, the quantity per month is shown in the extreme right column.

From this table it is obvious that the East Africa/Europe trade is the one best suited to commence liner trade, while the North America trade does not provide sufficient cargo quantity to maintain regular liner services; in the case of the Far East trade, cargo movement is one-way only. Meantime, there are substantial cargo movements to and from the Middle East and Indian Ocean countries, although the figures do not appear in these statistics, and the possiblility of service to these areas should be examined after those to Europe are well established.

Table 2-1-1 Area-Wise Statistics

		Average M/T per year	Average R/T per year	40% of R/T per year	40% of R/T per month
East Africa/ U.K. - N.W. Continent	Exports	369,000	516,600	206,640	17,220
	Imports	681,000	1,157,700	463,080	38,590
East Africa/ U.S.A.-Canada	Exports	39,000	54,600	21,840	1,820
	Imports	103,000	175,100	70,000	5,800
East Africa/ Japan	Exports	FIGURES NOT AVAILABLE			
	Imports	208,000	353,600	141,440	11,790

2.2 Financial Appraisal

There are various ways to secure required tonnage such as purchase of newly built or secondhand vessels, time-charter and space-charter. As time-charter and space-charter are free from such matters as studied in this section, we will take up newly built and purchase of tankers and multipurpose-ships only.

The basic assumption for this study is as follows:

(1) Depreciation:

Straight line depreciation with residual value NIL.

(2) Maintenance and repair cost:

Usual maintenance plus dry docking once every two years at estimated cost of Japanese dockyard.

(3) Insurance premium:

The premium varies according to the respective company, depending on past performance, but for a new company we assumed 50% more than for average Japanese vessels.

(4) Officers and crew:

Wages: ITF worldwide minimum plus 15% (overtime, etc.)

Number of officers and crew: 26 persons

There are two ways to arrange financing:

Firstly: Financing through commercial bank

In this case, we assumed 100% of the loan to be arranged with repayment over 10 years at an interest rate of 12% per annum. Vessels will be demolished at the age of 20 years.

Secondly: Financing by Government or by special arrangements

In this case, we assumed 100% of credit to be arranged at an interest rate of 5% for a period of 25 years, including a 5 year grace period for newly built, and 20 years, including a 3 year grace period, for secondhand vessels. Vessels will be demolished at the age of 25 years.

2.2.1 Tankers – 80,000 TDW

(1) Tankers – secondhand with commercial financing

Provided an 80,000 TDW tanker about 5 years old is purchased at the price of US$10 million, the operation cost and vessel cost are shown in Table 2-2-1.

If this tanker is to be time-chartered to major oil companies, the minimum

charter rate required per month is as follows:

For a five year time-charter

$17,644 ÷ 5 years ÷ 11.5 month = $306,852
(,000$)

For a ten year time-charter

$34,030 ÷ 10 years ÷ 11.5 month = $295,913
(,000$)

For a fifteen year time-charter

$56,240 ÷ 15 years ÷ 11.5 month = $326,029
(,000$)

Variation for different purchase prices at different rate of interest is shown in Figure 2-2-1.

(2) Tanker newly built with special financing

Building cost of a 80,000 TDW tankers is estimated to be US$ 35 million. After calculation as in case(1) above, (Table 2-2-2), the result is as follows:

For a five year time-charter	US$441,513
For a ten year time-charter	462,104
For a fifteen year time-charter	468,719

Vessel Cost by Commercial Financing
(80,000 TDW Tanker-secondhand)

Table 2-2-1 (Unit: $1,000)

	year 1	2	3	4	5	subtotal
Depreciation	667	667	667	667	667	3,335
Interest	1,155	1,035	915	795	675	4,575
Operation cost	1,985	1,369	2,405	1,457	2,518	9,734
Total	3,807	3,071	3,987	2,919	3,850	17,644

	6	7	8	9	10	subtotal
Depreciation	667	667	667	667	667	6,670
Interest	550	435	315	195	75	6,150
Operation cost	1,555	3,144	1,661	3,339	1,777	21,210
Total	2,777	4,246	2,643	4,201	2,519	34,030

	11	12	13	14	15	subtotal
Depreciation	667	667	667	667	662	10,000
Interest	0	0	0	0	0	6,150
Operation cost	4,303	1,910	4,565	2,053	6,049	40,090
Total	4,970	2,577	5,232	2,720	6,711	56,150

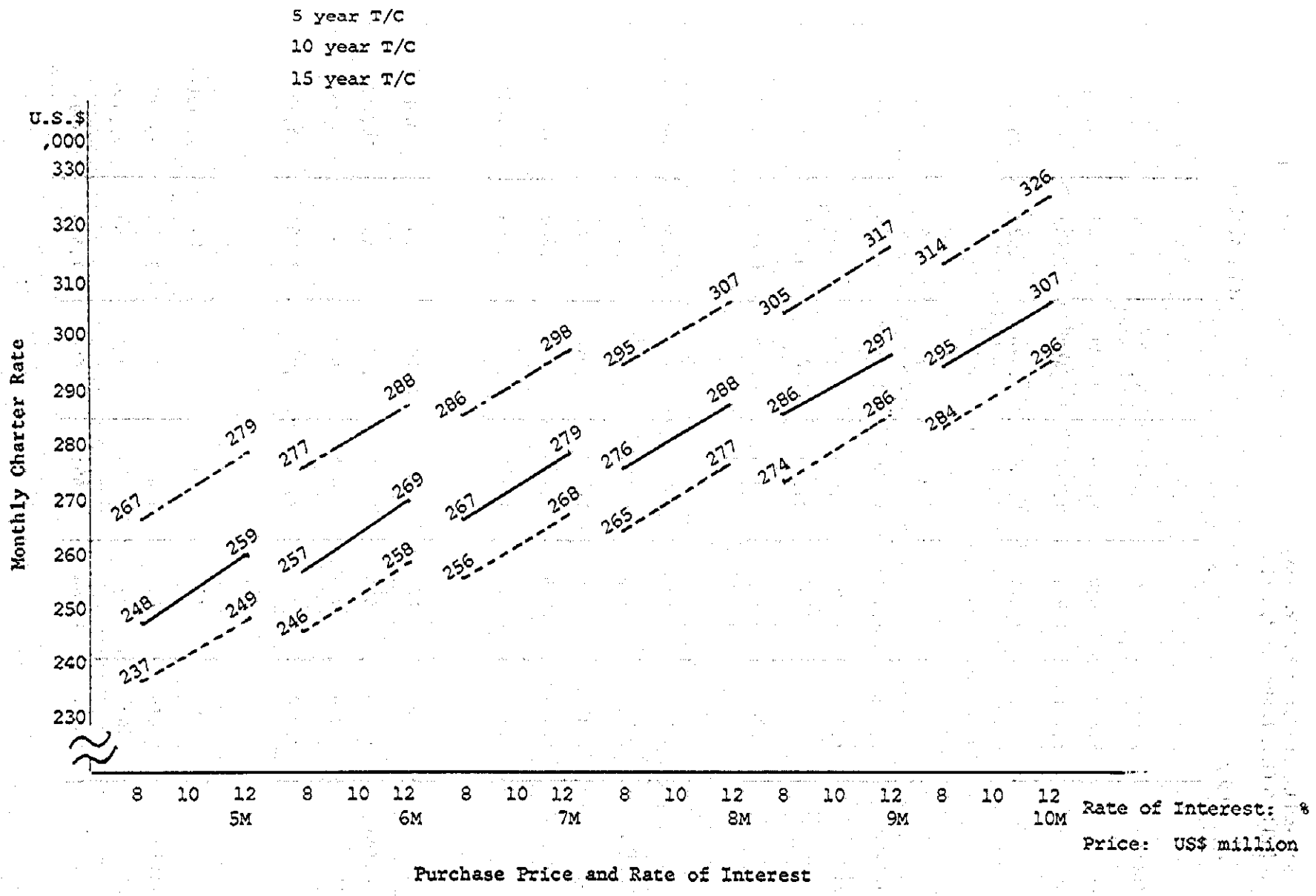


Fig. 2-2-1 Variation in Charter Rates for different Purchase Prices and Rates of Interest

Vessel Cost with Special Financing
(80,000 TDW Tanker-newly built)

Table 2-2-2

(Unit: $1,000)

	1	2	3	4	5	sub-total
Depreciation	1,456	1,456	1,456	1,456	1,456	7,280
Interest	1,820	1,820	1,820	1,820	1,820	9,100
Operation cost	1,461	1,934	1,560	2,400	1,652	9,007
Total	4,737	5,210	4,836	5,676	4,928	25,387

	6	7	8	9	10	sub-total
Depreciation	1,456	1,456	1,456	1,456	1,456	14,560
Interest	1,786	1,695	1,604	1,513	1,422	17,120
Operation cost	2,539	1,754	3,075	1,866	3,221	21,462
Total	5,781	4,905	6,135	4,835	6,099	53,142

	11	12	13	14	15	sub-total
Depreciation	1,456	1,456	1,456	1,456	1,456	21,840
Interest	1,331	1,240	1,149	1,058	967	22,865
Operation cost	1,993	4,016	2,130	4,268	2,280	36,149
Total	4,780	6,712	4,735	6,782	4,703	80,854

	16	17	18	19	20	sub-total
Depreciation	1,456	1,456	1,456	1,456	1,456	29,120
Interest	876	785	694	603	512	26,335
Total	2,332	2,241	2,150	2,059	1,968	55,455

	21	22	23	24	25	G. Total
Depreciation	1,456	1,456	1,456	1,456	1,456	36,400
Interest	421	330	239	148	57	27,530
Total	1,877	1,786	1,695	1,604	1,513	63,930

(3) Tanker-secondhand with special financing

If an 80,000 TDW tanker is purchased at US$10 million and a credit of 5% is obtained, the minimum charter rate is as follows: (Table 2-2-3)

For a five year time-charter	US$255,513
For a ten year time-charter	265,504
For a fifteen year time-charter	307,524

2.2.2 Liner Vessels-15,000 TDW Multi-purpose Ships

A voyage account for 15,000 TDW multi-purpose vessels is shown in Table 2-2-4. Net proceeds per year per vessel are US$3,072,000.00. In this calculation, we did not allow for escalation of various expenses, because we anticipate these increases can be absorbed by an increase of freight rate.

This voyage account is calculated on the assumption that 10,000 tonnes of general cargo and 100 TEU of container cargo can be secured for both northbound and southbound voyages. However, this may be a high target, particularly at the time of commencement and may need modification accordingly. (1,000 tonnes of general cargo on both legs means US$380,000 per year on net proceeds.)

(1) Liner vessels-newly built with commercial financing

In case of a newly built vessel at the price of US$14 million, profit/loss and cash flow is as per Table 2-2-5. With net proceeds of US$3,072,000 per year, the loss amounts to almost US$1 million for the first four years, and turns to a profit basis from the fifth year, but the total profit for ten years reaches only US$940,000 dollars. Also, the financial burden seems excessive, as a shortage in cash-flow reaches US$36,340,000 within ten years.

Vessel Cost with Special Financing
(80,000 TDW Tanker-secondhand)

(Unit: $1,000)

Table 2-2-3

	1	2	3	4	5	sub-total
Depreciation	500	500	500	500	500	2,500
Interest	500	500	500	489	460	2,449
Operation cost	1,987	1,372	2,406	1,459	2,519	9,743
Total	2,987	2,372	3,406	2,448	3,479	14,692

	6	7	8	9	10	sub-total
Depreciation	500	500	500	500	500	5,000
Interest	430	401	371	342	313	4,306
Operation cost	1,557	3,142	1,663	3,342	1,780	21,227
Total	2,487	4,043	2,534	4,184	2,593	30,533

	11	12	13	14	15	sub-total
Depreciation	500	500	500	500	500	7,500
Interest	283	254	224	195	165	5,427
Operation cost	4,301	1,913	4,568	2,056	6,056	40,121
Total	5,084	2,667	5,292	2,751	6,721	63,048

	16	17	18	19	20	sub-total
Depreciation	500	500	500	500	500	10,000
Interest	136	107	77	48	18	5,813
Total	636	607	577	548	518	15,813

Table 4-3-3 Profit and Loss of Voyage Account (15,000 TDW Liner Type)

1. Schedule

	Running	Staying	
Mombasa		15	
(Suez)	18	1	
Hamburg			
Rotterdam			
Antwerp	6	8	
Southampton			
(Suez)	18	1	
Mombasa		15	
Reserve	3	3	
Total	45	41	86 days

2. Revenue

North Bound	10,000 Tons x U$47.00	U$ 470,000
Container	100 TEU x U$1,200	U$ 120,000
		U$ 590,000
South Bound	10,000 Tons x U$100.00	U$1,000,000
Container	100 TEU x U$2,500	U$ 250,000
		U$1,250,000
Grand Total		U$1,840,000

3. Voyage Cost

Port Expense (Incl. Suez)	U$ 150,000
Cargo Expense	490,000
Container Cost	40,000
Fuel Cost	290,000
Agency Fee (5%)	92,000
Miscelaneous	10,000
	U$1,072,000

4. Net Proceed

Per Voyage	U$ 768,000
Per Year (4 Voyages)	U$3,072,000

Table 2-2-5 15,000 TDW Multi-Purpose Ship-newly built
(With Commercial Financing)

(Unit: $1,000.00)

YEAR	NET PROCEEDS	VESSEL COST				PROFIT/LOSS		CASH FLOW		
		DEPRECIATION	INTEREST	OPERATION COST	TOTAL	PROFIT	CUMULATIVE	REPAYMENT	BALANCE	CUMULATIVE
	(A)			(B)				(C)	(A - B -C)	
1	3,072	728	1,682	1,029	3,439	-) 367		3,138	-) 1,095	
2	3,072	728	1,507	1,205	3,440	-) 368	-) 735	2,963	-) 1,096	-) 2,191
3	3,072	728	1,332	1,118	3,178	-) 106	-) 841	2,788	-) 834	-) 3,025
4	3,072	728	1,158	1,396	3,282	-) 210	-) 1,051	2,614	-) 938	-) 3,963
5	3,072	728	983	1,202	2,913	159	-) 892	2,439	-) 569	-) 4,532
6	3,072	728	808	1,475	3,011	61	-) 831	2 264	-) 667	-) 5,199
7	3,072	728	633	1,292	2,653	419	-) 412	2,089	-) 309	-) 5,508
8	3,072	728	459	1,669	2,856	216	-) 196	1,915	-) 512	-) 6,020
9	3,072	728	284	1,392	2,404	668	472	1,740	-) 60	-) 6,080
10	3,072	728	109	1,766	2,603	469	941	1,565	-) 259	-) 6,339
11	3,072	728	-	1,506	2,234	838	1,779	-	1,566	-) 4,773
12	3,072	728	-	2,014	2,742	330	2,109	-	1,058	-) 3,715
13	3,072	728	-	1,629	2,357	715	2,824	-	1,443	-) 2,272
14	3,072	728	-	2,130	2,858	214	3,038	-	942	-) 1,330
15	3,072	728	-	1,764	2,492	580	3,618	-	1,308	-) 22
16	3,072	728	-	(2,000)	2,728	344	3,962		1,072	1,050
17	3,072	728	-	(2,000)	2,728	344	4,306		1,072	2,122
18	3,072	728	-	(2,000)	2,728	344	4,650		1,072	3,194
19	3,072	728	-	(2,000)	2,728	344	4,994		1,072	4,266
20	3,072	728	-	(2,000)	2,728	344	5,338		1,072	5,338

(2) Liner vessels-secondhand with commercial financing

If the company purchases a 15,000 TDW multi-purpose ship about 5 years old at the price of US$9,000,000 per vessel, the profit/loss and cash flow is shown on Table 2-2-6. When compared with net proceeds of US$3,072,000 per vessel per year, we can expect a profit of US$2,260,000 for the first five years and US$46,090,000 for a period of ten years.

Breakeven points of this vessel for the first 5 years are as follows:

	Case I	Case II	Case III	Case IV
DWT of N/Bound Cargo	10,000 T	10,000 T	10,000 T	4,780 T
DWT of S/Bound Cargo	10,000 T	10,000 T	8,430 T	10,000 T
Freight rate of N/B Cargo	$47.00	$37.70	$47.00	$47.00
Freight rate of S/B Cargo	$88.70	$100.00	$100.00	$100.00

Variation for different purchase price is as follows:

1,300 tonnes of northbound Cargo per million dollars, or
390 tonnes of southbound Cargo per million dollars, or
$2.80 per tonnes of either freight rate.

(3) Liner vessel-newly built with special financing (as per Table 2-2-7)

(4) Liner vessels-secondhand with special financing (as per Table 2-2-8)

In both instances, figures show remunerative results and need no further comment.

Table 2-2-6 15,000 TDW Multi-Purpose Ship-Second Hand
(With Commercial Financing)

(Unit: $1,000.00)

YEAR	NET PROCEEDS	VESSEL COST				PROFIT/LOSS		CASH FLOW		
		DEPRECIATION	INTEREST	OPERATION COST	TOTAL	PROFIT	CUMULATIVE	REPAYMENT	BALANCE	CUMULATIVE
	(A)			(B)				(C)	(A - B -C)	
1	3,072	600	1,040	1,164	2,804	268		1,940	-) 32	
2	3,072	600	932	1,015	2,547	525	793	1,832	225	193
3	3,072	600	824	1,316	2,740	332	1,125	1,724	32	225
4	3,072	600	716	1,093	2,409	663	1,788	1,616	363	588
5	3,072	600	608	1,391	2,599	473	2,261	1,508	173	761
6	3,072	600	500	1,181	2,281	791	3,052	1,400	491	1,252
7	3,072	600	392	1,589	2,581	491	3,543	1,292	191	1,443
8	3,072	600	284	1,275	2,159	913	4,456	1,184	613	2,056
9	3,072	600	176	1,681	2,457	615	5,071	1,076	315	2,371
10	3,072	600	68	1,380	2,048	1,024	6,095	968	724	3,095
11	3,072	600	-	1,499	2,099	973	7,599	-	1,573	5,799
12	3,072	600	-	1,499	2,099	973	7,599	-	1,573	5,799
13	3,072	600	-	2,048	2,648	424	8,023	-	1,024	6,823
14	3,072	600	-	1,627	2,227	845	8,868	-	1,445	8,268
15	3,072	600	-	2,382	2,982	90	8,958	-	690	8,958

Table 2-2-7 15,000 TDW Multi-Purpose Ship-newly built
(With Special Financing)

(Unit: $1,000.00)

YEAR	NET PROCEEDS	VESSEL COST				PROFIT/LOSS		CASH FLOW		
		DEPRECIATION	INTEREST	OPERATION COST	TOTAL	PROFIT	CUMULATIVE	REPAYMENT	BALANCE	CUMULATIVE
	(A)			(B)				(C)	(A - B -C)	
1	3,072	582.4	728	1,029	2,339	733		728	1,315	
2	3,072	582.4	728	1,205	2,515	557	1,290	728	1,139	2,454
3	3,072	582.4	728	1,118	2,428	644	1,934	728	1,226	3,680
4	3,072	582.4	728	1,396	2,706	366	2,300	728	948	4,628
5	3,072	582.4	728	1,202	2,512	560	2,860	728	1,142	5,770
6	3,072	582.4	714	1,475	2,771	301	3,161	1,442	155	5,925
7	3,072	582.4	678	1,292	2,552	520	3,681	1,406	374	6,299
8	3,072	582.4	642	1,669	2,893	179	3,860	1,370	33	6,332
9	3,072	582.4	605	1,392	2,579	493	4,353	1,333	347	6,679
10	3,072	582.4	569	1,766	2,917	155	4,508	1,297	9	6,688
11	3,072	582.4	532	1,506	2,620	452	4,960	1,260	306	6,994
12	3,072	582.4	496	2,014	3,092	-) 20	4,940	1,224	-) 166	6,828
13	3,072	582.4	460	1,629	2,671	401	5,341	1,188	255	7,083
14	3,072	582.4	423	2,130	3,135	-) 63	5,278	1,151	-) 209	6,874
15	3,072	582.4	387	1,764	2,733	339	5,617	1,115	193	7,067
16	3,072	582.4	350	(2,000)	2,932	140	5,757	1,078	-) 6	7,061
17	3,072	582.4	314	(2,000)	2,896	176	5,933	1,042	30	7,091
18	3,072	582.4	278	(2,000)	2,860	212	6,145	1,006	66	7,157
19	3,072	582.4	241	(2,000)	2,823	249	6,394	969	103	7,260
20	3,072	582.4	205	(2,000)	2,787	285	6,679	933	139	7,399
21	3,072	582.4	168	(2,000)	2,750	322	7,001	896	176	7,575
22	3,072	582.4	132	(2,000)	2,714	358	7,359	860	212	7,787
23	3,072	582.4	96	(2,000)	2,678	394	7,753	824	248	8,035
24	3,072	582.4	59	(2,000)	2,641	431	8,184	787	285	8,320
25	3,072	582.4	23	(2,000)	2,605	467	8,651	751	321	8,641
							(8,641)			

Table 2-2-8 15,000 TDW Multi-Purpose Ship-Secondhand (With Special Financing)

(Unit: $1,000.00)

YEAR	NET PROCEEDS	VESSEL COST				PROFIT/LOSS		CASH FLOW		
		DEPRECIATION	INTEREST	OPERATION COST	TOTAL	PROFIT	CUMULATIVE	REPAYMENT	BALANCE	CUMULATIVE
	(A)			(B)				(C)	(A - B - C)	
1	3,072	450	450	1,164	2,064	1,008		450	1,458	
2	3,072	450	450	1,015	1,915	1,157	2,165	450	1,607	3,065
3	3,072	450	450	1,316	2,216	856	3,021	450	1,306	4,371
4	3,072	450	440	1,093	1,983	1,089	4,110	969	1,010	5,381
5	3,072	450	414	1,391	2,255	817	4,927	944	737	6,118
6	3,072	450	387	1,181	2,018	1,054	5,981	916	975	7,093
7	3,072	450	361	1,589	2,400	672	6,653	891	592	7,685
8	3,072	450	334	1,275	2,059	1,013	7,666	863	934	8,619
9	3,072	450	308	1,681	2,439	633	8,299	837	554	9,173
10	3,072	450	281	1,380	2,111	961	9,260	811	881	10,054
11	3,072	450	255	1,941	2,646	426	9,686	784	347	10,401
12	3,072	450	228	1,499	2,177	895	10,581	758	815	11,216
13	3,072	450	202	2,048	2,700	372	10,953	731	293	11,509
14	3,072	450	175	1,627	2,252	820	11,773	705	740	12,249
15	3,072	450	149	2,382	2,981	91	11,864	678	12	12,261
16	3,072	450	122	(2,400)	2,972	100	11,964	651	21	12,282
17	3,072	450	96	(2,400)	2,946	126	12,090	626	46	12,328
18	3,072	450	69	(2,400)	2,919	153	12,243	598	74	12,402
19	3,072	450	43	(2,400)	2,893	179	12,422	573	99	12,501
20	3,072	450	17	(2,400)	2,867	205	12,627	546	126	12,627

2.3 Basic Policy of the Company

2.3.1 Capital Investment

If the new company is to be established, the required paid-up capital will be about Ksh. 50 million.

This amount is equal to a down payment of 10% of the vessels to be purchased, plus minimum expenses for the pre-trading period or, in case of time-charter, short-term financing, i.e., the operator must pay the charter-hire in advance every month, and the bunker charge must be paid in advance, although it takes substantial time until the freight is actually transferred to the operator. If more favourable financing for a purchase can be obtained, this amount is flexible.

2.3.2 Tankers

Purchase of one 80,000 TDW Tanker about 5 years old.

Required Funds: US$10 million

Presently, the tanker market is so badly deteriorated that there exists a very good possibility to buy a secondhand tanker at a far lower price than the actual value. Therefore the building of a new tanker is not considered practical.

In order to achieve this scheme, i.e., purchase and immediately charter-out, the full support and cooperation of major oil companies is essential. Some problems and difficulties may arise during the course of negotiations, but full efforts should be exerted.

2.3.3 Liner vessels

Purchase of 3 multi-purpose-ships of 15,000 TDW about 5 years old

Required Funds: US$27 million (@US$9 million)

In order to commence regular monthly service to UK/Cont., three vessels will be suitable and this number can be gradually increased depending on cargo requirements and the experience of the staff.

Instead of being purchased, these three ships can be procured by long-term time-charter, which may be an advantage in that the Company can avoid complex owner matters such as depreciation, interest, employment of crew and officers, etc. One risk involved in time-charter is that the charter rate fluctuates in a free market, so there exists a possibility to secure tonnage on favourable terms, like the present market, but adverse circumstances can also arise.

In addition to these three multi-purpose ships, participation in a Container Consortium on a space-charter basis must be considered. This method will provide the Company, apart from the economic aspect, the chance to offer more frequent service at shorter intervals to its customers. After gaining sufficient knowledge and experience of containers, a full-container ship must be built at a suitable time using favourable financing.

2.3.4 Containers

Although in this study we have assumed that lease-containers are readily available for use both for northbound and southbound voyages, acquisition of containers is essential at all times. The number of containers required must be calculated at a later stage when the form and scale of the operation is determined but, in general terms, the Company should increase as long as financial capacity permits.

2.3.5 Conference

Considering its status as a national shipping line, the company should join respective shipping conferences. In this way the Company will be entitled to load contract-cargo and can also have an internal influence on Conference decisions which is to the benefit of Kenyan economy. In any case, friendly relations must be maintained with ISCOS.

Table 2-2-9 Proposed Short Range Projects (1984–1988)

1 Ksh. = ¥19
1 $ = ¥240
1 $ = 12.632 Kshs.

No.	Project	Contents	Cost (million Ksh.)			Period	Degree of Importance	Degree of Urgency	Remarks
			Local	Foreign	Total				
1.	Tanker	Purchase of secondhand Tanker 5 years-old (one vessel)		126	126	Any time	A	A	
2.	Liner Vessel	Purchase of secondhand Multi-purpose vessels 5 years-old (Three vessels @$9.OMD)		341	341	Any time	A	A	
3.	Capital Investment	Initial fund to set up the company	50		50	on establishment	A	A	

Table 2-2-10 Proposed Medium Range Projects (1988–1993)

1 Ksh. = ¥19
1 $ = ¥240
1 $ = 12.632 Kshs.

No.	Project	Contents	Cost (million Ksh.)			Period	Degree of Importance	Degree of Urgency	Remarks
			Local	Foreign	Total				
1.	Container Ship	New Building of 1.600 TEU Full-Container Ship (one vessel)		445	445	1989 - 1993	D	D	

2.4 Summary and Proposal

We are aware of the firm intention of the Kenyan Government to establish a Kenyan National Shipping Line and, bearing this in mind, the following is a summary of our study.

2.4.1 Contribution to Foreign Currency Reserve

Earning of foreign currency by the Company and saving on payment of freight to foreign flag vessels will no doubt contribute to the Kenyan economy and improve the balance of payment.

Whilst the Company receives freight in foreign currency, overseas expenses of its vessels must also be paid in foreign currency. Therefore, the Company must earn sufficient freight to cover port charges, cargo handling charges, bunker charges and, in the case of a time-charter, charterage, etc. If, in the worst case, the Company should fail to earn revenue to cover these disbursements, foreign currency once earned will be forced to flow out and Kenya's balance of payment will be even worsened. However, as long as the Company keeps a healthy management, heir contribution in this respect will be substantial.

2.4.2 Tankers

(1) We based our calculation on a purchase price of $10 million for a secondhand 80,000 TDW tanker. We refer to Figure 2.2.1. in which corresponding charter rate to different purchase price and rate of interest is indicated.

(2) In order to avoid anticipated difficulties, establishment of an independent tanker company as in other countries may be worth exploration.

(3) Some consideration may be required of the recent tendency that oil producing countries, having their own refining facilities, are switching their exports from traditional crude oil to processed products.

No one can predict how fast this tendency will grow but no doubt it will spread to other oil producing countries.

2.4.3 Liner Vessels

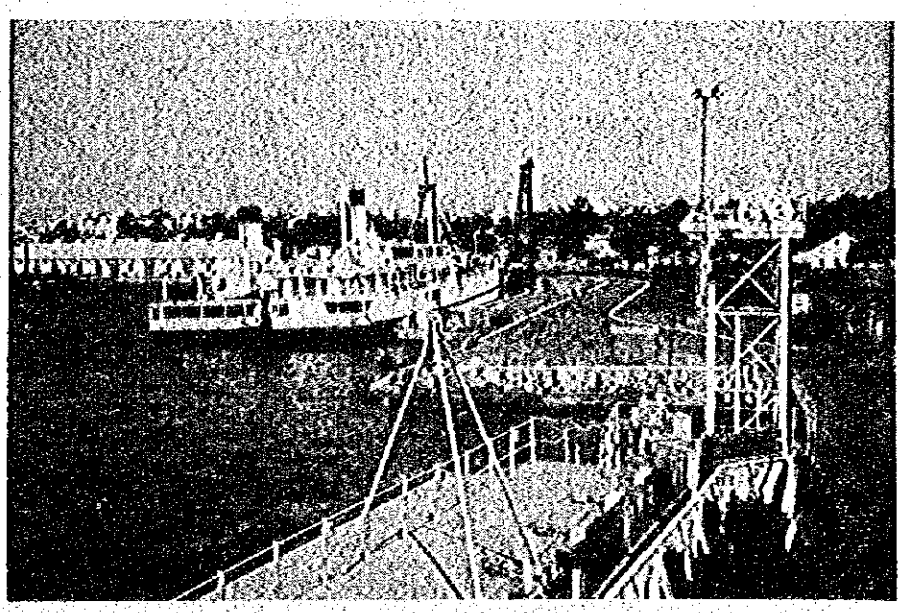
(1) Breakeven points of freight rate and deadweight tonnes on the respective purchase price of secondhand multi-purpose-ships are given in 2-2-2 (2).

(2) Financial appraisal given in 2-2-2 is for a single vessel. Therefore, in order to see the financial position of East Africa/Europe services as a whole, these figures must be tripled.

(3) The Company must join the Shipping Conferences and should try to have internal influence on the decisions made, which is to the benefit of Kenyan economy. Remembering that the main reason for the unfortunate failure of EANSL was the appearance of outsider activities, the Company must do its utmost to procure vessels on the most competitive basis.

(4) If the Company started operation with three vessels, the loading share would be very small. However, success or failure solely depend on, not loading right, but the ability to obtain cargo. Profit of the Company is given as an accumulation of each vessel, therefore the Company should adopt a "slow but steady" policy, and after obtaining experience and knowledge, it can expand its services and fleet gradually, either in the field of conventional vessels or, more likely, of full container ships.

PART VI. INLAND WATERWAY TRANSPORT



1. Present Condition

1.1 Waterway Transport on Lake Victoria, (hereinafter referred to as Lake Transport)

(1) Since the collapse of the East African Community in 1977, the Lake Transport of Kenya has been restricted to operation within the territory of Kenya and, as shown in Table 1-3-1, the fleets in operation are;

3 Passenger Boats
2 Tugboats
9 Lighters

The transport center of the Lake Transport is Kisumu, which is located at the northeast end of the Winam Gulf. There the railway trunk line from Nairobi directly connects with the Lake Transport.

Most passengers and cargo to/from local lake ports make connections with the railway.

Major local lake ports are Homa Bay and Kendu Bay and both are located on the south shore of the Winam Gulf with small farms/fishing towns right behind them, and extensive cereal farms (Kishii) and a sugar factory (Awendo) far inland.

Other local lake ports are Mbita (Rusinga Isl.), Sena (Mfangano Isl.) and Karungu, the first two being island ports which are located at the mouth of Winam Gulf and have small farms/fishing villages in back of them. Karungu is located at the south end of the Kenyan territory, close to the Kenyan-Tanzanian border.

Compared with the two aforementioned major ports, movements of passengers and cargo to/from the three small local ports are far fewer.

There are several small villages on the north shore of the Winam Gulf and the northern part of the Kenyan water. However, most of them are being only slowly developed and have small populations. To/from these small villages, movements of passengers and cargo rely on fishing boats or land transport.

As shown in Tables 1-2-1 and 1-2-2, recent major commodities being shipped out from Kisumu are construction materials (cement, etc.) and subsistence goods; those being shipped to Kisumu are dried fish, sisal, cotton seeds, etc.

In the near future, when the road from Rongo to Homa Bay is completed, it is expected that cereals will come back to the Lake again and that Sony (South Nyanza) sugar will also come to the Lake.

(2) Operation Schedule with the Existing Fleet

M. V. RELI (136 PASSENGERS)

KISUMU	KOWUOR	HOMA BAY
09:05	12:20	
	12:30	13:10
	14:20	13:40
17:45	14:30	

(Daily, except Tuesday)

M. V. ALESTES (200 PASSENGERS)

KISUMU	KENDU BAY
09:30	11:30
14:40	12:40

(Daily, except Friday)

M. V. KAMONGO (232 PASSENGERS)

KISUMU	KOWUOR	HOMA	MBITA	MFANGANO	KARUNGU
(TUE)					
10:00	14:00				
	14:20	15:05			
		(WED)			
		07:00	09:00		
			09:30	11:30	
				12:00	16:00
					(THU)
				11:00	07:00
			13:30	11:30	
		16:00	14:00		
		(FRI)			
		07:00	09:00		
			09:30	11:30	
				12:00	16:00
					(SAT)
				11:00	07:00
			13:30	11:30	
		16:00	14:00		
(SUN)		(SUN)			
06:00		02:00			

(WEEKLY: MAINTENANCE MONDAY)

TUGBOATS/LIGHTERS

Services (irregular) as requested.

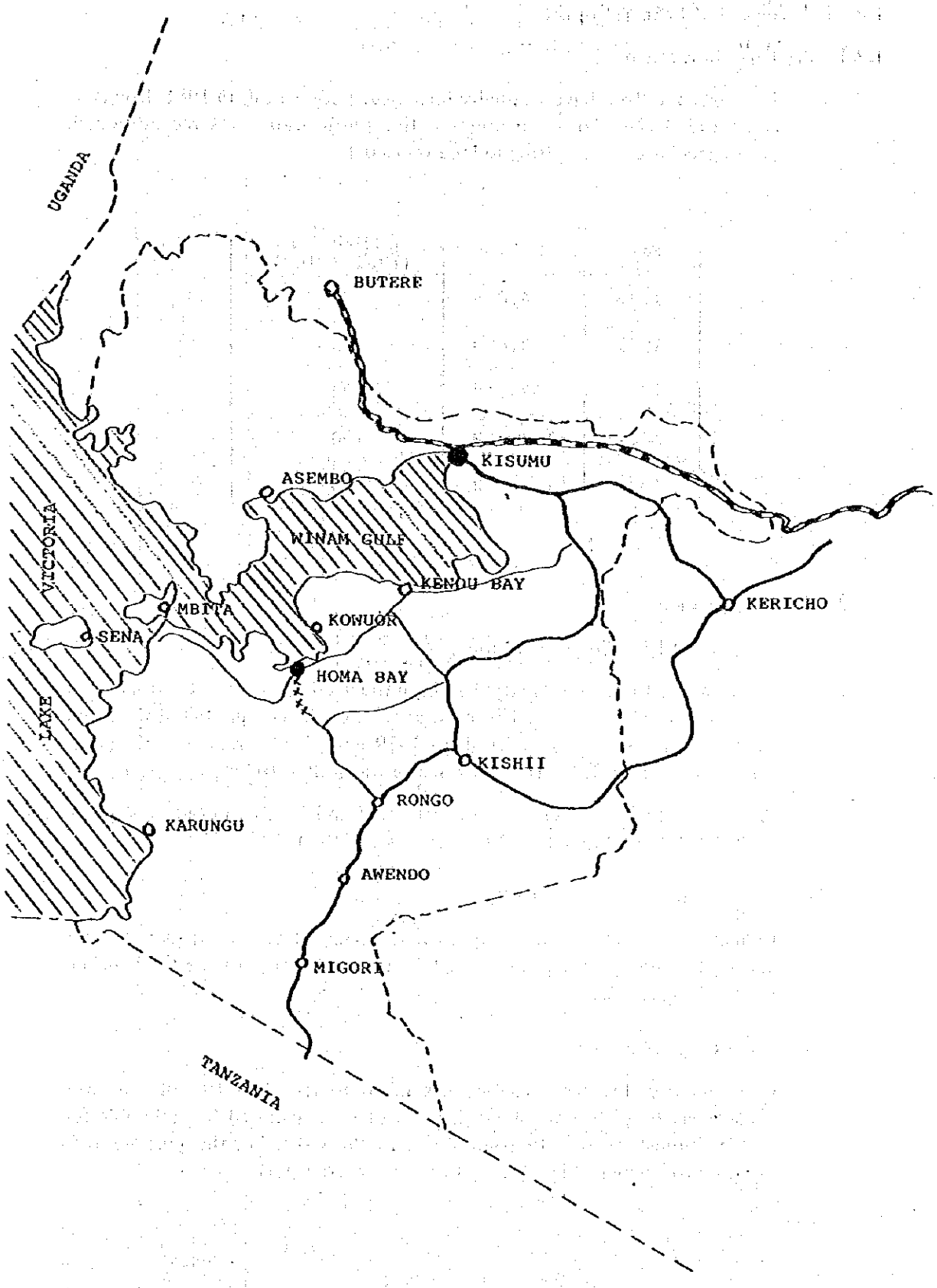


Fig. 1-1-1 Area map surrounding LAKE VICTORIA (WINAM GULF)

1.2 Past Record of Lake Transport

1.2.1 Passenger Movement

Passenger numbers have gradually increased, with a peak in 1981. However, since the A-class road surrounding the south shore was reconditioned, passengers have been shifting to land transport.

Year	Number	Index (1981 : 100)
1978	124,814	70
1979	139,889	79
1980	167,848	94
1981	177,729	100
1982	139,602	79

Source: KR

1.2.2 Cargo Movement

(1) Cargo from Lake Ports to Kisumu

As shown in Table 1-2-1, maize had been the leading commodity with a peak of 38,435 tonnes in 1977. However, because of the completion of the trunk road between Kisumu and Kishii in 1979 and also by reason of the poor, slow service of the Lake Transport, maize was shifted to land transport.

A sugar factory in Awendo was constructed and began to produce sugar in 1980 but the product has never come down to the Lake.

(2) Cargo from Kisumu to Lake Ports

Cement is the only commodity to have attracted attention; that is, after cereals had gone, cement amounted to more than 50% of the total (in/out Kisumu) movement.

(3) Total Cargo Movement

Consequently, the total volume has fallen to less than 10% of the most prosperous time. From a national point of view, it might be preferable for such voluminous cargo to come down to the Lake. For this purpose, it is essential to augment the capacity of the Lake Transport.

Table 1-2-1 Cargo Movement by the Lake Transport (From Lake Ports to KISUMU)

(Tons)

	1975	1976	1977	1978	1979	1980	1981
Maize	-	35,449	38,435	15,240	15,241	-	-
Beans	553	3,668	1,163	-	45	-	-
Groundnuts	635	321	244	454	1,361	-	-
Millet	313	1,710	67	-	113	-	-
Sisal Fibre	605	-	-	-	1,585	2,199	1,653
Parcels & Luggage	-	70	810	426	458	472	551
Dried Fish	-	5	222	46	202	313	403
Cotton Seeds	-	-	-	-	-	1,701	326
Furniture	-	-	-	-	396	605	398
Hide & Skin	-	-	-	-	-	76	53
General Goods	20	293	402	280	507	664	612
TOTAL	2,126	41,516	41,343	16,446	19,908	6,030	3,996

Table 1-2-2 Cargo Movement by the Lake Transport (From KISUMU to Lake Ports)

(Tons)

	1975	1976	1977	1978	1979	1980	1981
Cement	1,728	1,160	1,740	1,505	7,358	7,229	6,535
Parcels & Luggage	220	331	406	612	250	244	360
Personal Effects	49	24	14	26	134	286	-
Timber	1	32	30	57	102	667	217
Railway Material	-	150	-	-	446	-	80
G.I. Sheet	-	-	-	-	15	106	265
General Goods	877	842	772	647	861	695	1,224
TOTAL	2,875	2,539	2,962	2,847	9,166	9,227	8,681

Table 1-2-3 Cargo Movement by the Lake Transport (Total)

(Tons)

	1975	1976	1977	1978	1979	1980	1981
To/From KISUMU	5,001	44,055	44,305	19,293	29,074	15,257	12,677
INDEX (1977:100)	11	99	100	44	66	34	29

Source: KR Kisumu District Annual Report

1.3 Current Condition of Equipment and Facilities on the Lake

1.3.1 Ships and Boats (Table 1-3-1)

Two large passenger boats and the wagon ferry which were operated in the glorious age of the International Lake Transport have been moored at Kisumu port, but unfortunately these have not been in operation in the Kenyan water because of lack of facilities at the local lake ports.

The S.S. Usoga, which has Tanzanian nationality, seems to be a dead ship and the S.S. Nyanza was withdrawn from the books in 1968.

The wagon ferry, M.V. Uhuru, is still young and seems to be well maintained and able to go into operation at any time. However, she can only be operated when a rail rampway is installed at her calling port.

Table 1-3-1 Particulars of Ships and Boats

NAME OF SHIP/BOAT	COMMISSIONED	LENGTH (Ft.)	WIDTH (Ft.)	DRAFT (Ft.)	HP	SPEED (Knots)	CAPACITY PASSENGER	CAPACITY CARGO (TONS)	REMARK
PASSENGER BOATS									
M. V. RELI	1947	98	18	7	360	9	136	-	Engine and Generator replaced in March, 1983
M. V. ALESTES	1957	85	20	4	380 (190x2)	9	200	20	Engine and Generator replaced in April, 1983
M. V. KAMONGO	1977	107.5	23	3	150 (75x2)	6	232	7	
M. V. TILAPIA	(1983)	75	18	3.5	(Main engine removed in 1975)				
TUGBOATS									
S. S. KAVIRONDO	1912	100	21	7	400	BARE 9 TOW 4.5	120 TONNES LIGHTER x6		
M. V. HOMA	1937	85	16	4	300 (150x2)		120 TONNES x 1 OR 65 TONNES x 2		
LIGHTERS									
(9)	~1937						120 TONNES x 6 65 TONNES x 3		
MOORING AT KISUMU									
M. V. UHURU (WAGON FERRY)	1967	301	54	14	2,800	13	RAIL WAGON 42 UNITS (1005 TONS)		1,200 GROSS TONS
S. S. NYANZA	1907	220	35	10.2			NO.1 HATCH 19,824 c.ft. No.2 " 18,646 c.ft.		754 G/T
S. S. USOGA	(TANZANIAN REGISTRATION)								

1.3.2 Lake Ports

Kisumu

Among the lake ports, Kisumu is the only one worth mentioning as a port and has enough capacity and ample facilities to handle any increased volume expected in the future.

When the wagon ferry M.V. Uhuru was commissioned in International Lake Transport in 1967, existing facilities were completed and thereafter neither remodelling nor expansion seems to have been done.

Homa Bay/Kendu Bay

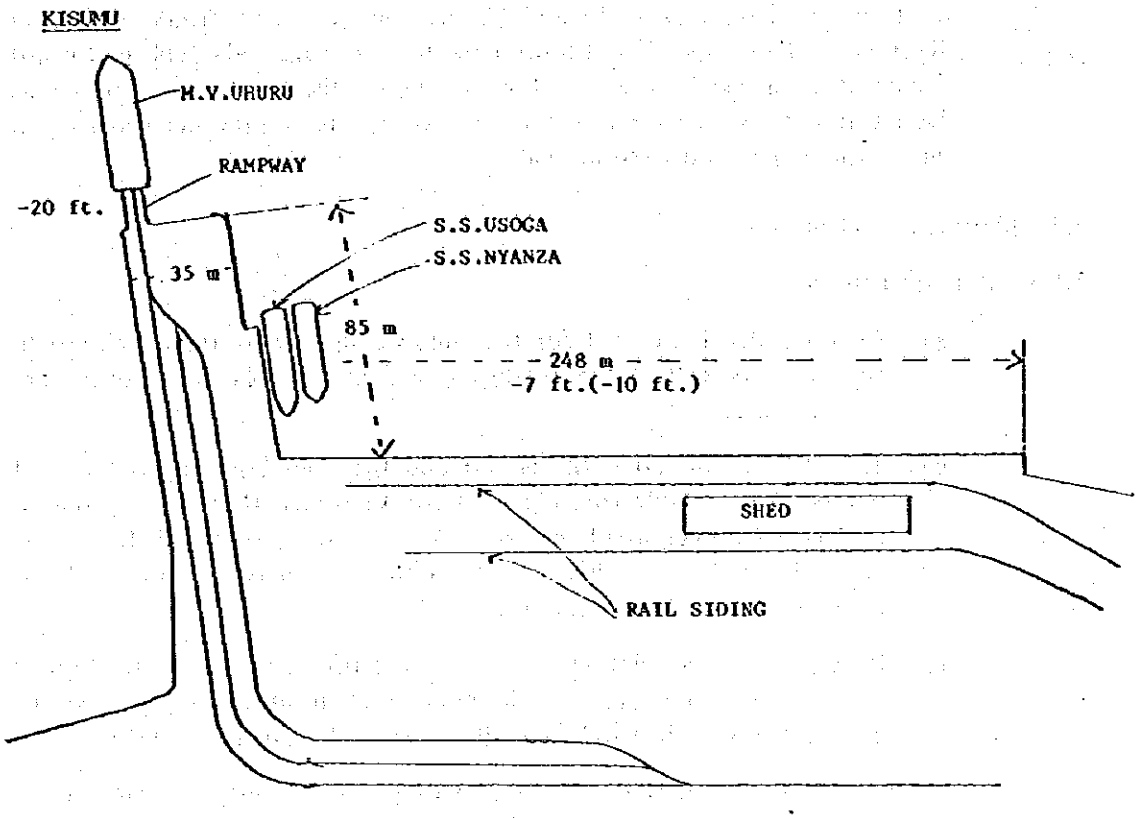
Despite being the next most important port to Kisumu, only a small jetty with a narrow caseway juts out into the lake.

This kind of jetty might be good for passenger transport but does not suit a cargo operation with lighters.

Other ports

Mbita, Sena and Karungu are new facilities with construction completed in 1977–78.

The jetties of these ports are much smaller than that at Homa Bay.



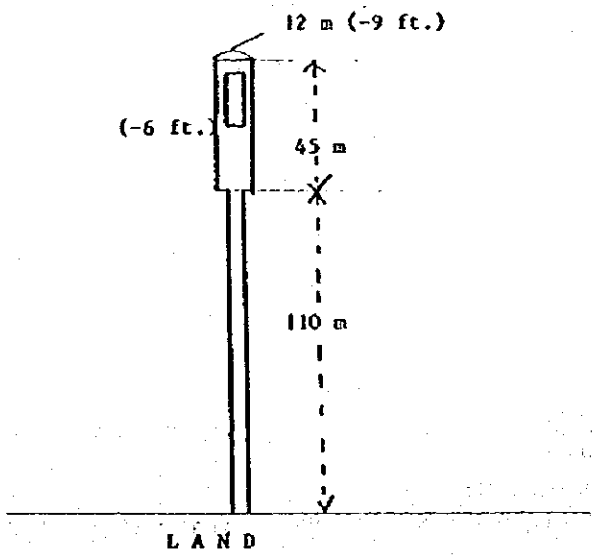


Fig. 1-3-1 Rough Sketch of Lake Ports

1.3.3 Road Access

Major agricultural farms at the inland point of the south shore are concentrated in Kishii, Awendo and Migori and a class A trunk road from Kisumu to these areas has been completed. However, about 4km toward Homa Bay (marked XXX on Fig. 1-1-1) of the road from Rongo to Homa Bay (now class C) remains unpaved, which prevents cereals and sugar from coming down to the Lake.

1.4 Matters to be Resolved

1.4.1 Passenger Boats

a) No difficulty is in sight for the time being because three well conditioned boats, (ref. Table 1-3-1) engaged in three essential routes, are now in order.

b) The M.V. Kamongo is the largest and the only boat engaged in and out of Winam Gulf (principally Lake Victoria). However, by reason of lack of power/speed, her schedule is quite irregular.*1 It is most desirable to increase her power so that she may be quite able to maintain two regular rounds a week.

c) If the rate of population increase in the future on the south shore is assumed to be 3.7%/year,*2 the population in this area in 1988 will be 25% greater than in 1982, and will have a 90% increase by 2000.

On the assumption that the movement of passengers may increase in the same ratio as the population, a 25% and 90% augmenting of passenger capacity will be required in 1988 and 2000, respectively.

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*1. Kisumu: one call a week
Other ports: two rounds a week
(ref. 1.1 (2) Operation schedule)

*2 The rate of population increase in Kishii for the past 11 years (1969–1979) was 3.69% per year and that of South Nyanza was 3.28%.
In due consideration of the population increase, owing to the Government program for increasing the yield of cereals in the outskirtsof Kishii and the acreage increase at the Sony Sugar Farm, the rate of population increase in the future in the south shore shall be assumed to be 3.7% per year.

For the short-run project, the 25% increase will be covered by M.V. Tilapia*3 when her engine is installed.

On the other hand, as mentioned in Past Record of the Lake Transport (1.2 (1)), when the road network is completed most of the passengers may shift to the land transport expecting it to be "much faster"*4.

---

*3. M.V. TILAPIA
After removal of her engine in 1975, she has been just sitting still at KISUMU waiting for the engine to be installed.

*4. This trend could be seen at ASEMBO, where passengers who used to utilize the Lake Transport had shifted to the land when the road was well conditioned. Then KISUMU ↔ ASEMBO service was suspended.

ASEMBO ↔ KISUMU	
by passenger boat	2 hours
by land transport	45 minutes

For the long-run project, if the above mentioned trend is applicable to the south shore and the southwest part, with potential passengers increasing year by year but shifting to land transport, then no increase in passenger capacity is required.

1.4.2 Tugboats

a) S.S. Kavirondo

Replacement is required as early as possible as she is too old and yet is being compelled to work, requiring a lot of money for maintenance and consuming a huge amount of fuel.

b) M.V. Homa

Remains in service for towing small lots of cargo and for shallow ports. However, increased power is desirable.

1.4.3 Lighters

Although a programme to rehabilitate and/or repair all nine lighters was made and planned for completion by July, 1984, it is recommended these be replaced one by one, because even the latest built are more than 45 years old, and even after overhaul high maintenance fees may be required because of their age.

1.4.4 Ports

Facilities of Kisumu Port are sufficient to handle any expected increased volume. The reason cereals have gone is the previous poor and slow service of the Lake Transport.

Most lighters stay at Kisumu for more than 10 days waiting to discharge cargo. The explanation given by KR was that because of a budgetary shortage they could not increase shore labourers and have them work over-time.

Without a quick turnaround of lighters, the Lake Transport cannot compete with land transport which is able to pick up and deliver cargo at the door and, consequently, cannot warrant the satisfaction of the customer. Therefore, the matter to be resolved is the reinforcement of manpower and cargo handling equipment at Kisumu and the other two major ports.

2. Inland Waterway Transport Plan

2.1 Selection of Projects

Reduction of transport cost by mass transport is most preferable for the national economy, and to accomplish this it is essential to take bulk and lot commodities back to the lake. The fundamental policy in selecting projects is how to effectively reinforce the capacity of the Lake Transport so that customers may enjoy better service.

It is necessary that equipment not be increased without reason but that consideration be given the effective utilisation of idle assets.

2.1.1 Passenger Boats

An increase in power of the M.V. Kamongo and installation of the engine for the M.V. Tilapia are included in the revised Capital Expenditure Programme 1983/88.

2.1.2 Tugboats

(1) Replacement of the S.S. Kavirondo is required.

(Ksh. 6 mil. 400 HP x 2)

(2) Increased power for the M.V. Homa is desired.

2.1.3 Lighters

Although rehabilitation/repair of all nine lighters is presently scheduled, replacement is recommended to avoid future high maintenance fees.

(120 tonne/lighter Ksh. 263,000)

2.1.4 Lake Ports

(1) Homa Bay

To revive the M.V. Uhuru, a rail rampway and railcar loading facility must be installed at Homa Bay; this is expected to be the gateway for agricultural products from Kishii and South Nyanza.

(Ksh. 76 mil. Source: KR)

(2) Other Ports

If agricultural products at Western South Nyanza increase, it might be necessary to develop jetties at Nyandhiwa, Kisigi and/or Sindo which are located to the north of Karungu.

2.2 Study of Projects

2.2.1 Revival of Wagon Ferry

Most of the sugar produced at Sony (South Nyanza) Farm and shipped out from Migori is carried by truck to Kisumu or directly to the markets, including Nairobi, and cereals that used to come down to the lake are now carried by truck because of the completion of the road network and the lack of capacity of the Lake Transport.

When the road from Rongo to Homa Bay is fully opened to traffic, there is a possibility that these bulk commodities may come to the Lake for economic reasons, and because it is better from a national point of view (reducing market prices and saving energy).

Another condition relating to the commodities that may come to the Lake is that sufficient capacity be available on the Lake Transport to handle the expected volume increase. Therefore, the revival of the M.V. Uhuru which has sufficient capacity, is strongly desired. Based on the existing tariff rate between Homa Bay and Kisumu, the breakeven point of the M.V. Uhuru is said to be 65% of her full capacity. On the assumption that her service frequency in the initial stage might be one trip/day for 5 trips/week:

Full capacity		540 tonnes
65% load	x 0.65	350 tonnes
5 trips/week	x 5	1,750 tonnes
52 weeks/year	x 52	91,000 tonnes

Thus a cargo volume of 91,000 tonnes/annum will allow her to break even after absorption of maintenance costs which are charged even when she is sitting still.

The maximum speed of the M.V. Uhuru is 13 knots/hour, therefore, depending on the cargo volume, she is able to turn two trips a day between Kisumu and Homa Bay.

The amount of 1984 production at Kishii and South Nyanza is estimated as:

Sugar	60,000 – 80,000 tonnes
Cereals	50,000 – 60,000 tonnes
Other	5,000 – 10,000 tonnes
Total	115,000 – 150,000 tonnes

This volume warrants the revival of the M.V. Uhuru.

Meanwhile, it is absolutely necessary that the authorities and parties concerned discuss in advance the propriety of utilising the Lake Transport, because a huge investment is required to complete the port facilities at Homa Bay.

2.2.2 Laying Railroad

The latest plan by KR to revive the wagon ferry is no more than to extend the movement of the rail wagon from Kisumu to Homa Bay. In this case, the transportation between farm/factory and Homa Bay will still be done by truck and this method will half kill the merits of through transport by rail wagon. To take full economic advantage of the rail wagon, a railroad between farm/factory and Homa Bay should be laid.

However, it is said that the budgetary measures of KR toward laying a new branch line are very severe and that an anticipated 400,000 tonnes of cargo a year will be required to lay the new line.

(railroad between Awendo and Homa Bay: Ksh. 296 mil. Source: KR)

2.2.3 Reinforcement of Tugboats and Lighters

A revival of the wagon ferry is the best way to take cereals and sugar back to the Lake Transport; however, if this is not possible, reinforcement of tugboats and lighters is necessary. Taking into consideration hours/days of loading and discharging at both ends and navigation hours, two trips a week (3 days round trip) are supposed to be maximum.

(1) A 120 tonne lighter may carry 12,480 tonnes a year;

120 tonnes x 2 trips = 240 tonnes/week
240 tonnes x 52 weeks = 12,480 tonnes/year

(2) Ten lighters are required to carry 130,000 tonnes of cargo a year;

130,000 ÷ 12,480 = 10 lighters

Supposing that the rate of down-time of a lighter for maintenance and repair is 20%, 12 lighters are required.

10 lighters x 1.2 = 12 lighters

(3) Four additional lighters will be required to cover other cargo than to/from Homa Bay, so 16 lighters are required in total.

Thus, after all of the nine lighters are overhauled or replaced, seven additional will be required to cover 130,000 tonnes of Homa Bay cargo plus some other cargo.

When the bulk/lot cargo comes down to the Lake, one highpowered tugboat will also be needed.

If bulk/lot cargo were to be carried by lighters rather than by wagon ferry, therefore, not only a huge investment would be required but the operating costs would also be heavy.

In general, the proportion of transshipping cost in through freight rate is very high, and as shown below, lighter operation requires more transshipment.

	Lighter	Wagon Ferry
Farm/Factory	truck loading	truck loading
Homa Bay	unloading	unloading
"	lighter loading	wagon loading
Kisumu	discharge	—
"	wagon loading	—

In conclusion, revival of the M.V. Uhuru is highly desirable since it is clear that the Lake Transport cannot prosper without it. In the year 2,000, though cargo volume may increase to twice that of 1984 (to 260,000 tonnes), in full operation the M.V. Uhuru has the capacity fot carry it all.

Full capacity (per trip)		540 tonnes
2 trips/day	x 2	1,080 tonnes
5 days/week	x 5	5,400 tonnes
52 weeks/year	x 52	280,800 tonnes

Table 2-2-1 Proposed Project in 5th 5-Year Plan (1984—1988)

1 Ksh. = ¥19
1 $ = ¥240
1 $ = 12.632 Kshs.

No.	Project	Contents	Cost (million Ksh.)			Period	Degree of Importance	Degree of Urgency	Remarks
			Local	Foreign	Total				
1.	Reinforcement of Passenger Boats	Power-up of M.V. KAMONGO.	-	-	-		B	B	
		Installation of engine for M.V. TILAPIA.	-	-	-		C	C	
2.	Reinforcement of Tugboats	Replace of S.S. KAVIRONDO.	6	-	6	1.0	B	C	
		Power up of M.V. HOMA	-	-	-		C	C	
3.	Reinforcement of Lighters	Replace of 9 lighters	2.4	-	2.4	1.0	C	C	
4.	Revival of Wagon Ferry	Installation of Rail Rampway and Railcar Loading Facility at HOMA BAY.	76	-	76	1.5	A	A	
5.	International Lake Passenger Boat	New Boat Capacity : 500 passengers Speed : 15 Kt. HP : 1,300 HP × 2 sets G/T : 1,300 T D/W : 300 T		98.5	98.5	2.0	A	B	Dimension Length 66.0 m Width 11.6 Depth 4.6 Draft 2.7 Crew. 35 persons

* The above Projects are all of Proposed Project in view of Long Lange

2.3 Overview of the 21st Century

Now that diplomatic relations with Tanzania have been restored, the International Lake Transport on Lake Victoria will be revived in the near future. Reportedly, however the major port facilities in Uganda have been destroyed completely, and therefore, it will not be possible for the Lake Transport to immediately begin with large vessels. Rather, transport will be done on a small scale using existing smaller vessels.

On the other hand, Tanzania is apparently reinforcing the port facilities on the Lake with aid from foreign countries, and this is obviously designed for the transit of cargo from inland countries such as South Sudan, Uganda and Rwanda. While the Lake Transport itself may be reinforced in Tanzania, the ocean ports and the railway connecting them with the lake ports are greatly inferior to those of Kenya so that the Lake Transport as a total means is by no means promising.

The main export commodities of Uganda, coffee and tea, are primarily via Kenya, and when the railway in Uganda and the northwestern part of Kenya (west of Eldoret) is developed in near future, railway transport Kenya become more secure.

The current high cost of fuel oil makes ships transport, which is adapted for mass transport, much cheaper than that by railway or truck. In Lake Victoria, however, the distance by ship is relatively short and when shipping is included in the total, transshipment costs are involved twice, resulting in an actually higher overall transport cost.

Viewing the International Lake Transport in the 21st Century on the basis of the foregoing forecast, it seems wiser to consider a car ferry intended mainly for passengers rather than cargo.

The investment cost for international passenger boat is estimated at Ksh 18.5 million.

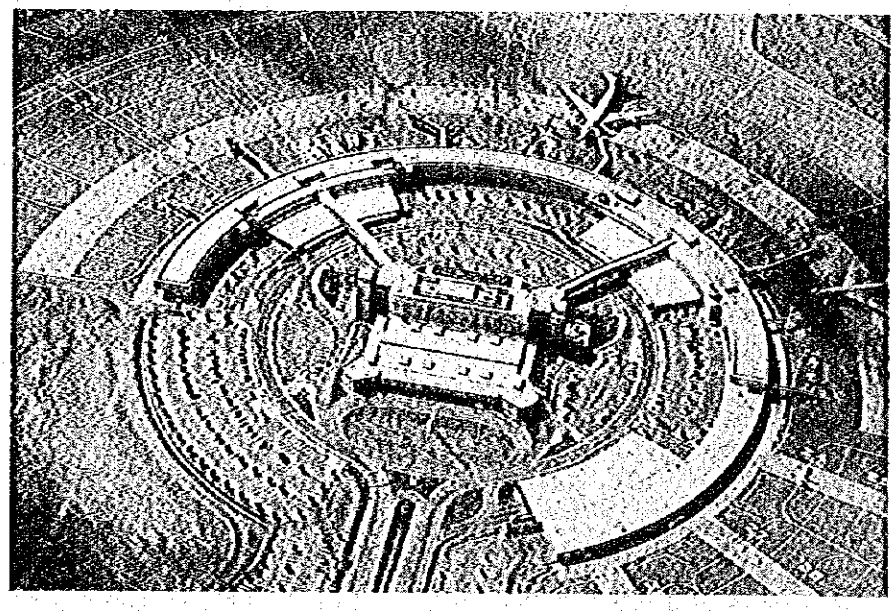
Table 2-3-1 Proposed Passenger Boat

Major Items	Capacity	500 passengers
	Speed	15 kt
	HP	1,300 HP x 2 sets
	G/T	1,300 T
	D/W	300 T
Dimension	Length.	66.00 m
	Width	11.60
	Depth	4.60
	Draft	2.70
Cost	18.5 Ksh million.	

(Preposition)

1) The Boat shall be designed and purchased in Japan.
2) Hull and Engine shall be half-funished in Japan, and transported to Kisumu via Mombasa at the cost of shipbuilder.
3) Assembling shall be done by KR in Kisumu under the supervision of marine engineers.
4) Therefore, the cost includes shipbuilding, assembling, and transport cost and engineering service cost.

PART VII. CIVIL AVIATION



1. Present Condition

1.1 Air Route Network

1.1.1 International Air Route

Jomo Kenyatta International Airport (JKIA), Nairobi and Moi International Airport (MIA), Mombasa are presently utilised for international air transport services in Kenya. Kenya Airways, the sole national flag carrier, and 34 foreign airline companies operate scheduled international flight services to and from Kenya and various foreign companies operate a number of chartered flights.

International air passengers comprise 95 percent*1 of the total travelers to and from Kenya, the rest being by road, railway and sea. This shows that JKIA and MIA hold positions as the main national gateways of the public passenger transport sector in the country.

(1) JKIA

Scheduled international flights using JKIA as their origin or destination airport have non-stop, direct connections to 35 cities of 34 countries. Thirty-five international airlines operate various types of aircraft such as B-747, B-707, B-727, B-737, DC-10, DC-9, BAC-111 and TU-154. Table 1-1-1 shows the cities connected with JKIA by scheduled flights not requiring a change of plane, and Fig. 1-1-1 shows non-stop flights available.

*1 Statistical Digest, 1982.

Table 1-1-1 Final Destination from Nairobi, Kenya

City (Code), Country, Remarks	City (Code), Country, Remarks
ABIDJAN (ABJ), IVORY COAST **	KARACHI (KHI), PAKISTAN
ACCRA (ACC), GHANA *	KHARTOUM (KRT), SUDAN
ADDIS ABABA (ADD), ETHIOPIA	KIGALI (KGL), RWANDA
ADEN (ADE), DEM. REP. YEMEN *	KINSHASA (FIH), ZAIRE
AMSTERDAM (AMS), NETHERLAND	KISUMU (KIS), KENYA
ANTANANARIVO (TNR), MADAGASCARS	LAGOS (LOS), NIGERIA
ATHENS (ATH), GREECE	LONDON (LON), UK
BLANTYRE (BLZ), MALAWI	LUSAKA (LUN), ZAMBIA
BOMBAY (BOM), INDIA	MADRID (MAD), SPAIN
BRUSSELS (BRU), BELGIUM	MAHE ISLAND (SEZ), SEYCHELLES
BUJUMBURA (BJM), BURUNDI	MALINDI (NYD), KENYA
CAIRO (CAI), EGYPT	MANDERA (NDE), KENYA **
COPENHAGEN (CPH), DENMARK *	MANZINI (MTS), SWAZILAND *
DAKAR (DKR), SENEGAL **	MARSEILLE (MRS), FRANCE
DHAHRAN (DHA), SAUDI ARABIA *	MAURITIUS (MRU), MAURITIUS
DJIBOUTI (JIB), DJIBOUTI *	MOGADISHU (MGQ), SOMALIA
DOUALA (DLA), CAMEROON	MOMBASA (MBA), KENYA
DUBAI (DXB), UNITED ARAB EMIRATES	MONROVIA (MLW), LIBERIA *
ENTEBBE (EBB), UGANDA	MORONI (YVA), COMOROS
FRANKFURT (FRA), GERMANY F. R.	MOSCOW (MOW), USSR **, ***
GARISSA (GAS), KENYA	NEW YORK (NYC), US **, ***
GOMA (GOM), ZAIR *	PARIS (PAR), FRANCE
HARARE (SAY), ZIMBABWE	ROME (ROM), ITALY
JEDDAH (JED), SAUDI ARABIA	TEL AVIV (TLV), ISRAEL
JOHANNESBURG (JNB), SOUTH AFRICA	VIENNA (VIE), AUSTRIA
JUBA (JUB), SUDAN	ZURICH (ZRH), SWITZERLAND

Remarks: No mark; non-stop flight
*, **, ***; "stop over"

Note: Excluding destinations regu

Note: Excluding destinations by transit connection

(Source: ABC Guides, August 1982)

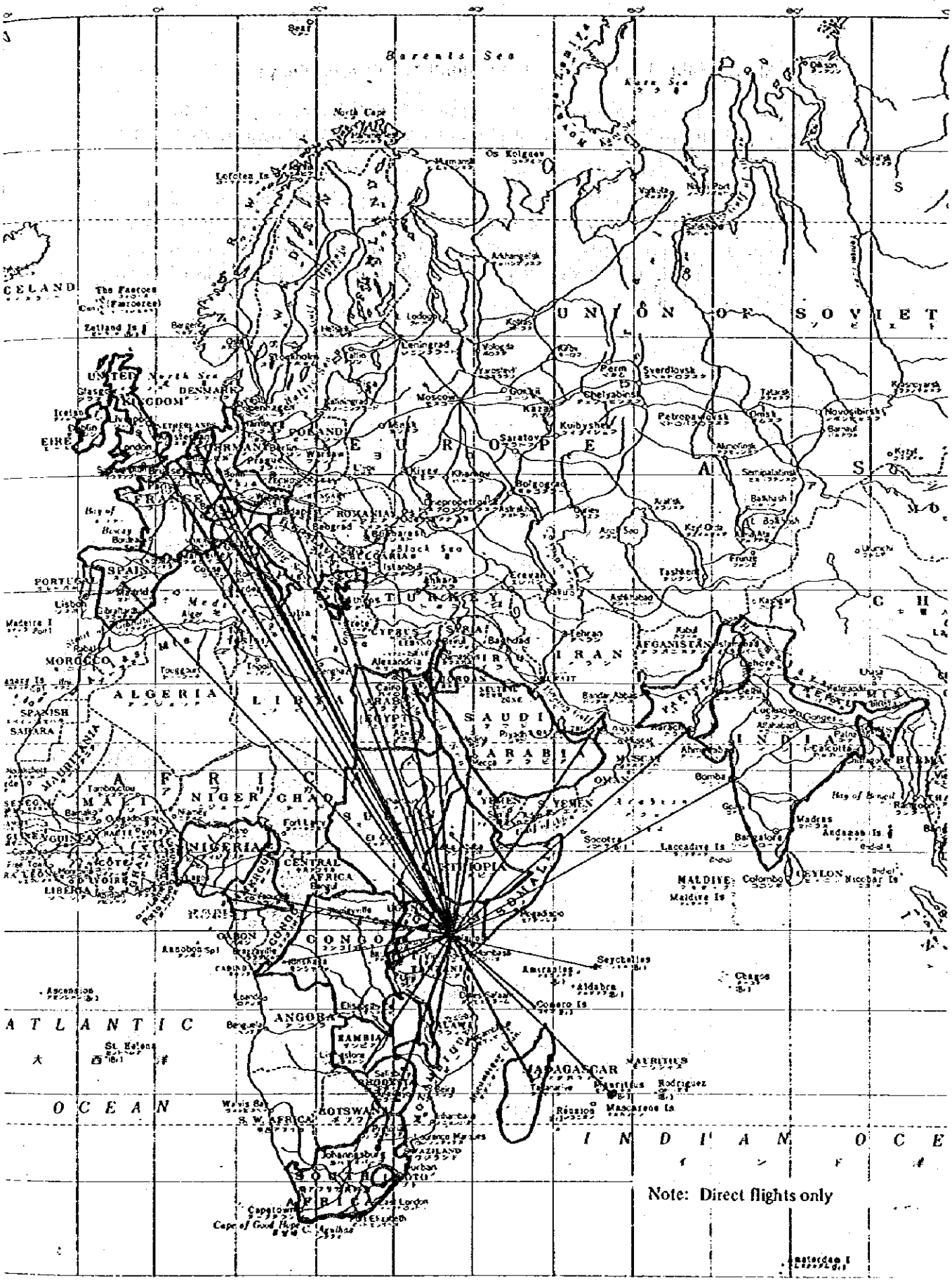


Fig. 1-1-1 International Air Routes from JKIA

(2) MIA

At present, Kenya Airways operates the scheduled international flights using B-747 and B-707 aircraft to 4 cities of 4 countries as shown in Table 1-1-1 and Fig. 1-1-1.

A marked characteristic of MIA is that it is the port of entry in Kenya where many chartered flights are handled year-round catering to group tours, mainly from European countries, going to the east coast resort areas of Mombasa, Kilifi, Malindi and Lamu as well as to the national parks of Tsavo and Amboseli.

Table 1-1-2 Final Destination from Mombasa (MBA), Kenya

City (Code), Country, Remarks
HARARE (SAY), ZIMBABWE
LONDON (LON), UK**
MALINDI (MYD), KENYA
NAIROBI (NBO), KENYA
ROME (ROM), ITALY*
KIGALI (KGL), RWANDA
MAHE ISLAND, SEYCHELLES (SEZ)

Remarks: No mark; non-stop flight
*, **, ***;
Source: ABC Guides, August 1982
Directorate of Civil Aviation

1.1.2 Domestic Air Route

(1) Scheduled Airline Route

JKIA, MIA, Malindi and Kisumu Airports are the major domestic airports where Kenya Airways operates scheduled domestic flights on four routes, Nairobi-Mombasa, Nairobi-Malindi, Nairobi-Kisumu and Mombasa-Malindi (Fig. 1-1-3).

From their home base of Wilson Airport, Nairobi, Sunbird Aviation operates scheduled domestic flights to Masai Mara and Lamu, and Pioneer Airline operates scheduled domestic flights to Lamu.

(2) Non-Scheduled Flight Route

Other than the four scheduled routes mentioned which are served by Kenya Airways, only non-scheduled chartered flight services are available as air transport between major cities and towns of the country.

Wilson Airport in Nairobi is the exclusive airport catering to all types of general aviation activities including chartered transport services.

1981 statistical traffic data identified the seventy-four busiest chartered air route sectors (Fig. 1-1-3).

The needs for non-scheduled chartered flights, so-called "third level aviation", are based mostly upon international tourist demands in Kenya, and the traffic volume is therefore concentrated on the routes between and among Nairobi and the national parks and east coast resort areas such as Masai Mara, Amboseli, Tsavo, Mombasa, Kilifi, Malindi and Lamu.

The third level route system in Kenya is presently covered by more than twenty private companies operating approximately 170 of the some 400 light aircraft registered in the country. Though usually providing charter service within Kenya, these companies also take passengers to points elsewhere in Africa.

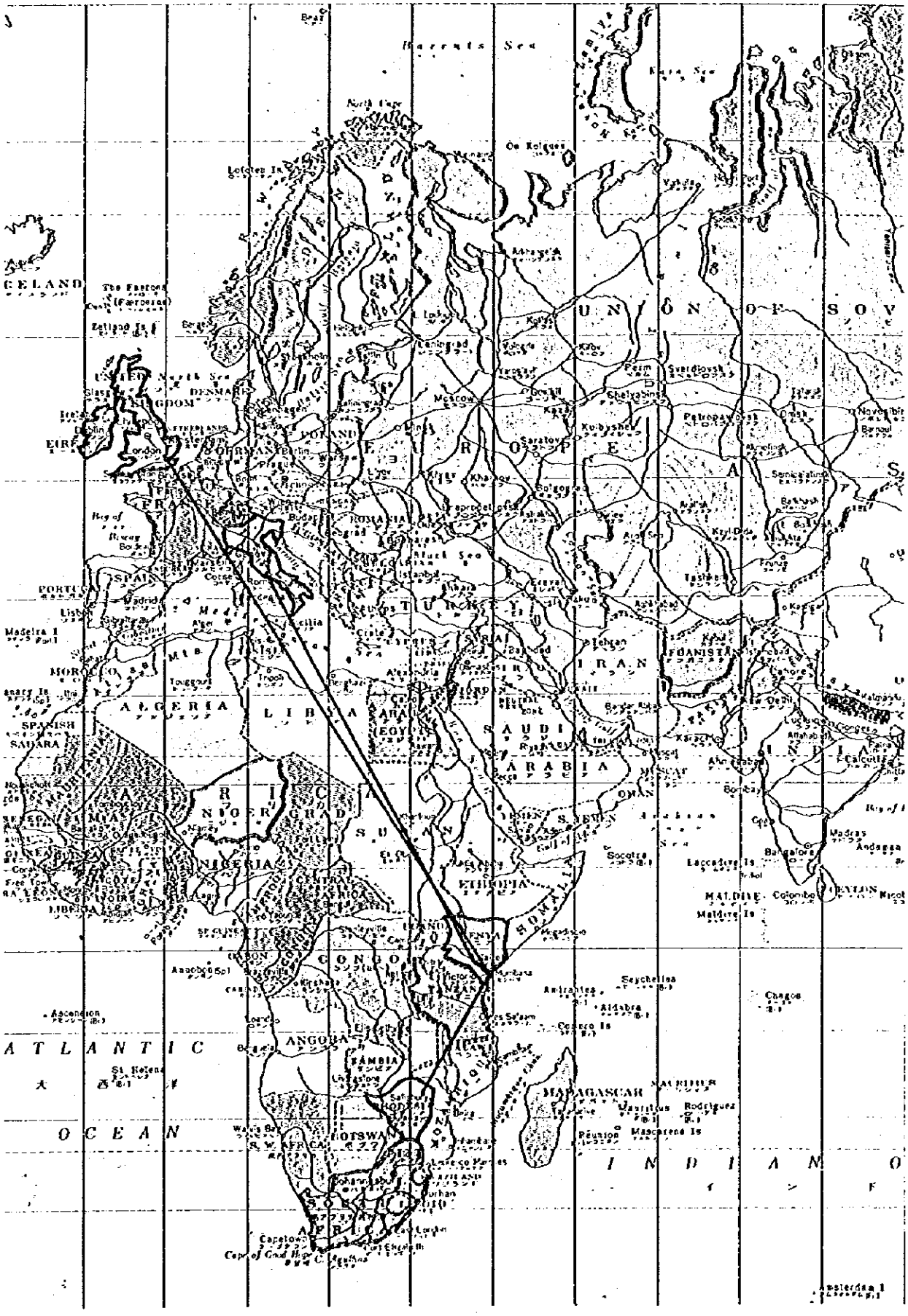
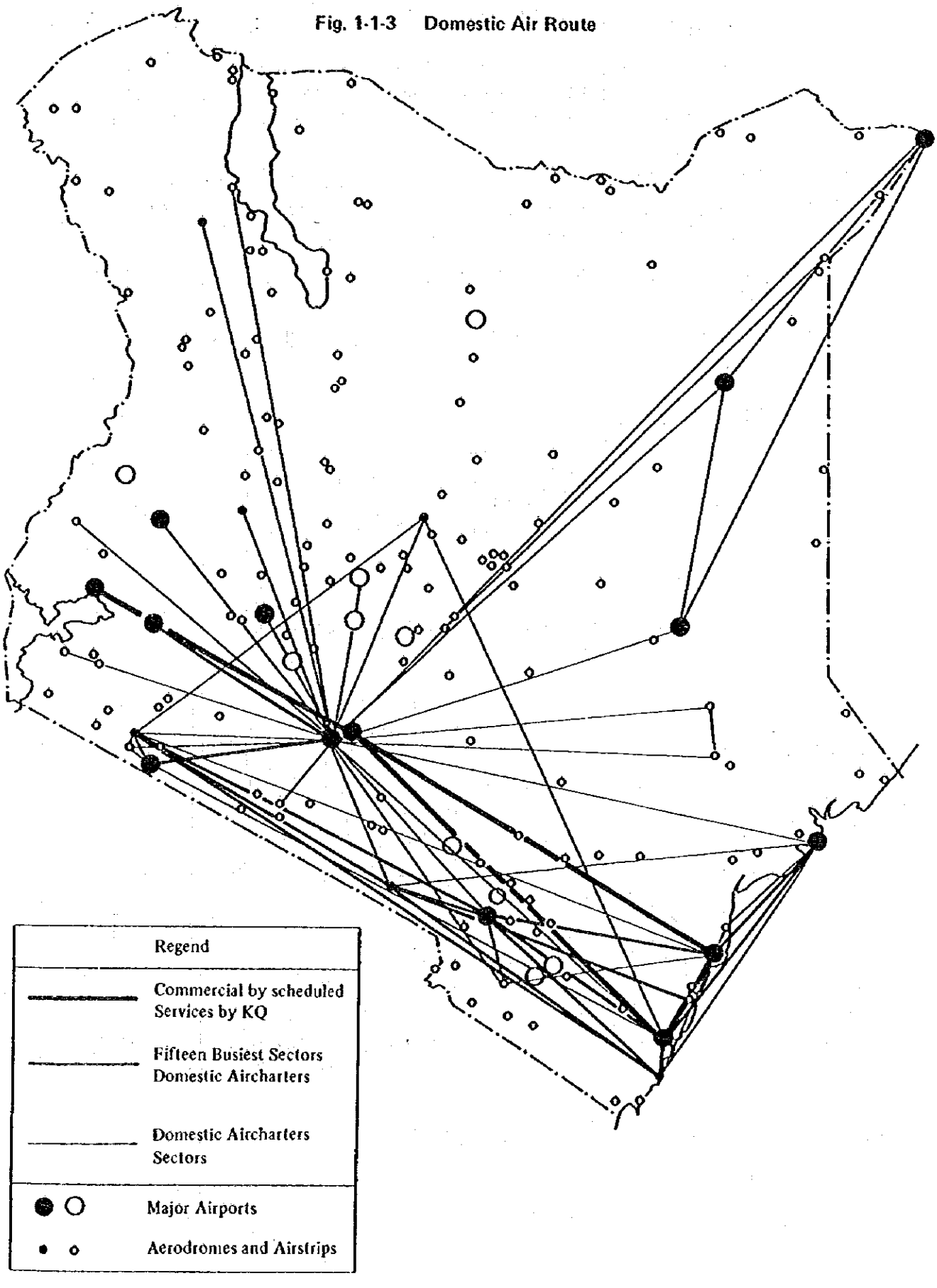


Fig. 1-1-2 International Air Routes from MIA

Fig. 1-1-3 Domestic Air Route



1.2 Air Transport Traffic Volume

The volume of passengers handled in 1981 at the four major airports is shown in Table 1-2-1: 994,000 passengers at JKIA, 352,000 passengers at MIA, 38,000 passengers at Malindi (1979) and 10,000 passengers at Kisumu.

1.2.1 International Passenger Volume – 1981

1,384,000 international passengers, (809,000 departing and arriving passengers and 575,000 in transit) were handled at JKIA.

MIA handled 195,000 international passengers of which 141,000 were on chartered international flights.

A total of 1,004,000 international air passengers (excluding those in transit) were thus recorded.

1.2.2 Domestic Passenger Volume

In 1981, total domestic passengers handled at the four airports were 392,900 (Table 2-6-3), which included about 30,000 on non-scheduled flights. The number of passengers handled at other local airports by third level aviation was relatively large at Wilson, Amboseli, Lamu and so on (Table 1-2-2).

Table 1-2-1 Air Passenger Movements at Main Airports in 1981 Arrivals & Departures)

Airport	Domestic		International		Total
	Scheduled	Non-scheduled	Scheduled	Charter	
NAIROBI (JKIA)	185,000[1]	-	809,000[1]	-	994,000[1]
MOMBASA (MIA)	157,000	-	54,000[1]	141,000[3]	352,000[2]
MALINDI	17,000[4] (1979)	21,000 (1979)	-	-	38,000[4] (1979)
KISUMU	5,000[3]	5,000[5]	-	-	10,000
TOTAL	364,000	26,000	863,000	141,000	1,394,000

Source: 1) Nairobi Airport Traffic Forecast 1981 – 1996, December 1982
2) Statistical Abstract, C.B.S. 1982
3) Aerodromes Annual Report
4) Malindi Airport Feasibility Study
5) Estimated

Table 1-2-2 Passenger Traffic at other primary Domestic Airports, 1979
(Third Level Aviation)

Airports	Departures				Arrivals			
	Flights	Passengers	Available Seats	Load Factor	Flights	Passengers	Available Seats	Load Factor
1. Wilson	7,622	26,635	47,213	56%	6,954	23,054	42,910	54%
2. Amboseli	2,268	11,721	13,114	89%	1,976	12,015	13,392	90%
3. Mombasa	2,624	8,687	17,424	50%	2,602	9,001	17,390	52%
4. Governors	1,567	8,603	11,125	77%	1,632	8,878	11,554	77%
5. Kilaguni	1,457	9,226	11,115	83%	1,465	8,835	9,671	91%
6. Malindi	2,082	10,814	13,986	77%	2,089	10,653	14,585	73%
7. Diani Beach	1,736	7,282	11,271	65%	1,890	7,539	12,664	60%
8. Lamu	1,644	8,056	11,672	69%	1,485	9,873	12,136	81%
TOTAL	21,000	91,024	136,920	66%	20,093	89,848	134,302	67%

(Source: Kenya Airways Statistical Department)

1.2.3 Total Air Traffic – 1981

According to the other air traffic data shown in Table 1-2-3, JKIA handled 2,111,000 passengers and MIA handled 371,000. These figures are larger than those in Table 1-2-1 since transit passengers here are counted twice (once on entering and once on leaving). JKIA handled 33,000 tonnes of cargo and MIA 20,000; other airports handled little, if any, cargo.

1.2.4 Domestic Air Service

All scheduled domestic flights are operated by Kenya Airways. The timetable shows 38 weekly from Nairobi to Mombasa; this is Kenya's main trunk line. There are also 7 flights from Nairobi to Malindi and from Mombasa to Malindi (Table 1-2-4). This timetable gives the capacity of seats available for each route by origin and destination (Table 1-2-5).

Table 1-2-3 Air Traffic Movements at Four Major Airports

Airport / Year	NAIROBI (JKIA)		MOMBASA (MIA)		MALINDI		KUSUMU	
	Passengers	Freight(kg)	Passengers	Freight(kg)	Passengers	Freight(kg)	Passengers	Freight(kg)
1970	1,090,992	16,979,233						
1971	1,217,718	19,396,863						
1972	1,154,524	23,722,556						
1973	1,466,462	28,963,871	324,929	3,131,057				
1974	1,605,446	33,045,127	411,343	2,484,440				
1975	1,838,295	33,247,300	263,213	2,310,563				
1976	1,914,853	33,316,180	282,119	1,927,449			7,811	253,709
1977	1,871,566	34,937,328	236,199	4,492,337	27,479	18,119.2	5,498	21,697
1978	1,837,402	31,687,925	335,153	25,430,843	40,193	63,674.5	3,429	1,532.5
1979	1,961,380	28,224,836	337,457	19,138,528	32,737	19,103.0	2,445	29.8
1980	2,117,125	32,758,455	434,457	27,319,827	36,160	11,146.7	3,626	-
1981	2,111,091	32,864,174	371,311	20,357,946	25,667	7,036.3	4,983	-

(Source: Aerodrome Department Annual Report for 1981)

Table 1-2-4 Domestic Flights by Kenya Airways

(1/Nov., 1982 to 31/Mar., 1983)

From To	A/C	Time (minutes)	No.of Flights per Week	Via	Annual Seating Capacity
Nairobi Mombasa	DC9	50	14	Non Stop	14x52x 96= 69,888
	B747	60	1	"	1x52x340= 17,680
	B720	50	3	"	3x52x126= 19,656
	B707	55	2	"	2x52x153= 15,912
	F27	90	18	"	18x52x 43= 40,248
			38		Total 163,384
Nairobi Malindi	F27	85	7	"	7x52x 43= 15,652
Nairobi Kisumu	F27	65	5	"	5x52x 43= 11,180
Mombasa Malindi	F27	30	7	"	7x52x 43= 15,652
Mombasa Kisumu	DC9/F27	335	2	Transfer	2x52x 43= 4,772

Note: Based on the KQ timetable.

Table 1-2-5 Annual Seat Capacity by Origin and Destination

From \ To	NAIROBI	MOMBASA	MALINDI	KISUMU
NAIROBI		163,384	15,652	11,180
MOMBASA	163,384		15,652	4,772
MALINDI	15,652	15,652		-
KISUMU	11,180	4,772	-	

1.3 Airport Facilities and Air Navigation Facilities

1.3.1 Classification of Aerodromes

There are many aerodromes throughout Kenya used by civil aircraft. These civil aerodromes include 159 "Government aerodromes" and more than 300 unlicensed aerodromes which are owned by the Government or private authorities, excluding a number of those Government owned which are used strictly for military purposes by the Armed Forces.

The Civil Aviation Act, chapter 349 of the Laws of Kenya, defines the term "aerodrome" as follows:

(1) "aerodrome" means any defined area on land or water, including installation or equipment therein, used or intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft, and includes any such area as the Minister may by notice in the Gazette declare to be an aerodrome;

(2) "Government aerodrome" means an aerodrome under the control of Government.

In the Subsidiary Legislation of the Civil Aviation Act, Government aerodromes are classified into the following three groups:

Class I	(Controlled)	–	Jomo Kenyatta and Moi Airports.
Class II	(Controlled)	–	Kisumu, Malindi, Wilson.
Class III	(Uncontrolled)	–	Garissa, Kitale, Lamu (Manda Island), Eldoret.

In addition, the A.I.P. (Aeronautical Information Publication) issued by the Directorate of Civil Aviation gives another classification of 111 aerodromes listed in AGA (ICAO Abbreviation for aerodromes) such as:

Category A – Those which are inspected at least once a day (6).
Category B – Those which are inspected at least weekly (20).
Category C – Those for which no inspection reports are received and whose state of serviceability is therefore generally unknown. Pilots or operators intending to use aerodromes in this category are advised to ascertain the state of surface prior to use. (85)

The Aerodromes Department has recently undertaken an inventory to classify all civil aerodromes in the country which will then be categorised into the following:

1) Major civil aerodromes are called "airports".

   (a) "Major airports" are the two international airports of Nairobi and Mombasa together with the two domestic aerodromes of Kisumu and Malindi which form the basis of current scheduled airline services. In addition, Wilson Aerodrome, the secondary airport in Nairobi, serves as the local point of charter and flying training operations.

(b) "Minor airports" are located in centres of populated areas and support administrative and commercial activities as well as providing efficient regional communication.

2) Smaller civil aerodromes are called "airstrips".

(a) "Tourist airstrips" are intended to provide the basic infrastructure necessary to assist private enterprise investment and stimulate development of the tourist industry.

(b) "Strategic airstrips" are located in remote areas of the country and are of strategic value for control of immigration and health, etc.

(c) "Police airstrips" will be used mainly for border control and to facilitate performance of police operations.

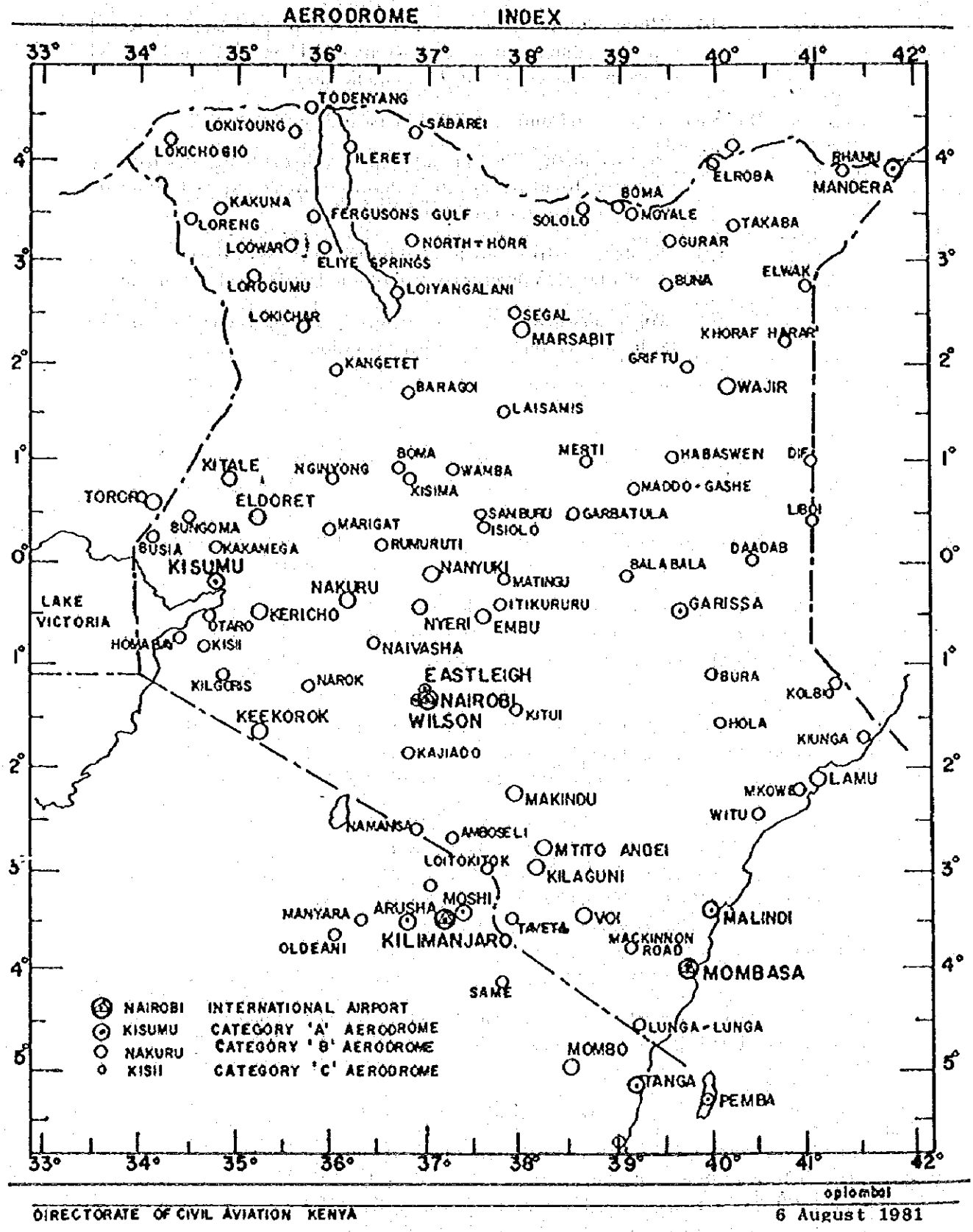


Fig. 1-3-1 Kenyan Government's Airports and Aerodromes

1.3.2 Airport Facilities

Among the more than 400 aerodromes in the public air transport system in Kenya, only the five airports of JKIA, MIA, Malindi, Kisumu and Wilson presently have facilities which meet all or part of the airport operational requirements for handling the aircraft, passengers and cargo.

JKIA, MIA, Malindi and Kisumu Airports have been improved with a terminal facilities complex accommodating commercially scheduled and non-scheduled flight services, and Wilson Airport is provided with the facilities necessary for all types of general aviation activities.

The JKIA new terminal redevelopment project, initiated in 1972 and completed in 1978, was supported by IBRD with financial assistance of 29 million US$. Total project cost was 577.5 million Ksh. on a current disbursement basis.

The Aerodromes Department intends to undertake further JKIA development projects which include the following:

1) Extension of parallel taxiway the full length of the runway, thereby increasing runway capacity and resulting in a substantial saving of fuel.

2) Improvement of lightning and power supply systems.

3) Provision of second runway parallel to the existing runway.

MIA has also been redeveloped with Japanese financial assistance in the amount of 4,086 million ¥. The full scale project with new runway, new terminal complex and related facilities was initiated in 1973 and completed in 1978.

Subsequent construction of a taxiway parallel to the main runway 03/21 has been completed together with an aircraft parking apron area of approximately 20,000 m^2. Currently, the old arrival building is being converted to a freight shed.

A feasibility study on development of the Malindi airport to accommodate DC-9 aircraft has been prepared. Currently a number of potential donors are being approached for financing of this project.

At Kisumu airport, a new control tower and operations complex will soon be completed at the new site with DANIDA assistance.

The rest of the 159 government aerodromes and the more than 300 others have only a runway or runways with a taxiway and aircraft parking apron; some of these are paved with a bituminous surface but most do not have such strengthening. For these third or lower class aerodromes, there is neither terminal facilities for passenger and cargo handling nor an airport operations complex equipped with telecommunication facilities to assist safe aircraft operation.

(1) Runway Length

As local conditions at an aerodrome affect the take-off and landing performance characteristics of an individual aircraft, the wind direction and velocity, runway elevation, temperature, runway slope, humidity and runway surface conditions should be considered in evaluating the required runway length.

Using simple methods of applying runway length correction for some fixed local conditions of data available on runway elevation and temperature, the actual length of existing runways for all Government aerodromes is evaluated and classified according to the basic runway length under the conditions of sea level and standard atmosphere. (ICAO, Annex 14, Seventh Edition)

There are twelve runways with an actual length of more than 1,500 metres. However, these are evaluated as shorter under the prevailing conditions of elevation and temperature. Therefore, no runway is classified in Code B and all the rest are in Code C and below (Fig. 1-3-2).*

Code A (runway length 2,100 m or more):
JKIA, MIA Primary Rwy
Code B (runway length 1,500 m to 2,099 m):
none
Code C (runway length 900 m to 1,499 m):
22 runways including MIA Secondary Rwy, Kisumu, Malindi
Code D (runway length 750 m to 899 m):
17 runways including Wilson Rwys, Eldoret
Code E (runway length 600 m to 749 m):
30 runways including Kericho, Makindu, Naivasha
Not covered by ICAO Code (runway length less than 599 m):
21 runways including Embu, Buna, Bungoma
Not evaluated due to lack of data:
81 runways

Note*: As of May of 1983, the ICAO runway classification relating to the aerodrome reference code went into effect in the Eighth Edition of Annex 14, Aerodromes, ICAO.

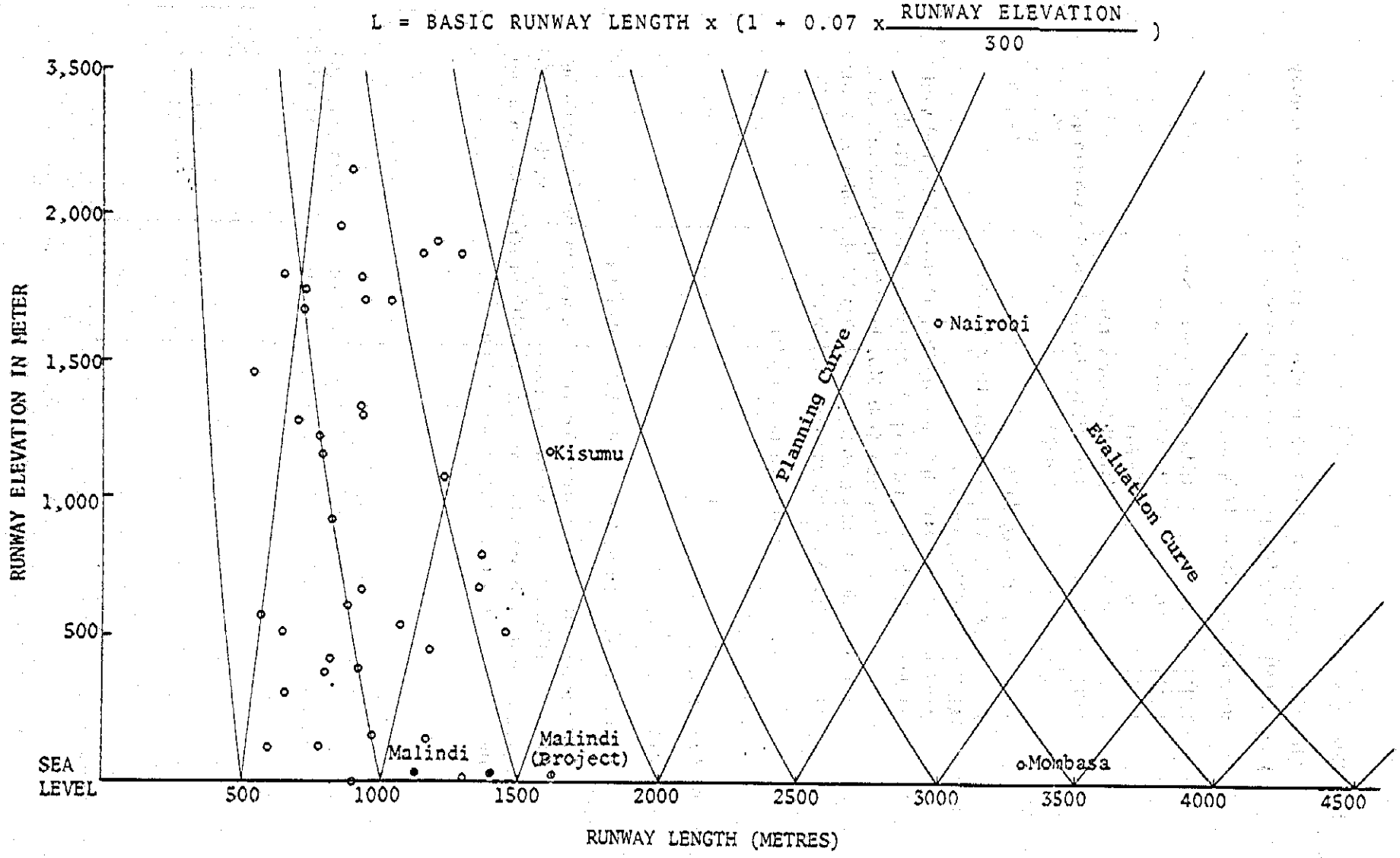


Fig. 1-3-2 Runway Length Correction for Elevation

(2) Runway Pavement Strength

AIP (Aeronautical Information Publication) gives information on the runway pavement strength of Government aerodromes as follows:

(a) Runways classified by LCN

LCN:	100	JKIA, MIA Primary Rwy
LCN:	50	Malindi Primary Rwy
LCN:	30	Kisumu
LCN:	20	MIA Secondary Rwy
LCN:	15 - 10	Lamu Rwys, Nyeri, Naivasha, Governors' Camp.

(b) Runways classified by AUW

AUW = 18,144kg; Wilson Primary Rwy, Mandera
AUW = 15,000kg; Lodwar
AUW = 13,600kg; Malindi Secondary Rwy, Garissa, Isiolo, Todeyant
AUW = 11,000kg; Eldoret, Nanyuki, Amboseli, Bungoma, Elwak, Fergusons Gulf, Moyale, Mananga, Samburu South
AUW = 5,500 - 5,700kg; 96 Rwys including Kitale, Embu, Keekorok
AUW = 2,750kg and below; Itikururu, Kitui

(c) Runways not classified (no data available)
40

1.3.3 Air Navigation Facilities

(1) Radio Navigational Aids

Existing radio navigational aids are listed in Table 1-3-1.

VHF omnidirectional radio range (VOR) and co-located distance measuring equipment (DME) are the primary en route and terminal navigational aids recommended by ICAO. There are 3 VOR/DMEs in service in Kenya and installation is in progress at Kisumu and Nakuru.

Table 1-3-1 Existing Radio Navigational Aids

Station	Ident.	Frequency	Range (NM)	Remarks
VOR/DME				
		(MHZ)		
Lodwar	LV	114.3	200	
Mombasa	MO	112.3	200	
Nairobi	NV	113.1	200	
(Kisumu)				Installation in progress
(Nakuru)				Installation in progress
NDB				
		(KHZ)		
Garissa	GA	371	50	
Isiolo	LL	364.5	50	
Kisumu	KI	347	50	
Lodwar	LW	338	350	
Malindi	ML	309	50	
Manyani	RA	398	75	
Mandera	MA	400	50	
Marsabit	MR	264	50	
Mombasa	MO	267	200	
Mombasa	KL	289.6		(Maritime)
Moyale	MY	288	50	
Nairobi	AL	379	300	
Nairobi	TH	329.5	50	
Nairobi	GG	315	50	
Nairobi	EA	256	50	
Nakuru	NU	358	50	
Narok	NK	368	50	
Nyeri	NY	388	50	
Seven Forks	SF	304	50	
Wajir	WA	318	50	
ILS				
		(MHZ)		
Mombasa (LLZ)	MI	110.1	25	GP, LOM, MM
Nairobi (LLZ)	NI	110.3	25	GP, LOM, LMM
VDF				
Mombasa				
Nairobi				
Wilson				

Non-directional radio beacons (NDB) cost less, but have a lower capability than VOR. There are 23 NDBs in service in the country. The instrument landing system (ILS) is a precision approach and landing aid. Two ILSs are in service at JKIA and MIA. ICAO recommends upgrading of JKIA's ILS to a Category II system (AFI 6, COM 3).

A VHF direction finder (VDF) is used to guide lost aircraft and for other emergencies. Three VDFs are in service at JKIA, MIA and Wilson airports.

(2) Air Traffic Control Services

Air traffic control services in Kenya are provided by the following facilities.

En route Control:	Nairobi Area Control Centre (ACC)
Terminal Control:	Nairobi and Mombasa Approach Control Facilities
Aerodrome Control:	Nairobi, Mombasa, Malindi, Kisumu and Wilson Towers

As shown in Fig. 1-3-3, en route air traffic control services are provided for flights on airlines connecting Kenya with Uganda and Tanzania. Flights on air routes from Nairobi to Europe via Khartoum (A10D), to the Middle East via Addis Ababa (G650D) are provided with flight advisory service after leaving the Nairobi Terminal Control Area.

ICAO recommends implementation of air traffic control services on all international air routes at the earliest time possible except where the type and density of traffic clearly do not justify the provision of such service. (AFI 6, ATS 4)

Long range radar for en route traffic control installed in Nairobi is not in service. Terminal approach radar systems are in service at JKIA and MIA, however, they do not have associated Secondary Surveillance Radar (SSR) which greatly enhances their effectiveness. It is noted that the life span of these radar systems expires in 1986. Negotiations are in progress to obtain funds to replace them before that time.

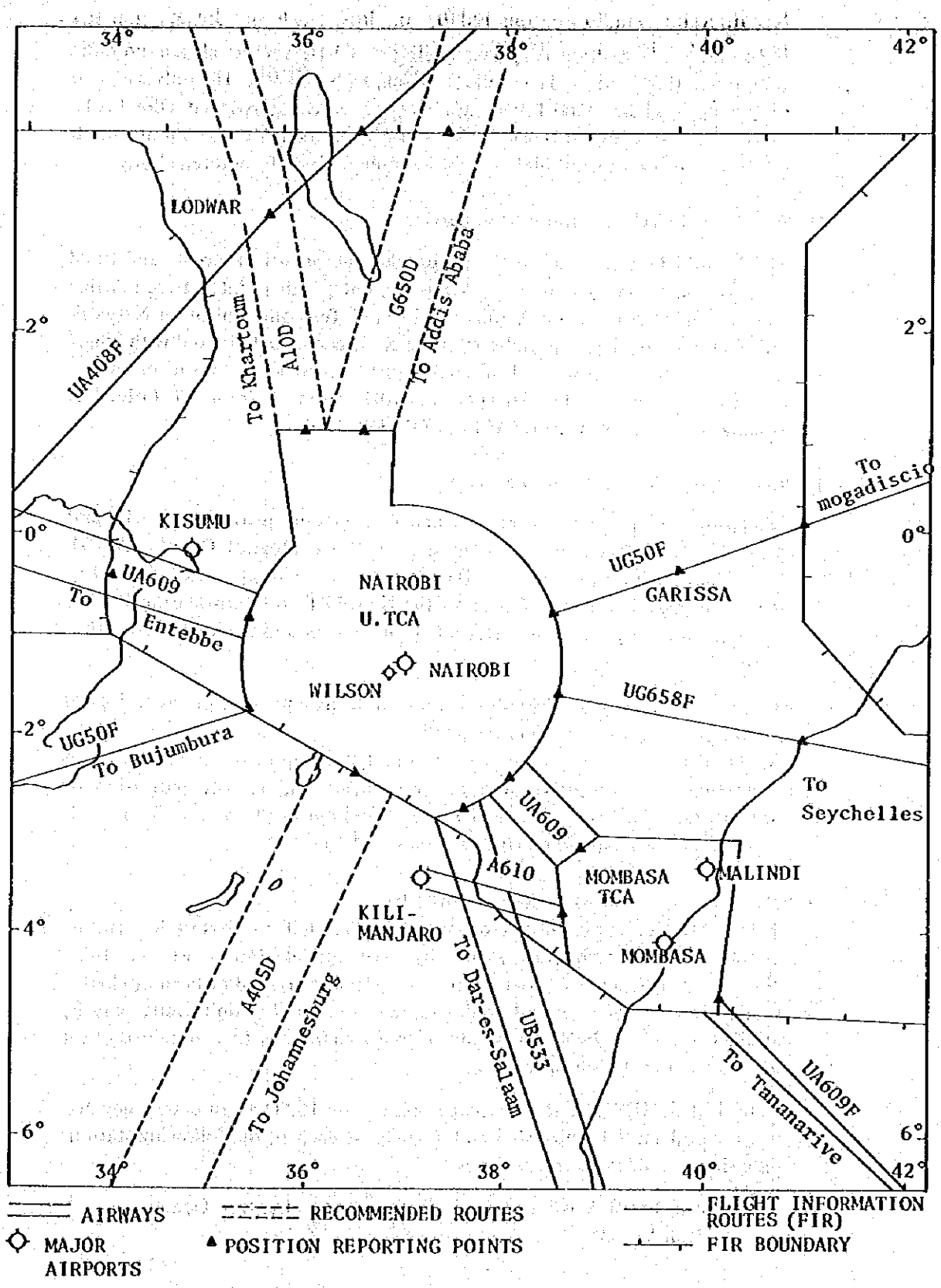


Fig. 1-3-3 Upper Air Routes & Controlled Airspace

Construction of an ATS/MET facility complex has been completed at the JKIA, MIA and Kisumu Airports. There are 3 VHF remote air-ground radio communication stations is Londiani, Ngong Hills and Voi. The only assigned frequency is 118.5 MHz. Emergency frequency* is not assigned. Direct ATS speech circuits between Nairobi ACC and ATS units in Mombasa is afforded, but between Nairobi and Malindi and Kisumu are by HF radiotelephony.

(3) Aeronautical Telecommunication Service

The Nairobi Communication Centre provides aeronautical mobile and fixed services and is designated by ICAO as the entry/exit point between Africa and Southeast Asia in the Aeronautical Fixed Telecommunication Network (AFTN). Existing landline/radio teletype circuits connect Nairobi with major facilities in the territory and in neighbouring countries. ICAO recommends expansion of the radio teletype network from Nairobi to Colombo, Antananarivo and Mauritius (AFI 6, COM 1).

(4) Aeronautical Meteorological Service

Operational meteorological reports and forecasts are provided in JKIA and MIA for 24 hours a day by Aerodrome Meteorological Offices (AMO). Nairobi Area Forecast Centre – Dagoretti Corner is designated by ICAO as the Meteorological Watch Office in the Nairobi Flight Information Region and exchanges operational meteorological reports and forecasts with other centres.

There are 25 meteorological observatories in Kenya, providing meteorological reports for aviation and other purposes.
ICAO recommends installation of automated equipment for measuring or evaluating, as appropriate, and for monitoring and remote indication of the surface wind, runway visual range and cloud height where Category II ILS operations are planned (ICAO Annex 3, 4.1).

Note*: Emergency Frequency (ICAO ANNEX 10, PART II)

The ICAO Communication Procedures require that an aircraft in airborne distress use the frequency in use by aeronautical stations at that time. However, it is recognised that, after an aircraft has crashed or been ditched, a particular frequency should be designated in order that uniformity may be attained on a worldwide basis, and so that a guard may be maintained or set up by as many stations as possible.

VHF 121.5 MHZ has thus been designated by ICAO as an emergency frequency and must be provided and guarded at each of the following stations on a single simplex operation basis.

International Aerodromes, Air Traffic Control Centres, Ocean Station Vessels

1.4 Administration and Operations

1.4.1 Airport Facilities

The organisation of public air transport is now under MOTC. The Civil Aviation Board is under the Permanent Secretary of MOTC, as established in the Civil Aviation Act of Kenya. There are two divisions and one department concerned with civil aviation under the permanent secretary in the MOTC headquarters. According to the MOTC organisation chart, the technical division administers the Aerodromes Department and the Aviation, Meteorology and Shipping Division administers the Directorate of Civil Aviation, the Meteorological Department and the Kenya Airways Corporation. The Roads and Aerodromes Department under the permanent secretary has the Aerodromes Engineering Branch which is directed by the Chief Aerodrome Engineer of the Aerodromes Department.

Actual roles of administration and operation by those organisations under MOTC are generally described as follows:

(1) Policy Planning on Civil Aviation (General)

General policy on the overall aspects of civil aviation is initiated by the three departments of Directorate of Civil Aviation, Aerodromes, and Meteorology in coordination with the Civil Aviation Division. The policy is then relayed to the Permanent Secretary, Ministry of Transport and Communications for decision and eventual implementation by the Government. The final decision is made by the Permanent Secretary who is the accounting officer. Some clearances are referred to the Minister for approval.

(2) International and Multilateral Agreements

This is handled on behalf of the Ministry of Transport & Communications by the Civil Aviation Division as in paragraph 1 above.

(3) Airport Operation, Maintenance and Ground Services

Here the policy is formulated by the Director of Aerodromes. The final decision is made by the Permanent Secretary for the Ministry of Transport and Communications.

(4) Development of Airports

The Civil Aviation Act (1977) charges the Civil Aviation Board with the responsibility of advising the Minister on the establishment and development of aerodromes, among other functions. This however, has to be done in consultation with the Director of Aerodromes. But the final decision rests with the Permanent Secretary for the Ministry of Transport and Communications.

(5) Air Navigation Facilities and Services

The Civil Aviation Act (1977) also provides that the Civil Aviation Board shall advise the Minister in relation to air navigation facilities and services. The Director of Civil Aviation is, under this Act, charged with the responsibility of planning, installing and maintaining air navigation facilities and

services.

Thus the Civil Aviation Board, the Director of Aerodromes and the Directorate of Civil Aviation each has an individual role and responsibility. The Civil Aviation Board is entrusted with coordinating matters concerned with civil aviation on behalf of the Ministry of Transport and Communications which is in overall charge of such matters in the country.

1.4.2 Administration of Air Navigation System

The Directorate of Civil Aviation (DCA) is responsible for the overall provision of the air navigation system in Kenya. This includes the following functions:

(a) Providing air traffic control services on Nairobi FIR.

(b) Providing search and rescue operations for lost aircraft.

(c) Providing aeronautical telecommunications and information services.

(d) Carrying out aircraft accident investigations.

(e) Registering of aircraft and issuing certificate of airworthiness to all aircraft so registered.

(f) Licensing air crews.

(g) Issuing air operator certificates.

(h) Advising on construction of airports including the planning and executing of the installation, operations and maintenance of telecommunications equipment and navigational aids.

(i) Designing of let-down approach charts.

(j) Licensing of all aerodromes.

(k) Training air traffic control officers, electronic officers, airport operations officers and pilots.

The present organisation chart of the DCA is shown in Fig. 1-4-1.

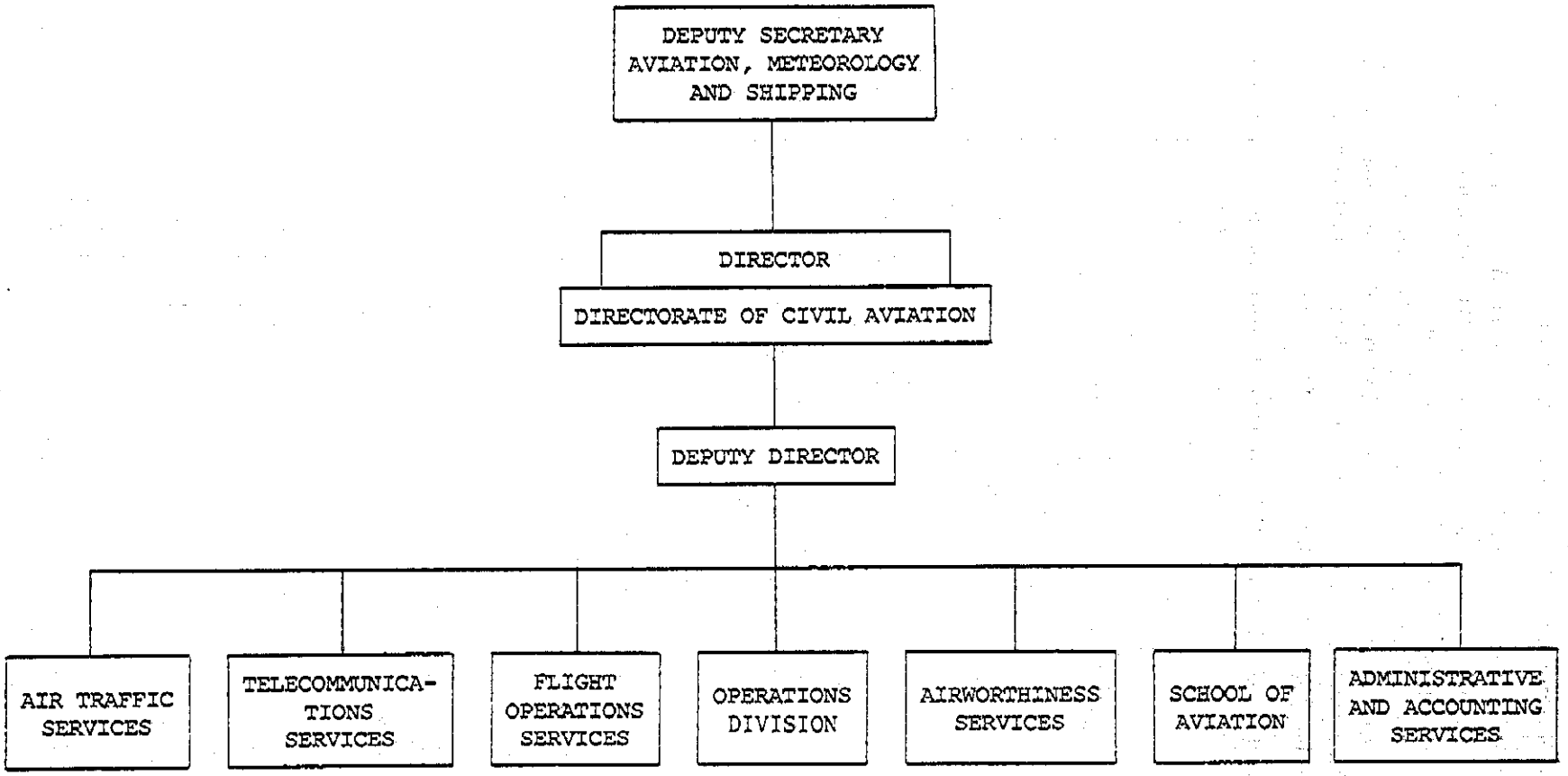


Fig. 1-4-1 Organization Chart of Directorate of Civil Aviation, MOTC

1.4.3 Administration of Aeronautical Meteorological Services

The Meteorological Department, one of the specialised departments of the Aviation, Meteorology and Shipping Division of MOTC, is responsible for the provision of meteorological services to civil aviation in Kenya. The Department maintains a domestic and international weather data collecting and dissemination network and its central office in Nairobi is designated as the Regional Meteorological Centre by the World Meteorological Organisation (WMO) and the Area Forecast Centre by ICAO.

The organisation chart of the Meteorological Department is shown in Fig. 1-4-2.

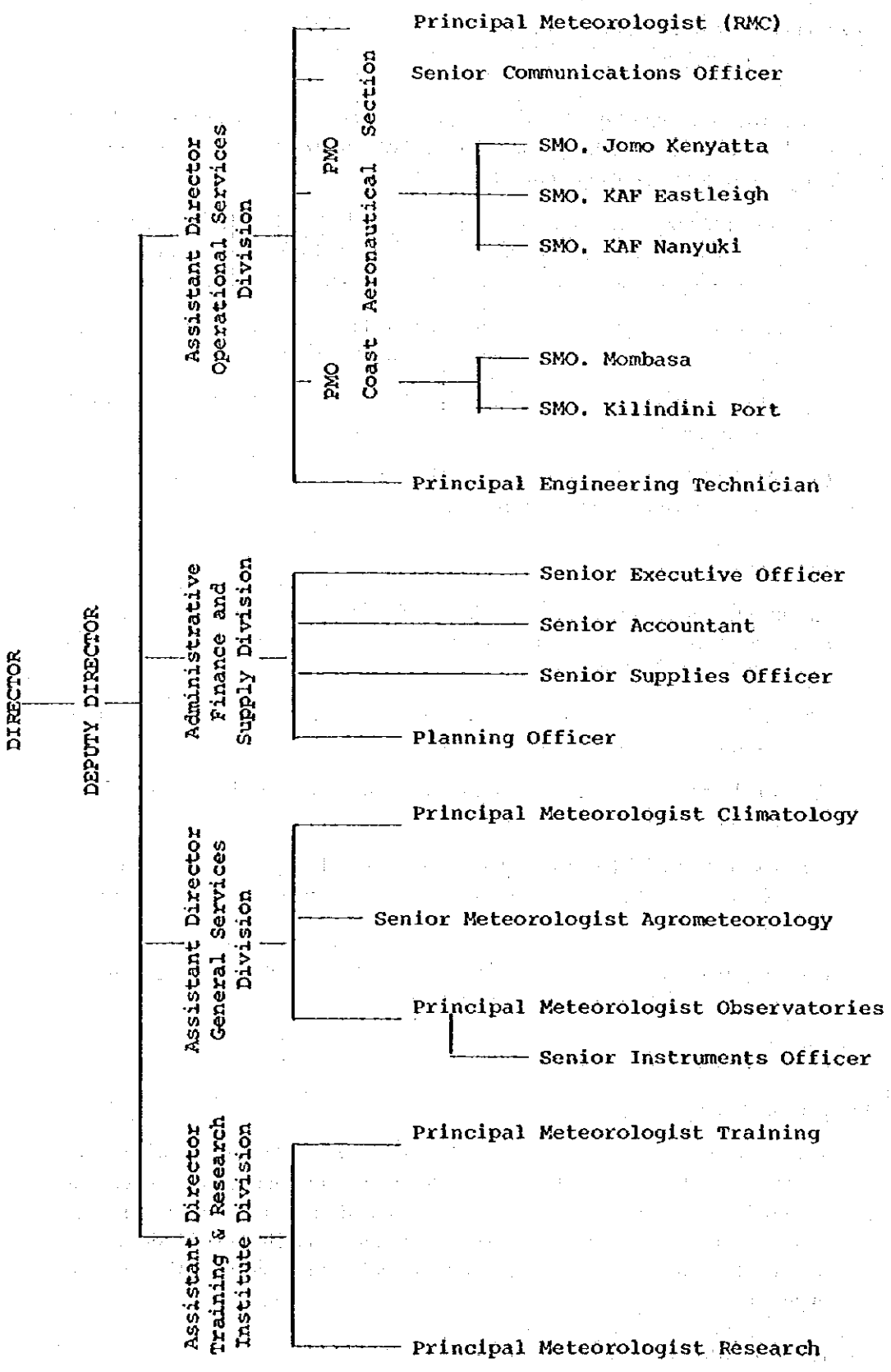


Fig. 1-4-2 Organisation of Meteorological Department

1.5 Current Issues Concerning Airports and Air Navigation

1.5.1 Airport and Air Navigation Facilities

(1) Airport Facilities

Since the only runways with a length and pavement strength capable of handling medium and long range jet aircraft are JKIA and MIA's primary runways, urgent improvements are required.

(a) The runways and associated facilities at Malindi and Kisumu Airports should be improved for domestic operation by medium range jet aircraft and subsequent international flight service by larger aircraft.

(b) At JKIA and MIA, serviceability should be upgraded by improvements to the parallel taxiways, passenger terminal aprons, etc..

(c) Local airports have poor facilities to accommodate scheduled flight services.

(d) Airfield lighting facilities are still at a low level compared with the standard recommended by ICAO.

(2) Air Navigation Facilities

Air navigation facilities and services should form an integrated system to meet the requirements of all civil aircraft operations. Particular emphasis should focus on the following.

(a) Rehabilitation of existing communication equipment to radio cover aircrafts flying both at low and high altitude.

(b) Replacement of Terminal Approach Radars in Nairobi and Mombasa reflecting mixed traffic in those area.

(c) Expansion of ATS direct speech circuit and teletype network between Nairobi and ATS units both in domestic airports and in neighbouring countries.

(d) Improvement of aviation related weather facilities and equipment to increase safety and to meet operational needs.

1.5.2 Administration and Operations

(1) *Airport Facilities*

The administrative structure for civil aviation under MOTC is rather complicated from the viewpoint of organisational integration and efficiency. This should be more simply centralised under the direction of one responsible division which answered to the permanent secretary. This would allow easy coordination among the various functions and permit centralisation of civil aviation matters.

(2) Air Navigation Facilities

(a) As most air navigational equipment is produced in foreign countries, it

is always accompanied by complicated procedures and acquisition takes a long time. The same applies to securing spare parts for equipment which, on occasion, causes delay in system restoration. Support systems such as a centralised avionics supply and maintenance center will improve work force efficiency and reduce the amount of on-site spare parts necessary.

(b) Installation, operations and maintenance of air navigation facilities requires specialised technicians in different fields; their training takes a long time. Further action should be taken to strengthen the training staff and equipment in the School of Aviation and to provide advanced or refresher courses on radar air traffic control, aeronautical electronics, data processing system, etc..

In addition to traditional lecture/lab training methods, use of Computer Based Instruction (CBI) in the School of Aviation will improve deployment of both new employees and field personnel.

2. Airport Development Plan

2.1 Basic Policy for Public Air Transport System Development

It is recommended that MOTC accelerate the development of the national public air transport system with a long range prospect in the following ways:

(1) Since it is considered that Kenya will continue to maintain the important position it now holds in the international air transport network of the African region, and that its role may likely increase in the future, development of the facilities to meet international requirements, and strengthening and improvement of the administrative and operational system are necessary. These tasks are recommended:

1) Development of aeronautical navigation aids for the international air route network in the country.

2) Improvement of air traffic services and their communications facilities.

3) Improvement of the facilities at JKIA and MIA.

4) Staff training in aerodrome operation and air traffic services.

5) Strengthening and improvement of administrative and operational system of the Government.

(2) Kenya has abundant tourism resources in its resort area to accommodate international tourists from all over the world, especially from Europe; this enables the country to make a big contribution to international exchange in the world.

Development of the tourism industry is closely related not only to an increase in employment opportunities but also to an increase in foreign currency income.

From these points of view, the public air transport system to the tourist areas must be improved as should the development of the tourism industry in the country. These tasks are recommended:

1) Redevelopment of Malindi and Kisumu Airports to accommodate jet aircraft operation, thereby upgrading existing scheduled domestic flights for tourists and Kenyan residents.

2) Development of airports handling tourists to enable them to accommodate scheduled domestic flights to those areas now most demanded of chartered flight operators.

(3) Air transport utilisation by Kenyan residents is still low. To accelerate popular use of public air transport, airports and the routing network must be improved to aid the densely populated areas.

Cities and areas now isolated and available only by air, especially in the rainy seasons, should be served by public air transport. Improvement of airports in these isolated cities and areas is needed and would obviously provide a

foothold for promoting their development.

Recommendations:

1) Development of major airports in populated areas so that scheduled domestic flights can be provided.

2) Development of airports in remote areas for the same reason.

3) Review of the policy and structure of the existing tariff system of domestic air transport.

(4) As part of the of the development of the national transport system, integration of the system's administrative operation is recommended and would contribute to air safety and efficient investment.

The following Governmental actions are recommended:

1) Development and issuance of laws and regulations for airport development in addition to the existing Civil Aviation Act, and establishment of a special committee chaired by the Minister of MOTC with empowered working staff for the above purpose.

2) Introduction of a priority system for approval by the Minister of MOTC on all airport development (public or nonpublic) now being planned.

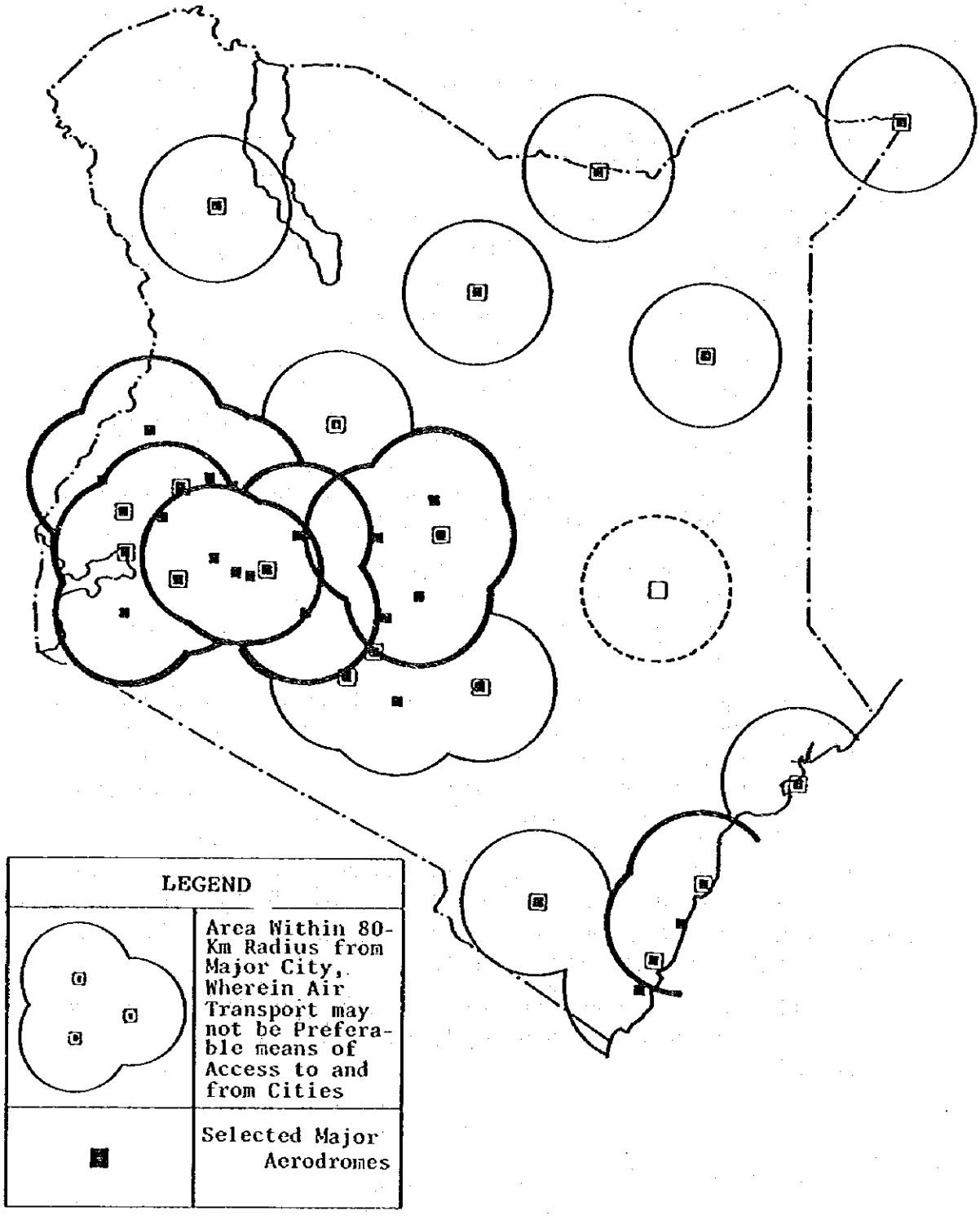
The right and duty of the registered owner and operator of each aerodrome should be clarified, as well as the allotment of rights and duties for airport development planning, its implementation and allocation of funds.

3) The many Government aerodromes in close proximity should be functionally integrated and physically consolidated to a number that would meet the demand of the area to be served; this would eliminate duplication of capital investment and wasteful overlapping of service areas. Figure 2-1-1 shows this current overlapping.

(5) Because of lack of personnel and structural defects observed in the existing organisation of the air transport sector under the Ministry of Transport and Communications, improvement and strengthening of its administrative capability are urgent requirements. Specifically:

1) Strengthening of the division specified to administer the air transport sector in the headquarters of MOTC.

Fig. 2-1-1 : Overlapping of Existing Airport Service Areas



Note: Each service area is defined as that within 80km of an airport, which is selected for a city with a population of more than 3,000.