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Mozambique

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NATIONAL INTELLIGENCE SURVEY

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Transportation and
Telecommunications

WARNING

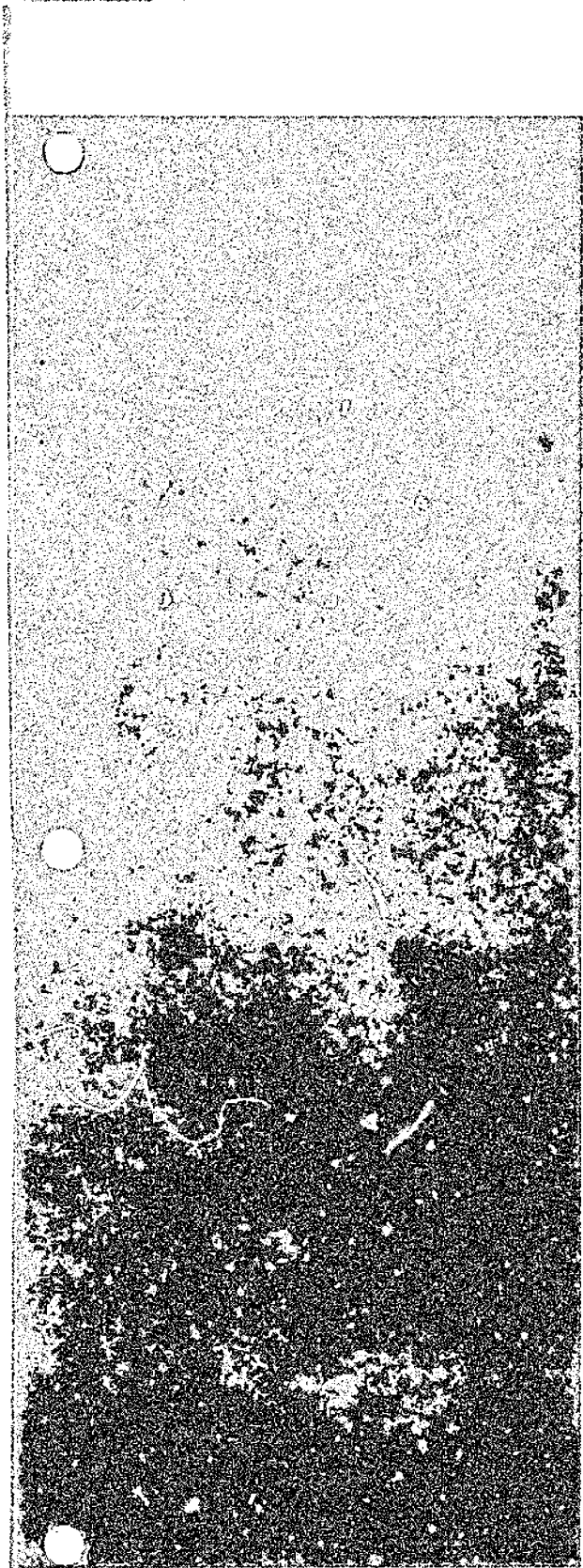
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This chapter was prepared for the NIS by the Defense Intelligence Agency and includes a contribution on airfields from the Defense Mapping Agency, Aerospace Center. Research was substantially completed by May 1973.



MOZAMBIQUE

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Transportation and Telecommunications

A. Summary (C)

1. Systems

Transportation and telecommunication (telecom) systems are adequate to satisfy the economic requirements of Mozambique. Transportation facilities, especially the railroads, play an important role in southern Africa, providing access to maritime ports for the landlocked nations of Malawi, Rhodesia, Zambia, and Swaziland and facilitating movement of goods to and from Transvaal Province of South Africa and the southern part of Zaire.

Railroads, the most important mode of transportation, carry most of the cargo that moves through the major ports of Lourenco Marques,¹ Beira, and Nacala, and the Mozambican economy is heavily dependent upon the revenue obtained from this traffic. The highway system provides feeder and distribution services to the railroads, and in large areas of the country highways are the only mode of transportation. Inland waterways have some importance to regional transportation, but the typically short and unconnected sections of navigable waterways are of only minor significance.

Mozambique has an adequate system of airfields, several of which have significance. The usable fields are distributed throughout the country, but the most important are located on the southern coast and adjacent to railroads. Domestically, civil air transport complements the surface carriers and provides ready access to remote areas. International air services provided chiefly by a state-owned airline, maintain ties with Portugal and supply rapid links to neighboring countries.

¹For diacritics on place names see the list of names on the apron of the Terrain and Transportation map and the map itself.

Telecom facilities are fairly modern but nevertheless are barely adequate to satisfy the country's needs. The chief characteristic of the system is a basic low-capacity, open-wire network supplemented by numerous small radiocommunication stations and a tropospheric scatter system. The most important centers are Lourenco Marques, Beira, Nampula, and Quelimane.

Transportation and telecom systems are operated by a number of organizations. However, the Harbors, Railway, and Transport Services Administration, an autonomous body directly responsible to the Governor General of Mozambique, with headquarters in Lourenco Marques, supervises most transportation operations. Public telecom facilities are administered by the Posts, Telegraphs, and Telephone Service.

Several important transportation development programs are in progress. Among the more significant are plans for the renovation of international rail lines to accommodate greater traffic volumes; large-scale highway improvement projects scheduled for completion in 1979; construction of several important facilities at the major ports; and extension of runways and aprons at Lourenco Marques and Beira airfields.

2. Strategic mobility

The support of large-scale military operations in Mozambique would be seriously hampered by inadequacies of the transportation and telecom systems. Railroads afford access to major maritime ports from significant inland centers and provide international connections with Malawi, Rhodesia, the Republic of South Africa, and Swaziland. However, troop movement and resupply would be hindered by the sparsity of the network, the lack of internal rail connections between systems, and the vulnerability of single-track lines to interdiction.

Movement by highway would be severely limited by low-capacity roads, numerous bottlenecks, and a lack of through and alternate routes. Conditions for cross-country movement in the northern and southern border zones are generally fair to good most of the year on flat to rolling plains and mostly poor in the central section because of rugged terrain. However, the Rhodesian border area near Tete is mountainous and densely forested; cross-country movement and offroad dispersal would be severely restricted. Movement in underdeveloped areas, particularly the northern part of the country, would be restricted by the low-density road network and hampered by the poor condition of the mostly unsurfaced roads. Except for the cross-country highway from Beira to the Rhodesian border and highways near large cities, roads generally have low-capacity surfaces and would require considerable maintenance if subjected to continuous heavy military traffic. Several long bridges on the main highways are vulnerable to interdiction.

Inland waterways are insignificant and would be of very little use in military operations. The three major maritime ports, however, are adaptable to military use. The 303 usable airfields are fairly well distributed and would be highly useful in the conduct of major operations. The important military airfields are adjacent to railroads, and advanced recovery bases are scattered throughout the northern and western parts of the country. Beira and Lourenco Marques airfields can support C-135's, and 16 other fields with hard-surfaced runways can support craft ranging from C-54's to C-130's. Five seaplane stations would also be available. Aircraft and personnel of DETA, the government-owned airline, would be readily available for mobilization. Other government and privately owned civil aircraft could be commandeered if the need should arise. In addition, graduates of the government's pilot and parachutist training program could become an effective force which might be used in emergencies or open hostilities. An organization known as the Air Force Volunteers (FAV), composed of civilian pilots and aircraft, is an auxiliary of the Portuguese Air Force (PAF) similar to the U.S. Civil Air Patrol. In some cases, the aircraft are privately owned and registered, while others are furnished by the PAF. In addition to being an auxiliary of the PAF, the FAV is an integral part of the Provincial Organization of Volunteers for the Civil Defense of Mozambique (OPVDCM).

Telecom facilities could support only minor military operations, since capacities on only a few routes are more than minimal. Gusty winds, severe thun-

derstorms, and the excessively humid climate would result in difficult military telecom operational conditions.

B. Railroads (C)

The Mozambique State Railroads (CFM) is comprised of 1,965 single-track route miles, consisting of 1,877 miles of 3'6"-gauge and 88 miles of 2'5 1/2"-gauge lines. The rail network has six unconnected systems which extend inland from the Indian Ocean and serve only limited sections of southern, central, and northern Mozambique.

The systems in Lourenco Marques, Beira, and Mocambique districts are the most extensive of the network, transporting all international freight and the bulk of the domestic traffic. The Quelimane, Inhambane, and Gaza systems are of minor importance and haul only domestic cargoes. The Lourenco Marques system makes international connections with the railroad networks of Swaziland near Goba, the Republic of South Africa at Ressano Garcia, the Rhodesian border near Machipanda, and into Malawi at Border Siding, Malawi. The Mocambique system crosses the border at Nayuei, Malawi. All international rail connections are 3'6"-gauge, and rolling stock is interchangeable with equipment of the same gauge in Malawi, Rhodesia, South Africa, Swaziland, Zambia, and Zaire.

The railroads are extremely important to the economies of neighboring African nations. They afford access to maritime ports for landlocked Malawi, Rhodesia, Zambia, and Swaziland and serve as vital import-export routes for the Transvaal Province of South Africa and the Shaba Region of Zaire. Although there are no internal rail connections between systems, external connections link the Lourenco Marques and Beira systems via Malawi. Railroad operations compare favorably with those of Rhodesia but are not as sophisticated as those of South Africa.

The government-owned CFM, consisting of six rail systems under the authority of the Harbors, Railway, and Transport Services Administration, is operated by five independent division administrations. The Inhambane and Gaza systems are organized under one division with headquarters in Inhambane. The former privately owned Trans-Zambezi Railroad and that segment of the Central African Railroad in Mozambique are now government owned and are included in the Beira system. In addition, the CFM also operates the 139-mile Swaziland Railroad under a working agreement with the Swaziland Government.



FIGURE 1. Modern automatic hump classification facilities at Lourenco Marques (U/OU)

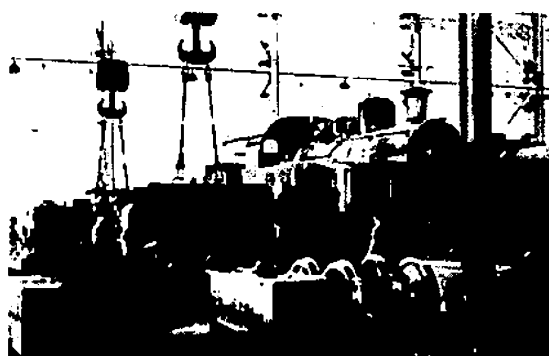


FIGURE 2. Major locomotive repair facility at Beira (U/OU)

Yards, terminals, and repair facilities are well distributed throughout each system and are adequate for current requirements. Modern classification yards at Lourenco Marques (Figure 1), Beira, and Nacala handle the greatest volumes of freight traffic on the network. Major repairs are accomplished at facilities at Lourenco Marques, Beira (Figure 2), Nacala, Nampula, Joao Belo, Quelimane, and Gondola, minor repair facilities are located at Inhambitanga, Machipanda, Malvernia, Inhambane, Lumbo, Vila Moutize, and Sena.

There are an estimated 330 railroad bridges, 12 feet and over, on CFM's 6 rail systems. Steel is generally used for the construction of 100-foot and longer bridges and reinforced concrete for those of shorter lengths. The longest bridge is the 12,064-foot steel bowstring through-truss and deck-plate girder structure over the Zambezi River near Sena on the Beira system. There are no tunnels.

The absolute system of train control is employed by the CFM. Automatic blocks are used on extensive segments of the Lourenco Marques and Beira systems. Centralized traffic control with color light signals has been placed in service between Lourenco Marques and Ressano Garcia, and it is being installed on the Lourenco Marques-Malvernia, Lourenco Marques-Goba, and the Beira-Machipanda lines. Manual block control is in operation on the Mocambique and sections of the Beira system. Electric token and telephone and ticket order with semaphore signals are used on the Mocambique system. Minor systems and lines rely on train orders to control traffic. Communications are by telephone, telegraph, and radio on major rail systems and by telephone and telegraph on minor systems.

Steam locomotives are used almost exclusively in Mozambique except on the Lourenco Marques-Ressano Garcia, Lourenco Marques-Malvernia, and

The various CFM rail systems, their mileages, and gages are as follows:

SYSTEM	MILEAGE	GAGE
Lourenco Marques	537	3'6"
Beira	620	3'6"
Mocambique	572	3'6"
Inhambane	57	3'6"
Gaza	88	2'5½"
Quelimane	91	3'6"
Total	1,965	
Swaziland Railroad	139	3'6"
Grand total	2,104	

Training facilities are excellent, and skill levels achieved by railroad personnel are high. Classroom training, supplemented by on-the-job training, is available at schools in Lourenco Marques, Beira, and Inhambane. In 1970 railroad personnel totaled 35,675. The number of unskilled laborers is adequate, but some technical and administrative personnel must be recruited from other countries.

Beira-Dona Ana lines where diesel motive power is predominant. Locomotives and rolling stock are generally maintained in good condition. The 1971 equipment inventory was as follows below. Main-line 2-8-2 and 2-8-2+2-8-2 steam locomotives with average tractive efforts of 27,000 and 58,000 pounds, respectively, are the principal units in use on the CFM. The most common diesel-electric locomotives are 2,150-horsepower, C-C, 51,000-pound tractive effort units on the Lourenco Marques system and 1,200-horsepower, Co-Co, 40,000-pound tractive effort units on the Beira system. High sided 4-axle gondola cars, with capacities ranging between 35 and 44 short tons, are the predominant freight cars in use on the CFM. Center automatic coupler-buffers 35 1/4 inches above the top of rail are standard on systems with international rail connections. However, the former Trans-Zambezi Railroad equipment operates on the Dondo-Sena and Inhamitanga-Marromeu lines and has couplers 33 1/2 inches above rail. Rolling stock on minor systems is equipped with center-buffers and pin and link or chain couplers. Vacuum brakes are standard on all rolling stock. Motive power units and rolling stock are imported from the United Kingdom, France, West Germany, South Africa, and the United States. *Cometal-Mometal* in Lourenco Marques manufactures freight cars.

Coal is available locally at Vila Moatize and is also imported from Rhodesia and South Africa. On minor systems some steam locomotives utilize firewood that is accessible en route. Diesel fuel, which is processed at the Matola-Rio refinery from imported Middle East crude, is available. The water supply is adequate and well distributed throughout the network.

Lines on major systems are well maintained but are in only fair condition on the Quelimane, Inhambane, and Gaza systems. Maintenance is mechanized on the Lourenco Marques, Beira, and Mocambique systems, and it is performed manually on minor systems. Heavy construction is generally contracted to private industry. Projects recently completed are the construction of the Muotas freight yard, the 38-mile Umpala-Salamanga branch line, the 55-mile Inhamitanga-Marromeu line, the 63-mile rail

extension from Catur to Vila Cabral, the 49-mile Nova Freixo-Malawi border extension that links the Malawi rail network to the port of Nacala, and the dismantling of the Caia-Marromeu line. Construction work in progress on major systems consists of renovation of the permanent way, reduction of grades, enlargement of the radii of curvature, construction of new stations, and renovation of repair facilities.

Foremost in the development of the CFM are plans for the renovation of international rail lines to accommodate greater traffic volumes; the modernization of equipment, repair facilities, and control and signaling systems; and the expansion of the railroad network. Rail extensions are planned from Salamanga to Ponta Dobela, Vila Pery to Mapai, and Vila Caldas Xavier to Rio Mucanha, including a branch line to the Cabora Bassa dam. Another project under consideration is the construction of a railroad between Vila Caldas Xavier and Shire Bridge Siding, Malawi. This line would provide direct access for Vila Moatize coal exports to the port of Nacala via Malawi.

Traffic statistics for the CFM-owned rail systems (in thousands) for 1971 were as follows:

	PASSENGERS	SHORT TONS
Lourenco Marques	2,410.7	15,098.8
Beira	1,388.4	4,053.6
Mocambique	751.5	549.7
Quelimane	237.3	129.3
Inhambane and Gaza	278.9	29.9
Total	5,066.8	19,859.3

In 1971 the CFM accounted for 162 million passenger-miles and slightly more than 2 billion short-ton freight-miles. Transit traffic accounts for approximately 70% of all freight hauled and includes exports of coal, mineral ores, and agriculture and forestry products, and imports of petroleum, machinery, fertilizers, motor vehicles, construction materials, and general cargo. Domestic traffic consists of sugarcane, dairy products, cotton, sisal, tea, and forestry products.

Terrorist activities have affected the normal operations of the railroad, particularly on the Beira-Vila Moatize line, where sabotage stopped

	LOURENCO MARQUES	BEIRA	MOCAMBIQUE	QUELIMANE	INHAMBANE AND GAZA
Locomotives:					
Steam	89	93	34	6	10
Diesel	43	10	0	0	0
Rollcars	13	9	9	2	0
Passenger cars	81	79	21	9	16
Freight cars	3,358	3,191	763	126	151
Tank cars	159	63	68	4	7
Baggage cars	55	47	18	4	7

FIGURE 3. Characteristics of selected Mozambique-state railroads (C)

TERMINALS AND ROUTE MILES	MAXIMUM GRADE		MINIMUM RADIUS OF CURVATURE	MAXIMUM AXLELOAD	PASSING TRACK		REMARKS
	Going	Coming			Maximum Interval	Minimum length	
	-- Percent --				Miles	Feet	
Lourenco Marques-Goba- Swaziland border. 51 miles	2.0	1.2	984	Short tons 15.4	20	*1,082	International connection with Swaziland. CFM operates the 130-mile Swaziland railroad. A 38-mile branch line with same general characteristics extends from Unipala (MP 25) to Salamanga. Continuation of line from Salamanga to future ore and petroleum port of Ponta Dabela is planned.
Lourenco Marques-Ressano Garcia. 52 miles	1.5	1.5	984	22	6	1,082	International connection with South Africa.
Lourenco Marques-Mal- vernia. 328 miles	1.0	1.0	984	16.5	19	1,424	International connection with Rhodesia.
Moamba-Xinavane..... 58 miles	2.0	1.0	984	16.5	19	*1,082	
Beira-Machipanda..... 108 miles	1.8	1.2	984	16.5	10	938	Do.
Dondo-Malawi border..... 208 miles	1.2	1.2	792	15.4	24	*1,082	International connection with Malawi at Border Siding, Malawi. A 55-mile branch line extends from Inharrim-tanga (MP 99) to Marroneu.
Dona Ana-Vila Mostize... 159 miles	1.8	1.0	984	22	20	*1,082	
Nacala-Vila Cabral..... 497 miles	1.8	1.0	984	17.6	25	*1,082	A 26-mile branch line with the same general characteristics extends from Monapo (MP 41) to Lumbo. International connection with Malawi is made via a 49-mile branch line from Nova Freixo (MP 334) to the Malawi border.
Joao Belo-Chicomo..... 59 miles	2.0	1.0	328	7.7	30	*1,082	Gage: 2'5 1/2". A 32-mile branch line with the same general characteristics extends from Manjacaze (MP 30) to Mausele.
Inhambane-Inharrime..... 57 miles	2.0	1.0	328	8.8	23	*1,082	
Quelimane-Vila de Mocuba. 91 miles	1.2	1.2	951	15.4	31	*1,082	

NOTE--Gage is 3'0" unless otherwise noted.
*Estimated.

traffic 11 times during the first 6 months of 1972. Armored railcars have been placed in service to patrol 124 miles of line in the vicinity of Vila Moatize to counter the terrorists. Traffic is frequently disrupted by severe storms which cause flooding in low-lying areas and occasionally damage communication lines.

In 1969 CFM operating income was US\$79,588,640 and operating expenses US\$45,189,685, establishing an operation ratio of 56%. The Lourenco Marques and Beira systems operate at a profit; all others have deficit operations.

Rails are T-section types weighing 60 to 91 pounds per yard with lengths of 39 feet 4 inches and 59 feet on major systems; minor systems have rail weighing 40 to 60 pounds. Rails are in the process of being Thermit welded into continuous lengths. CFM has more than 211 miles of continuous welded rail in lengths up to 8.7 miles. Domestic hardwood ties spaced 2,400 per mile are predominant on the CFM. Steel ties are used between Inhambitanga and Morrromeu. Ballast is available locally and consists of broken stone and gravel on major systems and sand on minor systems. Track materials are imported from the United Kingdom, France, and South Africa.

Major characteristics of the single-track railroads are given in Figure 3.

C. Highways (C)

The highways of Mozambique are unevenly distributed, with the greatest density of roads in the southern half of the country. The pattern consists generally of east-west routes extending from port and coastal areas to interior regions and adjacent countries. A single north-south coastal route connects the ports of Lourenco Marques and Beira and provides access to the northern part of the country. Roads extending from this coastal route afford access to interior agricultural and mining areas and provide access to adjacent countries. Links with neighboring countries are poorly developed; connections with Zambia and Tanzania consist mainly of earth tracks; narrow, bituminous-surfaced roads, generally in poor condition, connect Lourenco Marques with the South African and Swaziland borders and link Beira and Salisbury, Rhodesia. An international highway extending across Mozambique from the Rhodesian border to the Malawi border is bituminous surfaced from the Rhodesian border to Tete; the section from Tete to the Malawi border is under construction and was scheduled for completion in early 1973. A 2,625-foot suspension bridge across the Zambezi River at Tete was opened to traffic in July 1972.

The highway system totals about 20,000 miles, of which 18,260 miles are mainly improved or unimproved earth roads with some limited mileage of crushed stone, gravel, or laterite surfacing and 1,740 miles of bituminous-treated surfaces. Bituminous-treated roads range from 12 to 20 feet in width, but most range from 12 to 16 feet. Crushed stone and gravel roads are generally 12 feet wide with 3- to 8-foot shoulders. Earth roads are 18 to 20 feet wide.

There are 115 known bridges over 100 feet in length on the Mozambique highway network. The longest bridge is the 2,760-foot steel suspension bridge over the Rio Save at Vila Franca do Save on the Central Northeast Highway. A 9,600-foot bridge under construction over the Zambezi River at Vila Fontes will be the country's longest bridge when completed. Most bridges are reinforced-concrete deck-girder types; there are a few stonemasonry arch bridges, and some timber deck-type bridges which are being replaced by permanent structures as the road network improves.

The Autonomous Highway Board is responsible for the planning, construction, and maintenance of national highways and highway bridges. The board was created to give exclusive attention to highway development. In the past, responsibility for highway construction was vested in a division within the Department of Public Works and Transport. The plans and policies of the board are effected through district offices. Highway and bridge construction is performed mainly by Portuguese contractors.

Terrain features and weather impose problems in highway maintenance and construction. Most roads are unsurfaced and are subject to extensive damage from floods after heavy rains. Maintenance and repair generally are accomplished only during the dry months. Suitable road alignment through hilly and mountainous terrain necessitates extensive earthworks, and the low, swampy terrain in coastal areas requires extensive construction of fills, embankments, and drainage facilities. Construction of additional north-south routes would entail major bridging over the many rivers flowing eastward to the coast. Cement, stone, timber, and laterite used in road construction are available locally. Some steel and bitumen are produced at the plant in Lourenco Marques and at the Matola-Rio refinery, respectively, but most structural steel, heavy equipment, and bitumen are imported.

There is an extensive program of highway and bridge construction to improve arterial routes and to extend the highway network. Construction of new

roads and bridges to provide access to remote areas of the country in the interest of national security is also underway.

Large-scale highway improvement projects are scheduled for completion by the end of 1979 and will include the Central Northeast Highway from Lourenco Marques to Vila de Mocimboa da Praia. This major north-south highway scheduled for completion by 1978 will link the important cities of Beira, Quelimane, Nampula, Porto Amelia, and Vila de Mocimboa da Praia with Lourenco Marques. A 9,600-foot-long bridge across the Zambezi at Vila Fontes on this highway is under construction. East-west links to be improved include the roads from Lourenco Marques to Malvernia on the Rhodesian border; Tete to Malawi via Zobue; Nampula to Malawi via Nova Freixo; and Quelimane to Milange and Malawi. These east-west links will provide ties with Zambia and Malawi as well as an additional high-capacity road between Tete and Salisbury.

About 3,350 miles of supplementary roads will also be built by 1979, including 1,000 miles of roads to be constructed by the Autonomous Highway Board in Cabo Delgado District.

Highway traffic is subject to interruption during the rainy season, which occurs generally from October through April. During heavy rainfall, movement even on the best roads becomes difficult. Destructive flooding is common on many roads, and many streams, which are normally fordable, must be crossed by ferries. During the dry season, earth and gravel roads become dusty, and visibility is restricted. Bottlenecks include ferries, fords, narrow roadways, and narrow, low-capacity bridges.

Most road transport in Mozambique is state owned and is operated through State Roadways, an agency of the Harbor, Railway, and Transport Services Administration. Immediate control of all highway transportation is exercised by a highways control board. State road service supplements the railroads

FIGURE 4. Selected highways (C)

ORIGIN AND DESTINATION	DISTANCE	SURFACE TYPE	SURFACE WIDTH	REMARKS
	<i>Miles</i>		<i>Feet</i>	
Namaacha at Swaziland border to Inchope (via Lourenco Marques).	802			
Mile 0 to Mile 48 (Lourenco Marques).	.....	Bituminous treatment...	8-14	Hilly to undulating alignment.
Mile 48 to Mile 802.....	.....	Bituminous.....	18-24	Do.
Ressano Garcia at South Africa border to Boane.	56	Bituminous treatment...	8-14	Do.
Vila do Dondo to Nacala.....	753			
Mile 0 to Mile 635 (Nampula).....	.....	Earth and gravel; some short bituminous-treated sections.	12-20	Hilly to undulating; ferry, 62-ton capacity, across Zambezi River.
Mile 635 to Mile 753.....	.....	Bituminous.....	18-24	Undulating.
Namialo to Namiranga at Tanzanian border.	405			
Mile 0 to Mile 96 (Namapa).....	.....	Earth and light gravel..	12-24	Hilly to undulating alignment.
Mile 96 to Mile 323 (Mocimboa da Praia).	.....	Bituminous.....	18-24	Do.
Mile 323 to Mile 405 (Namiranga)...	.....	Earth and light gravel..	12-20	Do.
Sunate at junction with Namialo to Tanzanian border highway to Porto Amelia.	54	Gravel.....	18-24	Undulating alignment. Bituminous section, about 10 miles long, south of Porto Amelia.
Junction with Beira to Rhodesian border near Bandula to Zobue at Malawi border, via Tete.	303			
Mile to Mile 75 (approx.) at Vila Gouveia.	.....	Bituminous.....	18-24	Hilly to mountainous alignment.
Mile 75 to Mile 166 (Changara).....	.....	Gravel.....	18-24	Do.
Mile 166 to Mile 227 (Tete).....	.....	Bituminous.....	18-24	Hilly to mountainous alignment. Steel suspension bridge, 2,025 feet long, over Zambezi River at Tete.
Mile 227 to Mile 303 (Zobue).....	.....	Gravel.....	18-24	Hilly to mountainous alignment.
Cochemane at Rhodesian border to Tete.	30	Bituminous.....	18-24	Do.

NOTE—All highway shoulder widths range from 0 to 3 feet.

and serves newly developed areas. Authority to operate noncompetitive road transport is extended to private firms only where the state service cannot meet the requirements of the areas. The state service fleet totals over 350 vehicles, of which more than 250 are trucks; buses and combination cargo-passenger vehicles comprise the remainder. Cargo hauled by the state fleet amounts to more than 300,000 tons annually. The tonnage is composed of export-import products and agricultural commodities carried from producing localities to ports and distribution centers. In January 1970 there were about 82,000 vehicles registered in Mozambique, including 48,200 passenger cars, and 33,800 trucks and buses. All vehicles are imported, mainly from West Germany, Italy, and France. Recently, however, the majority of trucks have been purchased from the United States.

Characteristics of the most important highways are given in Figure 4.

D. Inland waterways (C)

Inland waterway transport plays a minor role in the economy of Mozambique. Private enterprise, which handles all waterway traffic, accounts for less than 6% of the total volume of internal trade.

The inland waterway system comprises about 2,330 miles of routes, navigable by vessels which carry agricultural products, timber, ore, and petroleum products. The Zambezi River dominates waterway transport, accounting for more than two-thirds of total traffic. Waterway movement is also active around the ports of Quelimane, Beira, and Lourenco Marques, and on the Limpopo River and Lake Nyasa.

The Zambezi flows southeastward for about 500 miles across central Mozambique and empties into the Mozambique Channel through several distributaries. One of these, the 18-mile Rio Chinde, provides navigable access for vessels of 8-foot draft. River steamers of 9-foot draft perennially navigate between Rio Chinde and Mopeia Velha, 70 miles from the sea. Normally, craft drawing 3 feet can proceed to Vila de Sena (mile 130), but safe draft occasionally drops to 1.5 feet at low water (May through October). During high water (November through April), draft of 3-foot draft can reach Tete (mile 275). A 130-mile section of the Zambezi between Chicou and the Zambian-Rhodesian border is navigable by river steamers, but this potentially effective route has very little traffic. Numerous rapids along a 95-mile section of the river south of Chicou preclude through navigation.

North of the Zambezi the only significant waterway system serves the port of Quelimane. The approximately 130 miles of interconnected waterways provide two access routes to the sea and several short routes to the interior. The Rio dos Bons Sinais has a perennial safe draft of 10 feet for 12 miles, and the Rio Macuse has a perennial safe draft of 8 feet throughout its 24-mile extent. A 14-mile section of the Rio Licuare and the 23-mile Rio Mucelo, both navigable at high water (November through March) by vessels of 6-foot draft, connect the Rio dos Bons Sinais and the Rio Macuse.

The Rio Pungoe and the Rio Buzi flow into the sea near the deepwater port of Beira and provide navigable transport routes to the interior. River steamers of 9-foot draft navigate 17 miles up the Rio Pungoe, and craft drawing 4 feet operate perennially for 41 miles. The lower 93 miles of the Rio Buzi are used perennially by shallow-draft craft.

Lourenco Marques is served by 275 miles of navigable waterways, including the Estuario do Rio Espirito Santo and five relatively short streams. The focal point of this waterway system is the 9-mile Estuario do Rio Espirito Santo, which has a perennial safe draft of 37 feet for 4 miles and 16.5 feet for its remaining extent. Three tributaries—the Rio Matola, Rio Umbeluzi, and Rio Tembe—afford navigable routes to the interior. Two other streams are connected with the Estuario do Rio Espirito Santo by the Baia de Lourenco Marques. The Rio Incomati has a safe draft of 7 feet at high water (November through April) and a perennial safe draft of 3.5 feet for 83 miles. The Rio Maputo has a perennial safe draft of 8 feet for 22 miles.

Lake Nyasa, which borders Mozambique for 150 miles, is perennially navigable by deep-draft vessels and is used by lake steamers, tugs, and barges.

Navigation on waterways is restricted by shallow bars across the mouths of streams, by silt in estuarine ports, and by rapids in the upper reaches of the rivers. Navigability is reduced during the dry season (May through October) by diminished depths, and occasional strong gales hinder navigation on Lake Nyasa and on exposed estuaries.

Bridges across the waterways normally permit uninterrupted passage of craft, but vertical clearance is sometimes inadequate during the flood season (November through April). An irrigation dam on the Limpopo River terminates through navigation at mile 142, but other dams are beyond the upstream limits of navigation.

Although primarily seaports, Lourenco Marques and Beira are adequately equipped to meet waterway transport requirements for alongside berthing, cargo handling, storage, and vessel repair. Quelimane, the principal outlet for agricultural produce from the Zambezi valley, has a 394-foot berth for deep-draft vessels alongside a reinforced-concrete pier and comparable space for small craft alongside an inner pier. Additionally, it has 70,000 cubic feet of covered storage and limited facilities for the repair of small craft. Chinde, an important coastal port on the Zambezi delta, is equipped to handle lighters and waterway craft. Other waterway ports consist largely of stabilized banks for cargo loading and discharge.

Government control of waterway transport is generally limited to licensing, which is controlled by the Maritime Department of the Harbors, Railway, and Transport Services Administration in Lourenco Marques. The majority of inland waterway craft are old and in need of repair. Included in the waterway fleet inventory are 10 steamers, 25 tugs, 24 barges, and 429 miscellaneous craft with a total cargo capacity of 15,800 tons.

Waterway maintenance consists principally of dredging and widening estuarine channels to provide port access for deep-draft vessels. This maintenance is under the Maritime Department, but private companies deepen other river channels.

Two major projects are planned that would significantly affect waterway transport. One calls for development of a new port, Cuama, near the mouth of the Zambezi distributary, Rio Cuama, and for digging a 5-mile canal to permit access by vessels up to 40,000 tons. The other project calls for the construction of the Cabora Bassa dam on the Zambezi River. Although primarily for hydroelectric development, the project will improve navigational conditions on the Zambezi for small and medium-size craft. Plans call for the eventual utilization of 1,000-ton coal and iron barges on the river from the Zambian border to rail links with Indian Ocean ports.

E. Ports (C)

The coastline of Mozambique is about 1,535 miles in length, indented by numerous estuaries and a few spacious bays which provide harbors for oceangoing vessels. The major ports are Lourenco Marques (Figure 5), Beira (Figure 6), and Nacala (Figure 7). The only minor ports of consequence are Porto Amelia and Inhambane. Several other minor ports have

limited facilities and are restricted by shallow coastal waters and coral reefs; they are used as coastal links for domestic trade.

Lourenco Marques, one of the most active ports in southern Africa, is the principal maritime outlet and distribution center for Rhodesia, Swaziland, South Africa, and Botswana. The port, situated on a naturally protected bay, has anchorage and berthing facilities for numerous large oceangoing vessels. Lourenco Marques is divided into two distinct sections, the commercial port at Cais Gorjas and Entrepoto da Matola, a mineral and petroleum facility located 4 miles west of the commercial port. About 1,250 feet of wharfage for container ships and a granary with a capacity of 50,000 tons are under construction at Cais Gorjas. In 1972 the port handled about 14 million tons of cargo.

Beira, the second largest port and the distribution center for central Mozambique, is a natural gateway to and from Rhodesia, Zambia, and Malawi. The port is restricted somewhat by shallow coastal waters, sandbanks, and a bar in the river's mouth. Long-range plans include construction of additional quays and covered storage buildings. In 1972 the port handled about 3 million tons of cargo.

Nacala has one of the finest natural harbors on the east coast of Africa, providing extensive anchorage and excellent shelter. It is situated in Porto de Nacala bay between Ilha de Mocambique and Porto Amelia. The port serves northern Mozambique and is the terminus of the Mocambique which extends into Malawi. To handle the increased volume of traffic generated in the last few years, an additional 1,900 feet of wharfage is under construction and is scheduled to be completed in late 1973. Possibilities for future expansion of the port are virtually unlimited. In 1972 the total amount of cargo handled was over 700,000 tons.

A 4-year (1972-75) program for extensive port development calls for the construction of an ocean terminal for supertankers at Ponta Dohela; construction of an ocean terminal for ore ships at Nacala; and the acquisition of additional tugs, dredges, and launches.

The ports are state owned and are controlled by the Harbors, Railway, and Transport Services Administration. Facilities are adequate to meet normal requirements of the state. Lourenco Marques, Beira, and Nacala are adaptable to military use.

Characteristics of the major ports are given in Figure 8.

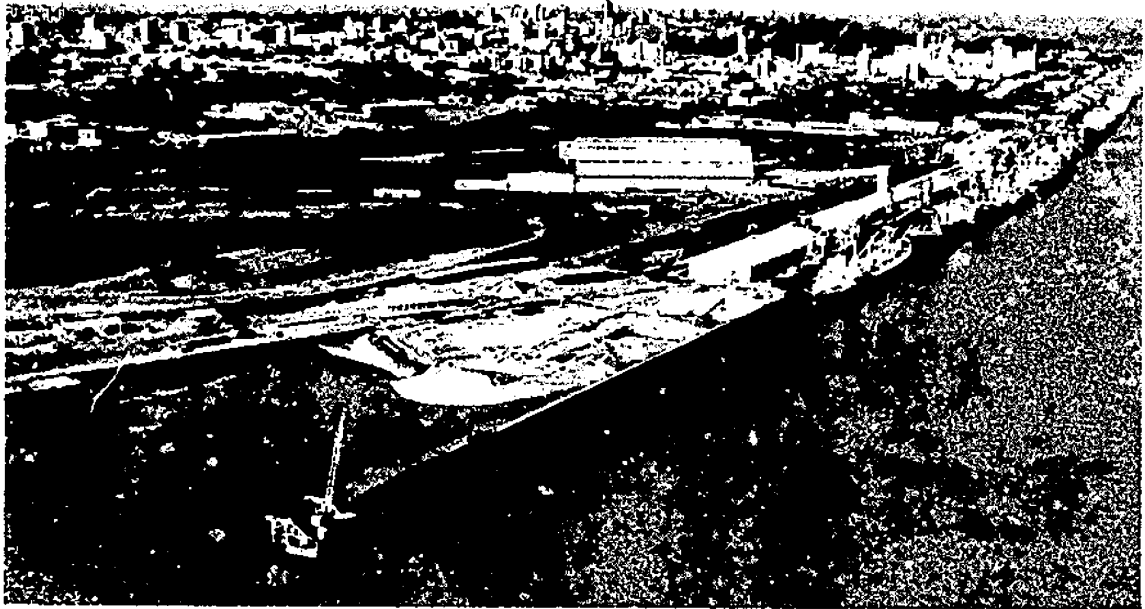


FIGURE 5. Port of Lourenco Marques (U/OU)



FIGURE 6. Port of Beira (U/OU)

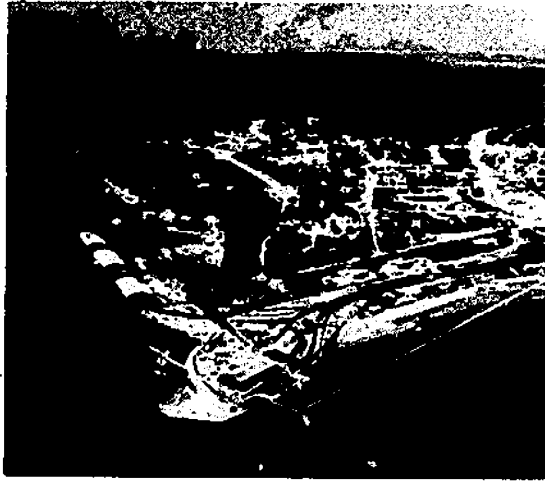


FIGURE 7. Port of Nacala. White line shows where new wharves are to be built. (U/OU)

F. Civil air (C)

Domestic air transport is important in complementing surface carriers and in providing access to remote areas. International air transport by the state-owned airline, *Direccao de Exploracao dos Transportes Aereos* (DETA), provides international links with neighboring countries as well as domestic services. The government plays a major role in the development of civil aviation through encouragement of private flying activities in the country and through airport construction programs.

DETA, the scheduled airline, was formed in 1936 as a division of the Mozambique Harbors, Railway, and Transport Services Administration. It flies 6,650 unduplicated route miles to 4 countries in Africa and to 17 domestic points. Some international flights are flown in cooperation with Air Malawi, Air Rhodesia, and South African Airways (SAA).

Air taxi service is especially important in Mozambique because of the geography and distribution pattern of populated areas. With the capital city of Lourenco Marques located in the extreme southern part of the country and other populated areas separated by undeveloped terrain with sparse surface transport networks, air taxi service supplements the regular flights of DET A. These carriers, which are primarily single-engine aircraft operators, are *Servico Aero de Mocambique, Lda.* (SAM), which operates in the southern part of the province; *Sociedade Exploradora de Trabalhos Aereos, Lda.* (SETA), *Transportes Aereos de Mocambique,*

Lda. (TAM), *Transportes Aereos za Zambesia, Lda.* (TAZ), which operate in the central region; and *Empresa de Transportes Aereos de Porto Anselia, Lda.* (ETAPA), which operates in Cabo Delgado District. In addition to regular schedules, the air taxi companies provide special charter service. Some have very lucrative contracts with the Portuguese Air Force (PAF) to carry mail and supplies to the smaller military outposts.

There is very little business flying by private commercial concerns, but airwork services are provided by some aeroclubs, foreign firms, and government survey missions. Nearly all pleasure flying is accomplished through aeroclubs which have played an extremely important role in the development of civil aviation and are largely responsible for the considerable interest in private flying.

Mozambique has about 200 registered civil aircraft of which 12 have individual gross weights of at least 20,000 pounds. DET A owns six of these major transport aircraft, three Boeing 737-200/200C's and three Fokker F-27-200/600's. SETA owns two Fokker F-27's and three Douglas DC-3's, and a Portuguese Government survey service operates a Douglas DC-3. These airlines an estimated 15 miscellaneous air taxi and airwork operators, and 13 aeroclubs use the remaining light aircraft.

About 1,800 persons are engaged in civil aviation activities in Mozambique. DET A has 1,500 employees, including 47 pilots, 12 other flight crews, 535 maintenance and overhaul, and 180 traffic and sales personnel. Approximately 100 additional pilots are licensed to fly general aviation aircraft.

Instructional flying is performed by the aeroclubs which offer inexpensive instruction up to commercial pilot level. A July 1961 decree provided that money grants and aviation equipment may be given to certain specified schools of aviation and similar institutions in the overseas provinces to stimulate and encourage increased interest in flying. Although DET A provides some instructional flight training in light aircraft, members of its staff currently receive their technical training in other countries.

Mozambique's first official civil aviation school is scheduled to open soon. DET A is to provide a Boeing 737 flight simulator, and the school will eventually instruct Portuguese Airlines (TAP) and DET A pilots who presently train in the United States. In addition, instruction will be provided to flight mechanics, radio operators, navigators, and flight instructors. It is expected that courses in meteorology, telecommunications, radio, radar, and, eventually, mechanical, hydraulic, and electronic engineering will be added.

FIGURE 8. Major ports (C)

NAME; LOCATION; AND ESTIMATED MILITARY PORT CAPACITY*	ACTIVITIES	HARBOR	BERTHS
Beira..... 19°50'S., 32°50'E.; on Indian Ocean about midway along Mozambique coast. 8,200 long tons	Second largest port in Mozambique. Serves central Mozambique, Rhodesia, Zambia, and Malawi. Receipts are general cargo, petroleum products, timber, and cement. Shipments are minerals and ores, tobacco, and general cargo. Limited repairs to ocean-type vessels; largest drydock has floor length of 377 feet.	Natural river harbor extending about 3 miles upstream from its S. limit. Well protected except from strong southerly winds. General depths 9 to 60 feet.	Alongside—For 10 large ocean-type cargo vessels and 2 small coaster-type vessels; 1 large ocean-type cargo vessel at Mineral and Oil Wharf. Free-swinging mooring—For several small ocean-type cargo vessels. Anchorage—For numerous coaster-type cargo vessels at harbor entrance and in roadstead.
Lourenco Marques..... 25°59'S., 32°34'E.; on Indian Ocean. 12,200 long tons	Largest port and principal maritime outlet for Mozambique, Swaziland, Rhodesia, and the Transvaal. Receipts are general cargo, petroleum, and timber. Shipments are minerals and ores, coal, general cargo, and petroleum products. Extensive heavy machinery repair facilities in area. Floating repairs available for ocean-type vessels; largest drydocking facility has a floor length of 262 feet.	Well-protected natural harbor composed of two sections: Baía de Lourenco Marques, the outer harbor and Estuario do Rio Espirito Santo, the inner harbor; water area about 8 sq. miles. General depths 22 to 72 feet; maintained by dredging.	Alongside—15 large ocean-type cargo vessels, 2 small coaster-type cargo vessels and one standard ocean-type tanker. Anchorage—Unlimited exposed anchorage for numerous vessels of all classes off port.
Nacala..... 14°33'S., 40°40'E.; 280 miles S. of Tanganyikan border. 1,600 long tons	Most important commercial and industrial port, serving northern part of country. Receipts are building materials, agricultural machinery, and general cargo. Shipments are cotton, tea, tobacco, timber, and hides. Minor repair facilities available.	Well-protected natural harbor, situated on the Bay of Nacala; entrance 1/2 mile from open sea, 5 miles wide, unlimited depths; water area about 2 sq. miles; general depths 23 to 49 feet; depths leading to berths exceed depths in berths.	Alongside—2 large and 1 small ocean-type cargo vessels. Anchorage—For large numbers of all classes 1 mile N. of harbor; excellent protection.

*The estimated military port capacity is the maximum amount of general cargo—expressed in long tons—that can be unloaded onto the wharves and cleared from the aprons during a period of one 24-hour day (20 effective cargo-working hours). The estimate is based on the static cargo-transfer facilities of the port existing at the time the estimate is prepared and is designed for comparison rather than for operational purposes; it cannot be projected beyond a single day by straight multiplication.

DETA is capable of performing all but the most technical maintenance work at its installation in Lourenco Marques; however, the nearby South African Airways (SAA) facilities at Johannesburg are used for the major overhaul of DETA's Boeing 737 airframes and engines. DETA and PAF, through a cooperative agreement, have integrated PAF personnel and equipment in the DETA shops, thus avoiding costly duplication of facilities. *Servicos Technicos de Aviacao* (STA), a private maintenance company founded at Beira in 1957, has one of the largest general aviation workshops in the Portuguese overseas territories. STA offers airframe and engine overhaul servicing of light aircraft; its customers include air charter companies, flying clubs, private

owners, and, occasionally, foreign operators. TAZ has a well-equipped and well-staffed maintenance facility at Quelimane, where STA has a second workshop for minor repairs and daily inspections. Both DETA and *Sociedade Technica de Aviacao de Norte, Lda.*, which specializes in aircraft repairs for air taxi companies, have small maintenance shops at Namputula. The government-owned *Missao de Fomento e Pavamento do Zambeze* has a minor facility at Tete, where it repairs its own and some aeroclub aircraft.

The Portuguese Ministry of Overseas exercises control over all matters relating to civil aviation in Mozambique through the Governor General and a subordinate, the Director of Civil Aviation Service at Lourenco Marques. Civil aviation laws and

regulations are similar to those in effect in Portugal, and all aspects of civil air policy and development are coordinated with the Portuguese Government.

Portugal is a member of the International Civil Aviation Organization, and DETA is a member of the International Air Transport Association. The government has civil aviation agreements or provisional arrangements with five neighboring countries. Four foreign airlines and the Portuguese carrier, TAP, operate scheduled services to Mozambique.

G. Airfields² (C)

The air facilities system of Mozambique consists of 303 usable airfields, of which 229 are civil, 8 are military, 6 are joint military/civil, 33 are army military support, and 29 are privately operated. In addition, there are 41 sites and 5 seaplane stations. Two major airfields are on the southern coast. The major military airfields are adjacent to railroads and on a line from Nacala to Tete. Advanced recovery bases are scattered throughout northern and western Mozambique. All Portuguese settlements are situated near civil or private airfields.

The country's air facilities system consists of several airfields of significance. Beira airfield has a C-135 capacity on one runway. The military ramp, hangar facility, and barracks compound at Beira, is the largest complex of its kind in Mozambique. At Lourenco Marques airfield, the Portuguese Air Force has a separate military ramp and hangar facility. One runway has a C-135 capacity. Most of the civil aircraft maintenance is accomplished at this facility. Nampula airfield is the base for all military air support and is the evacuation point for the northern combat operations area. The shop facilities have a base maintenance function for the operational military aircraft assigned to the combat area.

In addition to Beira, Lourenco Marques, and Nampula, there are 15 airfields with hard-surfaced runways, of which 12 are able to support C-54- to C-130-type aircraft. The remaining airfields have a capacity for C-47 or utility-type aircraft. The five seaplane stations are for emergency use. Some of the airfield sites could be made usable with a minimum amount of rehabilitation.

The general condition of the major airfields is good, with adequate maintenance being performed to

²For detailed information on individual air facilities in Mozambique, consult Volume 22, *Airfields and Seaplane Stations of the World*, published by the Defense Mapping Agency, Aerospace Center for the Defense Intelligence Agency.

sustain operational capability. However, airfield maintenance support and service facilities are negligible at most of the minor airfields. New airfield construction has been limited to private fields with a capacity to accommodate utility-type aircraft. Lourenco Marques and Beira Airfield runways and aprons are being extended and reinforced to accommodate Boeing 747 aircraft. Construction is scheduled to be completed in mid-1973.

Details of the more significant airfields are given in Figure 9.

H. Telecommunications (C)

The telecommunication (telecom) system of Mozambique is above the African average and is growing. The widespread system is based on low-capacity open-wire lines and radiocommunication stations. The principal telecom center is Lourenco Marques; secondary centers are Beira, Nampula, and Quelimane. Telecom facilities are vitally important for further development of the territory and contact with the largely illiterate population. The quality of telephone and telegraph services is fairly good, but circuit capacities and numbers of telephones are insufficient. Telecom development is comparable to Madagascar, Tanzania, and Angola but inferior to Rhodesia, South Africa, and Zambia.

Public telecom facilities are administered by the Posts, Telegraph, and Telephone Service of Mozambique. Radiobroadcast stations are owned by tax-free, nonprofit radio clubs licensed by the government. A few small private telecom companies offer commercial services to businesses.

The domestic long-distance network originally consisted of extensive lengths of open-wire lines mounted on steel-concrete poles. Carrier equipment was installed only on trunk routes. Numerous small radiocommunication stations supplement this network. Tropospheric scatter (from Lourenco Marques to Beira via Malvernia) and radio relay (from Quelimane to Beira, Nampula, and Tete) are being installed to fill gaps and augment capacities. Since 1967, telephone lines have been increased from 19,600 to 28,000 by automatic exchanges in major towns; 86% of the exchanges are automatic. Smaller towns still have manual exchanges.

The principal international telecom facilities are radiocommunication stations at Beira, Inhambane, Lourenco Marques, Nampula, and Quelimane which provide worldwide connections via Lisbon, Portugal. In addition to landlines to Rhodesia, South Africa, and Swaziland (Figure 10), other minor landlines

FIGURE 9. Selected airfields (C)

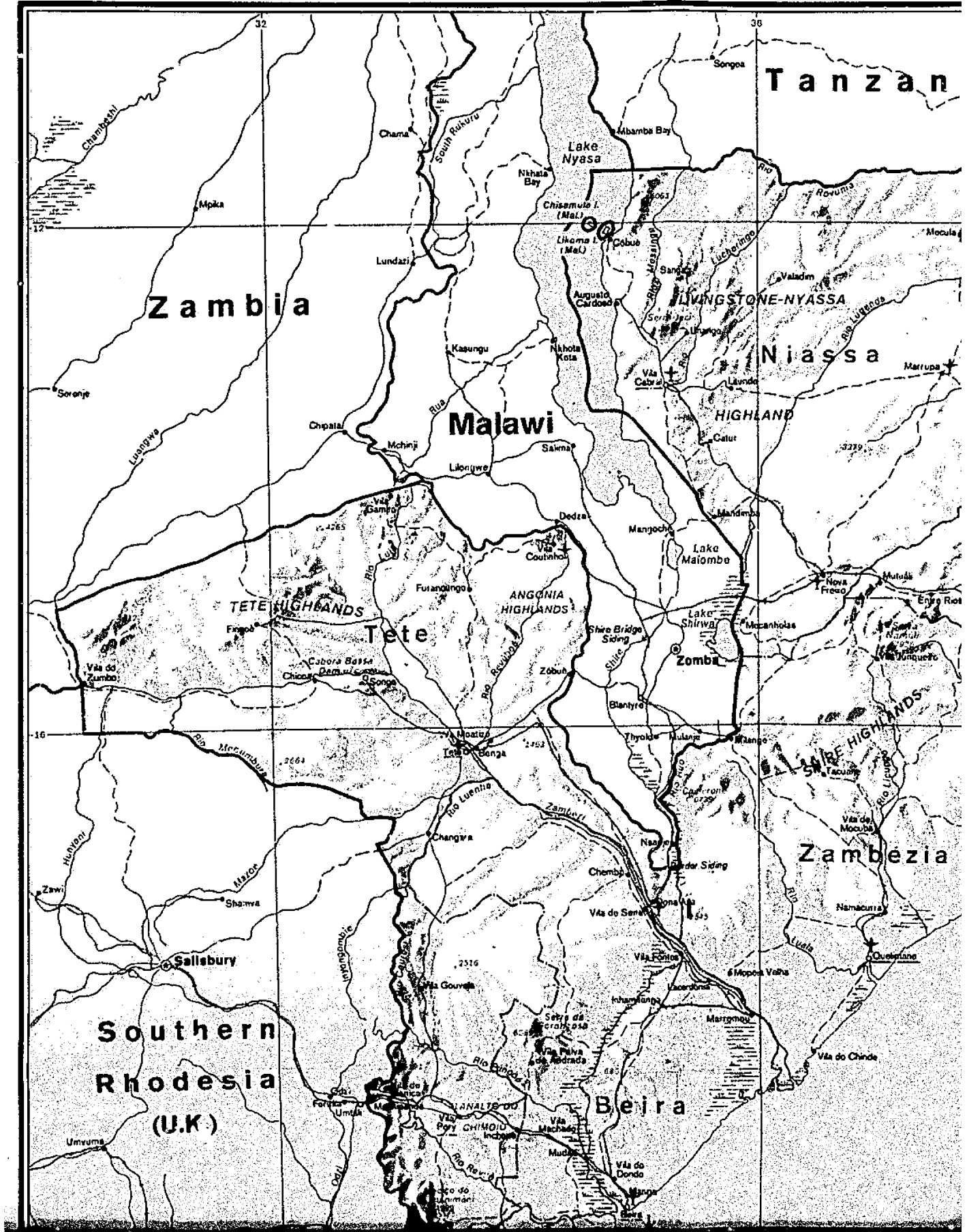
NAME AND LOCATION	LONGEST RUNWAY: SURFACE; DIMENSIONS; ELEVATION ABOVE SEA LEVEL	FSWL*	LARGEST AIRCRAFT NORMALLY SUPPORTED	REMARKS
	<i>Feet</i>		<i>Pounds</i>	
Beira..... 16°48'S., 34°54'E.	Asphalt..... 7,874 x 148 33	56,607	C-135.....	Joint, International airfield, Portuguese Air Force (PAF) Airdrome Base 10. Aviation and jet fuel available in underground tanks.
Lourenco Marques..... 25°55'S., 32°34'E.	Asphalt..... 8,858 x 148 131	56,607	C-135.....	Joint, International airfield, Portuguese Air Force (PAF) Airdrome Base 8 and the Third Air Region Headquarters. Aviation and jet fuel available in underground tanks.
Lumbo..... 15°02'S., 40°40'E.	Asphalt..... 4,021 x 98 33	28,160	Fokker F-27.....	Civil. Aviation fuel available in underground tanks.
Marrupa..... 13°14'S., 37°33'E.	Asphalt..... 5,413 x 98 2,480	28,160	C-54.....	Military, Portuguese Air Force (PAF) Maneuver Airdrome 02. Aviation and jet fuel available in aboveground tanks.
Mocimboa da Praia..... 11°21'S., 40°21'E.	Asphalt..... 6,502 x 148 80	35,500	F-27.....	Civil. Aviation fuel available in aboveground storage.
Mueda..... 11°40'S., 39°34'E.	Asphalt..... 7,350 x 90 2,762	33,000	C-118.....	Military, Portuguese Air Force (PAF) Maneuver Airdrome 51. Aviation and jet fuel available in aboveground storage.
Mutarara..... 17°22'S., 35°02'E.	Asphalt..... 5,249 x 98 159	28,160	C-54.....	<i>Do.</i>
Nacala..... 14°29'S., 40°43'E.	Asphalt..... 8,202 x 148 380	52,600	C-118.....	Joint, Civil and Portuguese Air Force (PAF) Airdrome Base 5. Aviation and jet fuel available in underground tanks.
Nampula..... 15°06'S., 39°17'E.	Asphalt..... 6,502 x 148 1,444	33,000	C-118.....	Joint, Civil and Portuguese Air Force (PAF) Maneuver Airdrome 52. Aviation and jet fuel available in aboveground tanks.
Nova Freixo..... 14°49'S., 36°32'E.	Asphalt..... 8,202 x 110 1,987	35,500	C-130.....	Joint, Civil and Portuguese Air Force (PAF) Airdrome Base 6. Aviation and jet fuel available in aboveground tanks.
Porto Amelia..... 12°59'S., 40°31'E.	Asphalt..... 5,905 x 148 331	33,000	F-27.....	Civil. Aviation fuel available in underground tanks.
Queimaco No. 2..... 17°51'S., 30°52'E.	Asphalt..... 5,905 x 148 38	33,000	Boeing 737.....	Civil. Aviation fuel available in aboveground storage.
Vila Cabral..... 13°17'S., 35°15'E.	Asphalt..... 6,501 x 148 4,491	25,600	C-123.....	Joint, Civil and Portuguese Air Force (PAF) Maneuver Airdrome 01. Aviation and jet fuel available in aboveground storage.
Vila Coutinho..... 14°43'S., 34°22'E.	Asphalt..... 5,905 x 98 4,276	17,034	F-27.....	Civil. Aviation fuel unavailable.
Tete/Moatize..... 16°06'S., 33°38'E.	Asphalt..... 8,202 x 148 500	45,500	C-133.....	Military, Portuguese Air Force (PAF) Airdrome Base 7. Aviation and jet fuel available in aboveground storage.

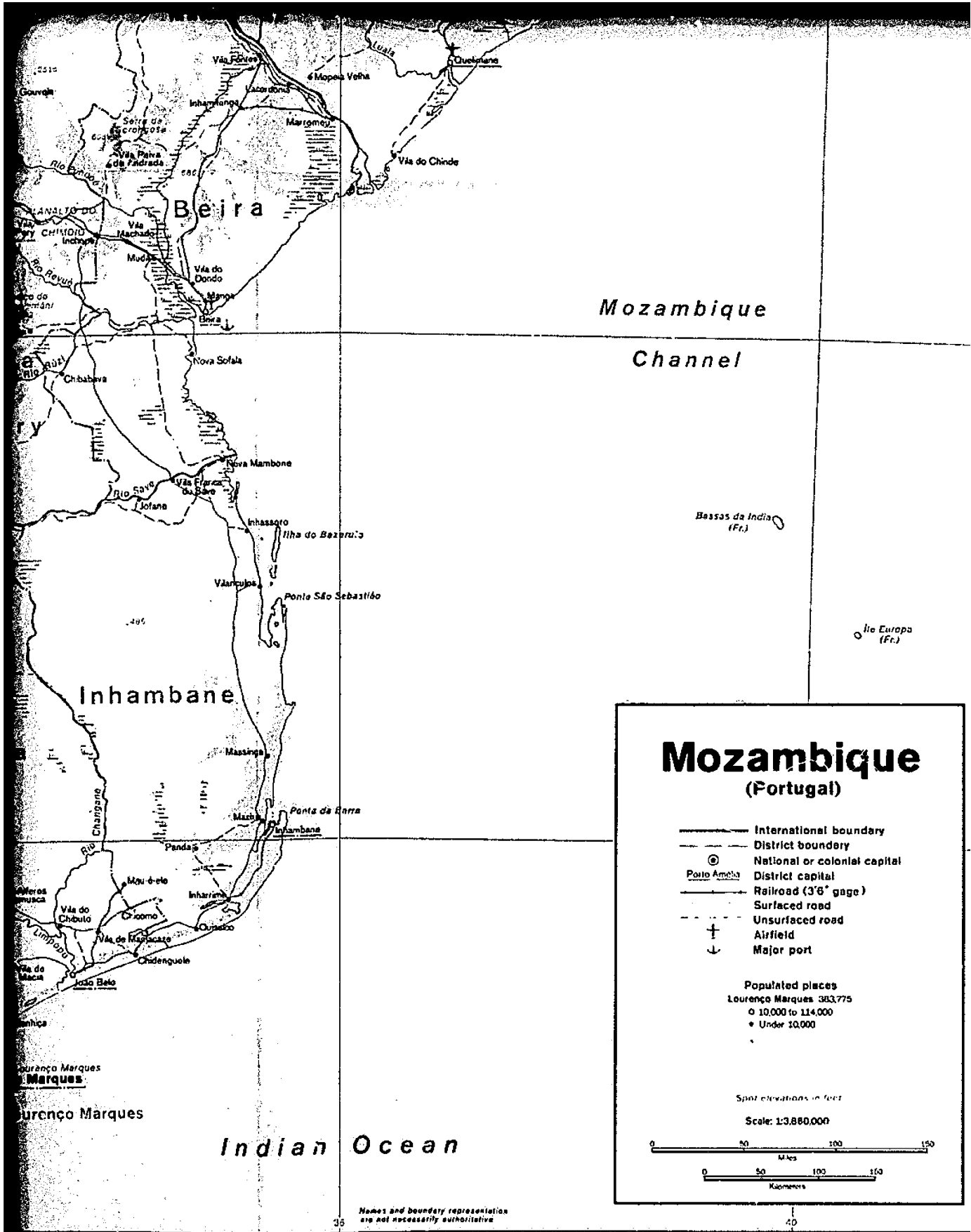
*Equivalent Single-Wheel Loading: Capacity of an airfield runway to sustain the weight of any multiple wheel landing-gear aircraft in terms of the single-wheel equivalent.

Angoche, Ilha (island)	18 20	39 61	Miwana, Tanzania	10 16	40 11
Arusha, Tanzania	3 22	36 41	Mucanha, Rio (strm)	15 39	31 35
Augusto Cardoso	12 43	34 49	Mucelo, Rio (strm)	17 38	37 02
Bagamoyo, Tanzania	6 26	38 54	Muda	10 23	34 25
Bandula	19 01	33 09	Mueda	11 39	30 33
Beira	18 04	33 13	Mziungu, Tanzania	6 53	37 37
Binga, Monte (mt)	11 52	35 02	Nacala	14 33	40 40
Bianlyre, Malawi	15 48	35 02	Nacala, Porto de (bay)	14 31	40 39
Boane	26 02	32 19	Nacala-Velha	14 33	40 30
Bona Sinais, Rio dos	18 03	36 50	Nachingwea, Tanzania	10 23	38 46
Border Siding, Malawi (rr siding)	17 09	35 12	Namaacha	25 58	32 01
Búsi, Rio (strm)	19 52	34 46	Namapa	13 43	39 50
Cabora Bassa (gorge)	15 34	32 50	Namialo	14 55	39 59
Calá (rr sta)	17 50	35 20	Nampula	15 07	39 15
Cambine (mission)	23 36	35 15	Namuiranga	10 32	40 23
Capochi (strm)	15 23	32 53	Nayuci, Malawi	14 58	35 52
Catembo	28 00	32 33	Nova Freixo	14 40	36 33
Catur	13 45	35 37	Nova Sofala	20 10	34 44
Changara	16 50	33 16	Nyassa, Lake (lake)	12 00	34 30
Chicoa	15 36	32 21	Odsi, Southern Rhodesia	18 58	32 23
Chicomo	24 59	33 06	Odsi, Southern Rhodesia (strm)	19 47	32 24
Chinde, Rio (strm)	18 33	36 28	Ponta Dohela (point)	26 31	32 54
Chirua, Lago (lake)	16 12	35 50	Porto Amélia	12 57	40 30
Chiuta, Lago (lake)	14 55	35 50	Pongot, Rio (strm)	19 50	34 48
Chiveve, Rio (strm)	19 50	34 50	Quelimane	17 51	36 52
Cochemane	16 57	32 51	Ressano Garcia	25 27	32 00
Dona Ana	17 25	35 04	Revuê	19 25	33 22
Espírito Santo, Estuário do (estuary)	25 59	32 37	Ricatia, Lagoa (lake)	25 46	32 37
Feruka, Southern Rhodesia (rr siding)	18 58	32 33	Rovuma, Rio (strm)	19 29	40 28
Fingoe	15 10	31 53	Salamanga	26 20	32 39
Furancungo	14 54	33 37	Salisbury, Southern Rhodesia	17 50	31 03
Gaza	18 34	34 40	Save, Rio (strm)	21 00	35 02
Goha	26 12	32 08	Sena	17 28	35 02
Gôndola	19 05	33 39	Shire Bridge Siding, Malawi (rr sta)	15 18	35 04
Gorongosa, Parque Nacional da (park)	18 45	34 20	Songea, Tanzania	10 41	35 39
Inchape	19 12	33 66	Sunato	13 06	39 59
Incomati, Rio (strm)	25 46	32 43	Tembe, Rio (strm)	26 00	32 29
Inhambane	23 52	35 23	Tete	16 10	33 36
Inhamitanga	18 13	35 11	Umbelúzi, Rio (strm)	26 01	32 28
Inharrime	24 26	35 01	Umpala	26 03	32 19
João Belo	25 04	33 39	Umtali, Southern Rhodesia	18 58	32 40
Kaapmuiden, South Africa	25 32	31 19	Vila Cabral	13 18	35 14
Kongwa, Tanzania	6 12	36 25	Vila Caldas Xavier	14 24	33 01
Lebombo Mountains (hills)	26 15	32 00	Vila de António Enes	16 12	39 54
Licuaré, Rio (strm)	17 54	36 49	Vila de Mocimboa da Praia	11 20	40 21
Limpopo River (strm)	25 12	33 32	Vila de Mocuba	16 51	36 56
Lindi, Tanzania	10 00	39 43	Vila de Sena	17 26	35 02
Lourenço Marques	25 58	32 34	Vila do Chinde	18 34	56 27
Lugenda, Rio (strm)	15 26	38 33	Vila do Dondo	19 36	34 44
Lumbo	15 00	40 44	Vila Fontes	17 49	35 23
Lúrio, Rio (strm)	13 31	40 32	Vila Franca do Save	21 09	34 33
Machipanda (rr sta)	19 00	32 41	Vila Gouveia	18 03	33 11
Macomia	12 15	40 08	Vila Lufsa	25 44	32 41
Macondes, Planalto dos (plateau)	11 30	39 00	Vila Moatize	16 10	33 46
Macossa	17 54	33 56	Vila Paiva de Andrada	18 41	34 04
Macuse, Rio (strm)	17 45	37 13	Vila Pery	19 08	33 29
Malvernia	22 05	31 40	Xinavane	25 02	32 47
Manga	19 47	34 53	Zambesi River (strm)	18 50	36 17
Manjacaze	24 43	33 50	Zóbuê	15 36	34 26
Maotas	25 53	32 37			
Mapai	22 51	31 58			
Maputu, Rio (strm)	26 11	32 42			
Marromcu	18 17	35 50			
Matola, Rio (strm)	25 59	32 27			
Matola-Rio	25 49	32 27			
Mau-6-ê	24 21	34 06			
Mbeya, Tanzania	8 54	33 27			
Mifango	16 05	35 47			
Moamba	25 36	32 15			
Mocimboque	15 32	39 51			
Mocimboque, Ilha de	15 03	40 45			
Mocimboa da Praia, Baía (bay)	11 20	40 25			
Molécúê, Rio (strm)	17 03	38 52			
Monapo	14 55	40 18			
Montepuez	13 07	39 00			
Mopela Velha	17 59	35 43			
Morogoro, Tanzania	6 49	37 40			
Mushi, Tanzania	3 21	37 20			

Selected Airfields

Beira	19 48	34 54
Lourenço Marques	25 56	32 34
Lumbo	15 02	40 40
Marrupa	13 14	37 33
Mocimbo da Praia	11 21	40 21
Mueda	11 40	39 34
Mutarara	17 22	35 02
Nacala	14 20	40 43
Nampula	15 06	39 17
Nova Freixo	14 49	36 32
Porto Amélia	12 50	40 31
Quelimane No. 2	17 51	36 52
Vila Cabral	13 17	35 15
Vila Coutinho	14 43	34 22
Tete/Moatize	16 06	33 38





Only

Terrain and Transportation Figure