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# Nigeria

February 1973

NATIONAL INTELLIGENCE SURVEY

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Transportation and  
Telecommunications

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*This chapter was prepared by the Defense Intelligence Agency and includes contributions on the merchant marine from the Department of the Navy and on airfields from the Department of the Air Force. Research was substantially completed by November 1972.*



# NIGERIA

## CONTENTS

*This General Survey supersedes the one dated December 1969, copies of which should be destroyed.*

A. Summary .....	1
1. Systems .....	1
Adequacy of transportation and telecommunications systems; development projects and administrative agencies.	
2. Strategic mobility .....	1
Capability of systems for supporting military operations.	
B. Railroads .....	2
Nigerian Railroad Corporation; data on rail system; classification yards; bridges; communications; equipment inventory; fuel and water; maintenance and improvements; traffic statistics; tabulation of selected lines.	

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	<i>Page</i>
<b>C. Highways</b> .....	3
Mileage figures and principal characteristics of the road networks; bridges; construction and maintenance; development plans; traffic problems; vehicle inventory; data on selected highways.	
<b>D. Inland waterways</b> .....	6
Limited role of river transport; effect of civil war; future plans to improve Niger and Benue; freight hauled; terminal facilities; craft, data on selected waterways.	
<b>E. Pipelines</b> .....	9
Located mostly in eastern Niger Delta; mileages and characteristics of the system.	
<b>F. Ports</b> .....	11
Two major ports, Lagos and Port Harcourt; 10 minor ports.	
<b>G. Merchant marine</b> .....	11
Specifications of the fleet; ownership; service; personnel training.	
<b>H. Civil air</b> .....	14
Nigeria Airways, Ltd., provides domestic and international service; four charter airlines; aircraft inventory; administration; maintenance; personnel.	
<b>I. Airfields</b> .....	15
Air facilities and maintenance; details on selected fields.	
<b>J. Telecommunications</b> .....	15
Administration; domestic radio-relay links; international service; special-purpose facilities; radiobroadcast and TV facilities; equipment imported.	

**FIGURES**

	<i>Page</i>
Fig. 1 Railroad line characteristics ( <i>table</i> ) .....	4
Fig. 2 Concrete deck bridge ( <i>photo</i> ) .....	5
Fig. 3 Combination highway/rail bridge ( <i>photo</i> ) .....	5
Fig. 4 Ferry crossing Niger River ( <i>photo</i> ) .....	6
Fig. 5 Selected highways ( <i>table</i> ) .....	7
Fig. 6 Physical characteristics of waterways ( <i>table</i> ) .....	9
Fig. 7 Selected pipeline systems ( <i>table</i> ) .....	10
Fig. 8 Port facilities, Lagos ( <i>photo</i> ) .....	12
Fig. 9 Major ports ( <i>table</i> ) .....	13
Fig. 10 Selected airfields ( <i>table</i> ) .....	16
Fig. 11 General telecommunications pattern ( <i>map</i> ) .....	17
Fig. 12 Terrain and transportation ( <i>map</i> ) .....	18

# Transportation and Telecommunications

## A. Summary (C)

### 1. Systems

Despite many improvements over the past 10 years, the transportation and telecommunications (telecom) facilities of Nigeria are hard put to satisfy normal demands. The civil war adversely affected the condition of most of the communications facilities, especially highways, and caused the postponement of several planned development projects. The chief transportation features are two rail lines and two highway systems which originate at the principal ports of Lagos and Port Harcourt and extend north (Figure 12). The highways converge in a regional network centering on Kano in the north-central part of the country; the main rail routes and their branch lines connect the leading agricultural, mineral, and population centers of the interior with the two principal ports. The Niger, Benue, and Cross rivers and coastal waterways are also significant, especially as means for moving bulk cargoes. Most of Nigeria's 620 miles of pipelines are located in the eastern part of the Niger Delta and include a 140-mile-long crude-oil line from the Ughelli and Kokori oilfields in the western delta to an ocean terminal at Bonny.

Merchant shipping provides the major transportation link with foreign markets and suppliers. The Nigerian merchant fleet has only 13 ships of 1,000 gross register tons or over, and seaborne cargoes are carried principally by foreign-flag ships. Air transport has become increasingly important; the government-owned Nigeria Airways provides both domestic and international service. International airfields which handle large jet transports are located at Lagos and Kano.

Nigeria's telecom system consists of a combination of several types of facilities widely distributed over the country. The principal center is Lagos, and secondary centers are Ibadan and Kaduna. Networks are densest in the south.

A major effort to improve the transportation and telecom systems is taking place under the Second National Development Plan (1970-74). Among the projects underway or about to begin are the construction of an expressway between Lagos and Ibadan and of highway bridges at Jebba and Makurdi; the drawing up of plans for the Trans-African Highway extending from Nairobi, Kenya, to Lagos; complete dieselization of the railroads; significant improvements to inland waterway navigability, made possible by the completion of the Kainji Dam project; construction of an additional 140 miles of crude-oil pipelines; and continued modernization of telecommunications facilities.

Administration of transportation is accomplished by several subordinate agencies of the Commissioner for Transport; the Commissioner for Communications is responsible for telecommunications.

### 2. Strategic Mobility (C)

Transportation and telecommunications in Nigeria are inadequate to support large-scale sustained military operations. Both communications systems were employed extensively for military movement and resupply during the civil strife, however, and would provide substantial support in future emergencies. Rail lines clear the major ports of Lagos and Port Harcourt and would be of considerable assistance again in these areas. However, vast areas of the country have no railroads. The highway system would also provide substantial logistic support especially in the southern part of the country. East-west roads provide border to border movement in the north, and highways link Nigeria with Dahomey, Niger, and Cameroon. However, operations would be limited by the large numbers of low-capacity narrow roads and bridges and small ferries. Prolonged or extensive use would require bridging equipment and major repair and maintenance work on the roads. Seasonal factors such as lengthy rainy periods adversely affect highway

conditions particularly in the interior. During the dry season dust restricts vehicle speeds and damages equipment.

The inland waterway system would be useful in the movement of bulk cargos, but the Niger Delta cannot be entered by oceangoing ships. All maritime ports are adaptable to military use. The merchant fleet constitutes a considerable military support potential. With an estimated cargo capacity of 122,340 deadweight tons, the 13-unit fleet has a short-haul (48 hours steaming) troop-lift capability for nearseas operations. The self-loading and unloading capability of the units is enhanced by the fact that five ships have booms of 40 tons or more lift capacity. Twelve ships, which are employed primarily in international trade, are government owned and operated and thus, if accessible at the time of emergency, would be assured for military support.

The 77 usable airfields are evenly distributed throughout the country, near cities and villages along the rail lines and highways. Kano and Lagos airfields can handle large jet transports; 10 other fields also have paved runways and are capable of supporting smaller transports and liaison craft. Most of the 100 civil aircraft, including 13 major transports, would be readily available to the government in the event of hostilities, but the limited availability of indigenous flight personnel could restrict their use.

Nigerian telecommunications services would provide telephone, telegraph, telex, and radio and TV support to military operations. The telecom system, however, lacks alternate facilities and, because of the great distances covered by unguarded wire lines, is highly vulnerable to sabotage. In many sections of the country unfavorable terrain—including mangrove swamps, impenetrable rain forests, and mountainous areas—renders defense of telecom facilities and emergency construction and maintenance measures extremely difficult.

## B. Railroads (C)

The Nigerian railroads are government owned and are operated by the semiautonomous statutory corporation, the Nigerian Railway Corporation (NRC), which reports to the Commissioner for Transport. The rail system consists of 2,178 route miles of 3'6"-gauge single-track lines; there are no electrified lines. The system has two main lines which connect the seaports of Lagos and Port Harcourt with the interior; branch lines serve major centers of population and production. There are no international connections. The topography of Nigeria is generally

favorable for the construction of railroads, but an escarpment located in the central part of the country presents some construction and maintenance problems. Despite the age and poor condition of some lines, the system is able to satisfy economic demands.

The railroads are among the best in western Africa in spite of their comparative old age. Track is being renewed and new locomotives and freight cars are being purchased. Expenditures are being financed by a Can\$57 million, 50-year, interest-free loan from the Canadian Agency for International Development, a US\$3.4 million loan from Japan, and US\$25 million loan from the World Bank.

The principal officers of the NRC are a chairman, general manager, deputy general manager, and secretary. Until 1970 the corporation had been highly centralized, with railway officials throughout the country reporting directly to headquarters located at Ebute Metta, a suburb of Lagos. During 1970 the corporation chairman, with support from the general manager, was successful in decentralizing the corporation. The four newly formed districts and their headquarters are: Western, in Ibadan; Eastern, in Enugu; Northeastern, in Bauchi; and Northern, in Zaria. Two subdistricts are located at Kafanchan and Minna. The railroad, one of the largest employers in the country, has about 30,000 employees. Most of the skilled personnel are Ibo. In order to augment its skilled staff NRC is recruiting at home and in the United Kingdom, West Germany, and India and is operating training schools at Zaria and Bauchi. Locomotive-operator schools are located at Zaria, Kano, and Kafanchan, and a mechanical engineering school is in Zaria.

All classification yards are of the flat type and are adequate for normal operation; these are located at Ibadan, Minna, Kaduna Junction at Kaduna, Zaria, Enugu, Lagos, and Port Harcourt.

Rail bridges are in fair to good condition. There are approximately 715 bridges 12 feet and over in length; of these, 64 are over 100 feet long, the longest being the 2,520-foot combination rail-highway structure crossing the Benue at Makurdi. Bridges are primarily of steel construction. The system has no tunnels.

The absolute manual block system of train control is used; train movements are protected by electric train staff, key token, and telephone train-control systems. The electric train staff has been replaced by the key token system in many areas, and two-aspect semaphore signals at more important stations are being replaced by color light signals. Flashing-light warning signals are being installed at major level



crossings. Communications are by railroad-owned telephone and telegraph.

Equipment is in fair to good condition and is adequate for current needs. Automatic buffer couplers centered 34 inches above top of rail are used on all equipment. Most rolling stock has four axles and is equipped with automatic vacuum brakes. The railroad equipment inventory in 1970 was as follows:

TYPE	UNITS
<b>Locomotives:</b>	
Steam, mainline .....	164
Steam, switchers .....	48
Diesel, mainline .....	84
Diesel, switchers .....	17
Railcars, diesel trainsets .....	2
Passenger cars .....	535
Freight cars .....	6,666

Nigeria has no equipment manufacturing facilities; equipment and parts are imported from the United Kingdom, the United States, West Germany, Italy, Canada, and Japan. Major repair facilities are located at Ebute Metta in Lagos, Enugu, and Zaria. NRC repair shops produce some spare parts and rebuild freight and passenger cars. Service cars equipped for welding rail are stationed at Ebute Metta, Offa, Minna, Zaria, Kano, Kafanchan, Bauchi, Makurdi, Enugu, and Port Harcourt.

Coal and diesel fuel are the sole sources of energy for motive power available to the NRC. Coal has been imported since 1967 due to the closure of the Enugu mine. Refined petroleum products are imported; the only refinery, located at Port Harcourt, was severely damaged during the hostilities in 1967 but has since been repaired and is on-stream. Major bulk diesel-oil storage installations, with a capacity of 150,000 U.S. gallons, are located in the Lagos area; other installations are at Offa, Minna, Kaduna Junction, Zaria, Kano, Kafanchan, and Bauchi. Water is of good quality and readily available except in the north during the dry season (November through April); water-storage facilities supplied by wells are being constructed to correct this dry season deficiency.

The NRC is engaged in a continuous effort to maintain its railroads by strengthening bridges, roadbeds and tracks. Construction and maintenance are hampered by washouts caused by seasonal rains. Current improvements to the network include replacing rail ties and ballast, welding rail, and installing modern signaling devices. Complete dieselization is in progress, with late 1973 as the projected completion date. Several loans are to be used primarily for the purchase of new locomotives and freight cars.

Traffic in 1969 totaled approximately 2.7 million short tons of freight transported 1.7 billion ton-miles and 8.4 million passengers for 376.6 million passenger-miles. Approximately 35% of the freight revenue was derived from exports—principally peanuts, cocoa, hides, timber, and minerals—and about 21% from imports of machinery, vehicles, and petroleum products.

The NRC has operated at a deficit since FY64 (1 April through 31 March). In FY67 an especially large deficit of \$10.9 million resulted primarily from a decline in traffic caused by the civil war. In FY69 the deficit was only \$2.3 million. The loss of traffic due to highway competition and high interest charges paid on capital liabilities compounds the problem.

The NRC uses T-section rail weighing 60 to 80 pounds per yard and ranging from 30 to 40 feet in length. Some portions of the main line have welded rail in lengths of up to 320 feet. A plant for flashbutt welding of rail is located at Zaria. Wood, steel and concrete ties are in use. Tie spacing ranges from 2,080 to 2,336 per mile on main lines and from 1,760 to 2,112 on secondary lines. The Pandrol Clip, a United Kingdom import, is being used as a standard fastener for steel, wood, and concrete ties. Ballast is of crushed granite and laterite. Rail and steel ties are imported from the United Kingdom; concrete and treated timber ties and ballast are available locally.

Figure 1 lists characteristics of the rail lines of Nigeria.

### C. Highways (C)

Roads are classified into three groups based on responsibility for their construction and maintenance: 1) federal roads (Trunk A) which connect federal and state capitals, link the ports to their hinterlands, and provide access to foreign countries; 2) state roads (Trunk B) which connect the most important trading centers and provincial capitals with the state capitals; and 3) local authority roads that supplement these trunk (or primary roads). The main highways of the system originate at the ports of Lagos and Port Harcourt and extend north, converging in a regional network that centers on Kano in the north-central part of the country. The primary routes generally parallel railroad lines, and short feeder roads have been established to connect agricultural areas with the primary north-south routes and to provide access to railroad stations. The highway system is most dense in the southern part of the country, although there are relatively few east-west through routes in this area. Some east-west routes in the north provide border to

FIGURE 1. Selected railroad line characteristics (C)

TERMINALS AND ROUTE MILES	MAXIMUM GRADE		MINIMUM RADIUS OF CURVATURE	MAXIMUM AXLELOAD	PASSING TRACK	
	Going	Coming			Maximum Interval	Minimum Length
	Percent		Feet	Short tons	Miles	Feet
Lagos-Minna 462 route miles	1.5	1.5	662	18.1	12.4	1,400
Minna-Kaduna Junction 99 route miles	*1.0	*1.3	*765	13.8	11.8	1,400
Kaduna Junction-Zaria 52 route miles	*1.0	*1.0	*765	13.8	11.8	1,400
Zaria-Nguru 230 route miles	*1.3	*1.3	*574	13.8	11.2	908
Zaria-Kaura Namoda 137 route miles	*1.0	*1.3	*717	13.8	15.5	908
Minna-Baro 111 route miles	0.7	0.7	717	13.8	20	971
Port Harcourt-Kafanchan 458 route miles	1.0	1.3	574	13.8	14.2	1,300
Kafanchan-Kaduna Junction 111 route miles	1.3	1.3	574	13.8	14.9	1,300
Kafanchan-Bauchi 148 route miles	2.0	2.0	574	13.8	19.2	951
Bauchi-Maiduguri 291 route miles	1.5	na	950	12.0	22.9	1,500
Kuru-Jos 22 route miles	*2.0	*2.0	*574	13.8	18	na
Ifo-Idogo 27 route miles	1.3	1.5	574	13.8	na	na

na Data not available.  
\*Estimated.

border movement. International road connections link Nigeria with Dahomey, Niger, and Cameroon. Also, Fort-Lamy, Chad, may be reached via highway across the northern tip of Cameroon.

The road network totals approximately 55,400 miles, of which about 9,500 miles are bituminous surfaced; the remaining 45,900 miles consist of laterite, gravel, crushed stone, and improved and unimproved earth. Bituminous-surfaced roads range from 10 to 24 feet wide. Gravel, crushed-stone and laterite-surfaced roads are from 10 to 25 feet wide. Shoulders on surfaced roads are up to 10 feet wide. Improved and unimproved earth roads range in width from about 10 to 15 feet and generally do not have shoulders. Roads are in poor to good condition, depending generally on the type of surfacing, on the frequency of maintenance, and on deterioration occurring during the rainy season. The alignment of roads in mountainous areas, particularly at the eastern border and in the Jos highlands, is frequently winding, with sharp curves and steep grades.

Information on the total number of bridges on the Nigerian highway network is not available. Of the approximately 3,000 bridges on the primary (or trunk)

road system, more than half are constructed of steel or concrete (Figure 2); the most common types of construction are the through and half-through truss, girder, or beam. However, there are still many timber structures on the primary and secondary networks. Most bridges have unlimited vertical clearances; the through truss bridges with horizontal cross members above the bridge deck (Figure 3) have vertical clearances of 14 feet or more. Horizontal clearance varies considerably; most timber bridges and permanent types constructed prior to 1960 are only 12 feet wide. Structures built after 1960 are up to 24 feet wide or generally equal to the road width. Load capacities vary widely depending on the age of the structure and the construction material but range from 8 to 25 tons on the Trunk A and Trunk B roads. Timber bridges on many local roads have low load capacities estimated at from 2 to 5 tons, depending on the original design and condition of the structure. Present construction designs specify that new bridges have a gross load capacity of approximately 35 tons. Most steel and concrete bridges are in good condition; war-damaged bridges or bridges neglected during the 30-month civil war are being repaired as rapidly as



FIGURE 2. Concrete deck bridge between Zaria and Sokoto in northern Nigeria (U/OU)

funds and manpower permit. Timber bridges are frequently in poor condition because of the destructive effects of seasonal floods which undermine or otherwise weaken the structure. Many of the unbridged waterways are crossed by using modern diesel-driven or primitive cable-operated ferries. There are also a great number of fords on the less significant roads.

Highway construction and maintenance are shared by federal, state, and local administrations. Trunk A roads are administered by the Commission for Works and Housing; Trunk B roads are the responsibility of the respective state governments; and local roads are administered by local authorities. The trend in recent years has been to improve local roads and transfer them to state maintenance as Trunk B roads. In

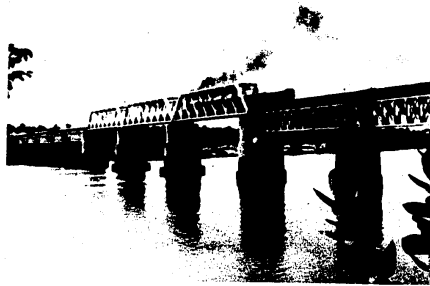


FIGURE 3. Combined highway-rail bridge across Benue River at Makurdi (U/OU)

addition, there is a trend to upgrade certain of the Trunk B roads and transfer them to federal maintenance as Trunk A roads. The increasing federal and state mileage has caused some political and fiscal problems stemming from the costs of maintaining these routes. The Federal Highway Authority, a statutory corporation, was established in 1972 with responsibility for planning, construction, and maintenance of the network of federal (Trunk A) roads. Apart from the destruction and damage which the roads and bridges suffered as a result of the civil war, many of them had reached an advanced stage of deterioration caused by a lack of maintenance during this period. In addition, major construction and maintenance problems are caused by a shortage of skilled personnel and equipment and by the effects of climate. Heavy rains occur from March through November along the coast and from June through September in the interior of the country; during these periods construction and maintenance activities are curtailed or halted. The many miles of low-type roads deteriorate rapidly in wet weather and require considerable maintenance. Construction of roads is difficult in hilly and mountainous areas, where extensive excavation and the construction of embankments and retaining walls are required. The many rivers and streams require the construction of numerous culverts and bridges and, in some cases, the installation of ferry facilities. There is an abundant supply of laterite, gravel, and sand; several rock quarries provide suitable aggregate for road construction. There are several cement plants in the country, but production has not yet achieved prewar levels. Cement requirements are supplemented by imports, and all structural steel is imported. Bitumen obtained from the petroleum refinery at Port Harcourt is supplemented with imports.

The Federal Republic of Nigeria has instituted the Second National Development Plan for the 4-year period from 1970 to 1974. Total investment in the transport sector during the plan period is to be \$678 million, with \$468 million to be provided by the federal government and \$210 million to be provided by the states. The biggest area of expenditure is to be roads, where the states are scheduled to spend \$202 million and the federal government \$263 million. In addition to continuing work on projects already started, several new road construction projects are to get underway during the plan period. One of the most important of these projects, to be completed in 1974, is the construction of a \$25 million expressway between Lagos and Ibadan, Nigeria's two largest cities. Also, engineering design and about half the construction of two new road bridges at Jebba and Makurdi should be completed during the plan period. In addition to

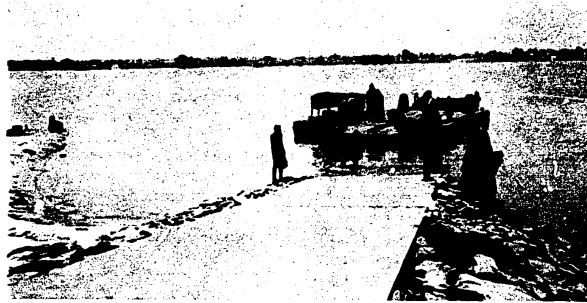


FIGURE 4. Ferry crossing Niger River near Yelwa (U/OU)

actual construction, some 15 potential road segments will be studied and designed. Nigerian roads are assuming increasing international significance as manifested in February 1972 with the signing of a contract to rebuild and repave the road link between Idiroko in Nigeria and Porto-Novo in Dahomey. The Trans-African Highway from Mombasa, Kenya, to Lagos, for which studies are presently being conducted, will extend from the northern Cameroon border to Lagos, bisecting Nigeria from east to west. Repairs to the Niger River Bridge at Onitsha are underway to restore the bridge to its prewar condition and capacity.

Highway traffic is impeded by many bottlenecks on the system, including ferries (Figure 4), fords, narrow and low-capacity bridges, and sharp curves and steep grades. In addition, traffic is hampered by the many miles of narrow roads and routes that are poorly constructed and aligned. In the rainy season miles of poor quality roads are closed to traffic for short periods to protect the surfaces, and many earth roads become slippery or impassable. Ferry operations are also curtailed or halted because of high water. In the dry season vehicle operations in the northern part of the country are impaired by intense summer heat and by dust conditions. Temporary traffic problems are being experienced since the country switched on 2 April 1972 from driving on the left side of the road to driving on the right.

There are numerous transport firms that operate about 25 to 200 vehicles each. Service is offered to all parts of the country; some classes of vehicles are restricted to operations over certain routes because of regulations pertaining to weights and dimensions of trucks and trailers. "Mammy wagons," which consist of a truck chassis and a locally built body adapted for freight and passenger use, operate to any part of the

country where traffic warrants. Ownership of these vehicles varies from an owner-driver to a large transporter who may own a fleet of up to 100. The number and use of this type of vehicle have slowly decreased as more modern equipment, especially buses, come into use. In addition, the government is increasingly regulating "Mammy wagon" operations to force them off the roads. The Nigerian Railway Corporation operates a fleet of vehicles to provide pickup and final delivery services from railroad terminals to the consumer.

In January 1971, there were 125,654 motor vehicles registered, including 84,941 passenger cars and 40,713 trucks and buses. All vehicles and spare parts are imported, mainly from the United Kingdom and other countries of the European Communities (EC).

Figure 5 lists characteristics of the most important highways.

#### D. Inland waterways (C)

Inland waterway transportation has played a very limited role in the carriage of goods and passengers and generally has not fulfilled the high hopes held by the government. This is due mainly to navigational restrictions and the rapidly developing highway network. River transport accounts for less than 6% of total surface tonnage; cargoes consist mainly of forestry, agricultural, and petroleum products. During normal operations approximately 365,000 short tons of cargo are moved and about 125 million ton-miles are produced on the principal waterways by organized water transport companies. An additional 35,000 short tons usually are carried by privately owned craft. Approximately 165,000 short tons also move throughout the Niger Delta, particularly to and from the maritime ports of Lagos and Port Harcourt. About

FIGURE 5. Selected highways (C)

ORIGIN AND DESTINATION	DISTANCE	SURFACE TYPE	SURFACE WIDTH	SHOULDER WIDTH	REMARKS
	<i>Miles</i>		<i>Feet</i>	<i>Feet</i>	
Lagos to Niger border via Ilorin, Kontagora, Kaduna, and Kano.	792	Bituminous.....	12 to 24	0 to 10	Fair to good condition. There are several long bridges in Lagos; the new Eko Bridge is reinforced concrete, 5,000 ft. long. There are approximately 20 additional bridges over 150 ft. long on this route. Undulating alignment.
Port Harcourt to Illela at Niger border.	1,067	.....do.....			Numerous bridges on the route; the longest is a 2,628-ft. rail and highway bridge over the Benue River near Makurdi.
Port Harcourt to Aliade.....	303	.....do.....	12 to 18	0 to 6	Fair condition. Hilly alignment.
Aliade to Jct. 43 mi. SW of Jos.	200	Gravel.....	16 to 18	0 to 6	Do.
Jct. 43 mi. SW of Jos to Pambeguwa.	148	Bituminous.....	12 to 24	0 to 6	Do.
Pambeguwa to Zaria.....	52	Gravel.....	12 to 18	0 to 6	Do.
Zaria to Sokoto.....	306	Bituminous.....	12 to 24	0 to 6	Fair condition. Undulating to hilly alignment.
Sokoto to Illela.....	58	Improved earth.....	8 to 12	0 to 6	Poor to fair condition. Undulating to hilly alignment.
Shagamu to Cameroon border near Mamfe, via Benin City and Enugu.	454				Narrow surface west of Benin City. Numerous bridges over 150 ft. long on this route. The longest is about 4,600 ft. long over the Niger River at Onitsha; damage incurred during civil hostilities is being repaired, although temporary Bailey bridging permits one-lane passage.
Shagamu to Benin City.....	176	Bituminous.....	24	0 to 5	Fair condition. Hilly alignment.
Benin City to Onitsha.....	86	.....do.....	12 to 15	0 to 5	Poor condition. Undulating alignment.
Onitsha to Enugu.....	24	.....do.....	24	0 to 5	Fair condition. Undulating alignment.
Enugu to Bansara.....	108	.....do.....	12 to 14	0 to 5	Do.
Bansara to Cameroon frontier..	65	Gravel.....	10 to 22	0 to 5	Do.
Jos to Ngala via Potiskum and Maiduguri.	455				Some bridges on this route, but only four are known to be over 150 ft. long. Longest bridge is 360 ft. over Ebeji River at Gambaru.
Jos to Maiduguri.....	367	Bituminous.....	12 to 24	3 to 5	Fair condition. Hilly alignment.
Maiduguri to Ngala.....	88	Gravel.....	12 to 14	0 to 2	Fair condition. Undulating alignment.

two-thirds of the total tonnage moved is from the interior of the country to the maritime and delta ports. The Nigerian civil disturbance had an adverse effect on inland waterway operations, halting river traffic on the Niger-Benue system and causing severe losses to commercial operators. The two largest and most successful river fleets (Holt Water Transport and Niger River Transport Company) liquidated their assets at the conclusion of the war. Much of the traffic on the Benue is expected to be absorbed by the Transcameroon Railway upon its completion in the early 1970's. Although adequate for normal economic demands,

the waterway system will require major improvements, including improved navigational conditions and operating procedures, to accommodate any really significant increase in water transport service. Nigeria has 5,330 miles of navigable waterways within three major networks: the tidal creeks and coastal lagoons; the Niger and Benue and their tributaries and deltaic distributaries; and the Cross. In addition, the newly formed Kainji Lake offers several hundred miles of navigable lake routes. The creeks and lagoons are interconnected and form a natural communications link between Lagos and the Niger

Delta. The Niger and Benue, two of the principal waterways, afford lengthy routes inland, the Niger to the northwestern interior, Dahomey, Niger, and Mali, and the Benue to the eastern interior and Cameroon. The third principal waterway, the Cross, serves eastern Nigeria and is utilized primarily by native craft.

The Niger is one of the world's great rivers, almost rivaling the Nile in economic potential and geographic importance. Formerly, inland waterway craft could travel up the Niger to a point northwest of Jebba, where further passage upstream was prevented by rapids. However, with the completion of the Kainji Dam in February 1969, it is believed possible to develop the Niger as a commercial waterway on a national and international basis. Experimentation is underway to determine the feasibility of regular commercial water transport service to the Republic of Niger. The Niger is expected to be navigable up to 7 months a year by barges of 700 tons capacity traveling the entire length of the Niger within Nigeria. The Benue and the Cross are not navigable throughout the year due to low water conditions in their upper reaches. Owing to the short duration of navigation on the Benue, the commercial shipping companies concentrate their fleets on the river from late June or early July to the end of October to move seasonal cargoes from Garoua, in Cameroon. Yola, Numan, and Makurdi shipments are loaded and moved downstream as the shipping season progressively deteriorates. The largest coasters able to reach Makurdi on the Benue are from 550 to 850 tons. The largest river craft operating on the Niger and Benue are semi-integrated tows consisting of a towboat and eight barges with a total carrying capacity of 3,600 tons.

The Niger and its delta complex of waterways cannot be entered by large oceangoing vessels. Excluding Port Harcourt, which can be reached by maritime vessels of considerable size, the principal entry into the Niger is via the Escravos River and Chanomi Creek stream channel to the Forcados River, the major tributary of the Niger.

Fluctuation in water levels, shifting channels, silting, rapids, and extreme meandering are the main factors adversely affecting navigation on the principal waterways. Channel widths are not restrictive to passage by commercial vessels, and in only a few instances, in the Niger Delta area and the upper reaches of the Benue, does curvature make navigation difficult. The water levels in the upper reaches of the Benue and Cross become so low during the period March to June and January to March, respectively, that commercial navigation becomes impossible.

Tidal currents and vegetation carried downstream during high-water periods are interruption factors in the delta region. Rock protrusions, especially at the confluence of the Niger and Benue at Lokoja, are hazards even though they are marked by buoys.

Very few bridges span the waterways. There are bridges at Onitsha, Kainji, and Jebba on the Niger and at Makurdi on the Benue. Only the Makurdi railroad bridge is restrictive, preventing further upstream passage by small coasters during the high-water season. The Kainji Dam, located on the Niger 630 miles from the sea, can be bypassed via a canal fitted with two locks. The 2-mile-long Awuru Canal, located 11 miles south of Kainji, permits the bypassing of the heretofore treacherous Niger rapids by push-tow units consisting of a pusher and two barges of the gondola type.

Inland waterway ports fall into two categories. Within the first category are the maritime/inland waterway ports of the delta area. These serve basically as transshipment centers from river craft to maritime vessels and include the ports of Burutu, Warri, and Sapele. Within the second category are the strictly inland waterway ports serving the interior. Transshipment here is from river craft to rail or highway transport. The major inland ports are Baro—a leading railhead and the most important facility—Onitsha, Lokoja, Makurdi, and Yola. Yelwa, the northernmost port on the Kainji Lake, is expected to become a major waterway facility. In most inland ports, facilities for the quick handling of goods are inadequate; manual handling and poor storage arrangements are the general rule.

Dugout canoes, long the traditional means of waterway transport in Nigeria, have been supplemented by more modern passenger and cargo craft. Canoes and other similar shallow-draft craft ply all waterways and carry a large amount of tonnage. Their services are used extensively in areas inaccessible by other transport means. On the main creeks and rivers, craft vary from dugout canoes to modern barge trains. A very common vessel in use has been the stern-wheeler with a draft of from 4 to 6 feet. Diesel-powered towboats are in use with push-towing the general practice. These vessels are capable of pushing from 4 to 8 barges with a total load of about 1,500 tons and have a draft of from 5 to 6 feet.

The total capacity of the commercial barge fleet is approximately 45,000 tons. The fleet serves the Niger, the Benue, and the coastal creeks and distributaries; in 1964 it consisted of at least 69 powered vessels and 180 barges ranging in carrying capacity from 10 to 1,000 tons. The government operates a fleet of 86 powered

and 114 dumb craft. In addition, there are estimated to be 20,000 small craft of private ownership. The average barge capacity is approximately 200 tons with a draft of 6 feet. Dugout caroes vary in capacity, with the largest capable of transporting 20 tons of cargo. Much of the equipment is poorly designed, old, and in need of repair. Construction and maintenance of river craft are performed at various river and delta ports. Local boatyards construct small craft drawing from 1.9 to 3.8 feet and equipped with either outboard or small diesel engines.

Control over inland waterways is vested primarily in the Inland Waterway Department (IWD), under the Commissioner for Transport, with headquarters in Lokoja. The IWD has the responsibility for river management and conservancy, which includes the operation and maintenance of government-owned craft, channel improvement, navigational aids, and waterway regulations. The Nigerian Ports Authority has jurisdiction over 10 maritime/inland waterway ports. Prior to the civil war about 95% of all waterway operations were organized by private concerns; however, state-controlled organizations are now the principal operators. The Central Water Transport Company, which is jointly owned by five states, was inaugurated in February 1972 with the aim of improving river transportation. The existing private carriers include the Niger Benue Water Transport Co., *Compagnie de Transport et Commerce*, and J. Elder Dempster Line, Ltd. A few relatively small companies operate specialized transport firms.

Unskilled labor is plentiful in all parts of Nigeria. Artisans and technically trained personnel are scarce,

but this situation has improved as a result of the experience gained from the Kainji Dam construction project and training offered by the Nigerian Ports Authority for the IWD.

The completion of the Kainji project provides numerous improvements to navigation, including the extension of the upper limit of through navigation on the Niger to beyond the Dahomey border. More importantly, the dam permits control of flood waters and thereby extends the navigation season downstream. Plans for the improvement of the Benue, principally through extending the navigation season by the construction of flood-control dams, is being considered in light of the pending loss of traffic to the Transcameroon Railway, which will serve areas that have been using the Benue. Also, increased dredging operations, improved navigational aids, fleet rehabilitation, the introduction of night navigation, and the construction of a water-control facility at Jebba are planned in an extensive effort to make the waterway system more responsive to the country's transport requirements.

Physical characteristics of selected Nigerian waterways are listed in Figure 6.

### E. Pipelines (C)

Most of Nigeria's pipelines are located in the eastern part of the Niger Delta. Their total length is in excess of 620 miles, including 581 miles of crude oil lines, over 40 miles of natural-gas lines, and 3 miles of refined-products lines. Over 100 miles of crude pipelines are planned or are under construction.

FIGURE 6. Physical characteristics of selected waterways (C)

NAME, TYPE, AND NAVIGABLE LENGTH	CHANNEL CHARACTERISTICS		CONTROLLING LOCK DIMENSIONS; LENGTH AND WIDTH; DEPTH OVER SILL	CONTROLLING UNDERBRIDGE CLEARANCES		REMARKS
	Width	Safe draft		Horizontal	Vertical	
<i>Feet</i>						
NIGER:						
Natural and dredged stream; land-cut canal; 790 mi.	249	4.9 (HW) 2.9 (MW) 1.6 (LW)	390 x 40; 8	140	30 (HW)	Safe draft 20.6 ft. in delta region.
BENUE:						
Natural stream; 564 mi.	196.8	4.9 (HW) 2.9 (MW) 0.98 (LW)	No locks	214	40 (MHW)	River extends additional 46 miles to Cameroon port of Garoua.
CROSS:						
Estuary; natural stream; 238 mi.	na	9.8 (HW) 3.9 (LW)	...do	328	na	River extends additional 69 miles to Cameroon port of Mamfe.

na Data not available.

FIGURE 7. Selected pipeline systems (C)

FROM	TO	LENGTH Miles	DIAMETER Inches	CAPACITY	PRODUCTS TRANSPORTED	REMARKS
Oloibiri	Port Harcourt	77	8/10	5,000	Crude	
Afam	do	30	6	2,500	do	
Ughelli	Eriemu	5	16	na	do	Trans-Niger Pipeline System.
Kokori	do	9	10	na	do	Do.
Eriemu	Bonny	127	16/18/20/24	na	do	Do.
Obigbo	Trans-Niger line at Eielewa	7	8	na	do	
Umu Ekehem	Trans-Niger line	3	8	na	do	
Imo River	Alesa-Eleme	19	6/8	na	do	
Do	Trans-Niger line at Ebubu	15	12	na	do	
Oza	Bomu	18	na	na	do	
Afam	do	14	12	30,000	do	
Bomu	Bonny	18	12	80,000	do	
Bodo	do	14	12	na	do	
Jones Creek	Ughelli-Forcados pipeline	20	20	na	do	About 50% of the pipeline system has been completed.
Ebocha and Mbode	Trans-Niger line at Rumuekpe	45	14	na	do	Completed in 1968.
Eriemu	Sapele	28	24	120,000	do	Completed in 1969.
Ughelli	Oron	20	8/12	na	do	Do.
Forcados	Offshore buoy moorings	20	48	na	do	Submarine pipeline completed in 1969.
Ughelli	Forcados	50	24/28	350,000	do	Completed in 1969.
Imo River	Aba	18	6	na	Natural gas	15 miles of aluminum pipe, and 3 miles of steel to facilitate pipeline connections.
Korokoro	Afam	8	8	na	do	Supplies the Afam powerplant.
Bomu	Alesa-Eleme refinery	15	8	150,000	do	
Alesa-Eleme refinery	Benny River at Okrika	3	12/16/18	80,000	Refined products	10 parallel lines.
Oguta and Egbema	Trans-Niger line at Rumuekpe	50	na	na	Crude	
Eriemu	Ognibo	18	na	na	do	Planned.
Buguma Creek	Ekulama	14	na	na	do	Do.
Krakrama	Alakiri	40	na	na	do	

na Data not available.

\*Crude oil and refined products in barrels; natural gas in cubic meters per day.



The main crude-oil trunk line is the Trans-Niger Pipeline System, the longest in the country. It transports crude oil over 140 miles from the Ughelli and Kokori oilfields southeastward through numerous oilfields to the ocean terminal at Bonny. Another 80-mile trunkline transports crude oil from Ughelli west and southwest to the Forcados terminal via the Odudu oilfield; it has booster stations at Bomu and at the Rumuekpe gasfield. Numerous branch lines join the Trans-Niger line at various points. The most important are a 45-inch line from the Ebocha and Mbede oilfields, and a 50-mile line from the Oguta and Egbema oilfields, both terminating at Rumuekpe. Two crude-oil pipelines terminate at Port Harcourt: a 77-mile, 8- and 10-inch diameter line from Oloibiri, and a 30-mile, 6-inch line from Afam.

The refined-products pipeline system consists of 10 parallel lines 3 miles long, with diameters of 12, 16, and 18 inches. The pipeline extends from the Alesa-Eleme refinery at Port Harcourt to Okrika, on the Bonny River.

Natural-gas pipelines, totaling over 40 miles, are located in the eastern part of the country. An 18-mile, 6-inch line extends northeast from the Imo River to Aba; 15 miles of this line are of aluminum; and the remainder are of steel. Others are a 15-mile, 8-inch line which extends from Bomu northwest to the Alesa-Eleme refinery and an 8-mile, 8-inch line from Korokoro to Afam.

Details of the pipelines are given in Figure 7.

#### F. Ports (C)

The maritime port system of Nigeria consists of two major ports, Lagos (Figure 8) and Port Harcourt, and 10 minor ports; all are located along rivers within 50 statute miles of the sea. Tidal marshes and lowlands interrupted by numerous estuaries and coastal lagoons characterize the coast of Nigeria, providing few natural harbors suitable for port development or with access to land transportation routes. Except for Lagos, which is the only maritime port serving western Nigeria, the ports are concentrated along the Niger Delta and the Benue and Cross rivers in central and eastern Nigeria. In 1970, Lagos handled 90% of the country's general cargo traffic, which amounted to about 5.4 million tons. The minor ports of Burutu, Calabar, Degema, Koko, Sapele, and Warri annually handle more than half a million tons of timber, agricultural products, construction materials, drilling equipment, and general cargo. These minor ports accommodate several small ocean-type cargo vessels either alongside wharves or at fixed moorings and have

estimated military port capacities of 600 to 800 long tons per day. The oil companies have intensified their development program by the construction of new offshore loading berths and extension of offshore platforms. Escravos, Forcados, Bonny, and Kwa Ibo are shipping terminals for the important crude oil exports from midwestern and eastern Nigeria. Petroleum products are shipped from a terminal at Okrika on the Bonny River. All general cargo ports are administered by the Nigerian Ports Authority (NPA), an autonomous public corporation. The oil terminals are under the jurisdiction of the NPA but are owned and operated by private oil companies.

Lagos has adequate facilities for handling normal maritime cargo requirements. However, the concentration of traffic at the port since the partial closure of Port Harcourt during the war, combined with inadequate clearance facilities and inefficient cargo-handling practices, has caused continuous congestion there. Facilities at the minor ports are adequate for the present volume of trade. No extensive port development projects are underway at the general cargo ports; there are plans, however, for extending wharves at Lagos, Calabar, and Warri.

Figure 9 lists details of facilities at Lagos and Port Harcourt.

#### G. Merchant marine (C)

The Nigerian merchant fleet consists of 13 dry cargo ships of 1,000 gross register tons (g.r.t.) and over, totaling 83,605 g.r.t. or 122,340 deadweight tons (d.w.t.). Twelve ships are between 9,000 and 11,000 d.w.t. and the remaining ship is 1,795 d.w.t. About 46% of the fleet deadweight tonnage is less than 10 years old, 46% is between 10 and 20 years, and 8% is more than 20 years. Twelve ships have service speeds between 12 and 16 knots, and one ship has a speed of 10 knots. All units employ diesel power. Five ships are equipped with heavy-lift booms (40 tons or more); none has hatches larger than 47 feet in length.

Merchant tonnage is owned by two beneficial owners (entities which take the profit or loss from operations). The government-owned Nigerian National Shipping Line, Ltd. (NNSL) controls 12 ships totaling 120,545 d.w.t.; the privately owned Anansa Line, Ltd. controls the remaining 1,795 d.w.t. ship.

Most of the fleet tonnage is employed in liner (scheduled) service between Nigerian ports and major ports of the west coast of Africa and Western Europe. Nigeria's international seaborne trade is carried principally by foreign-flag ships which make frequent

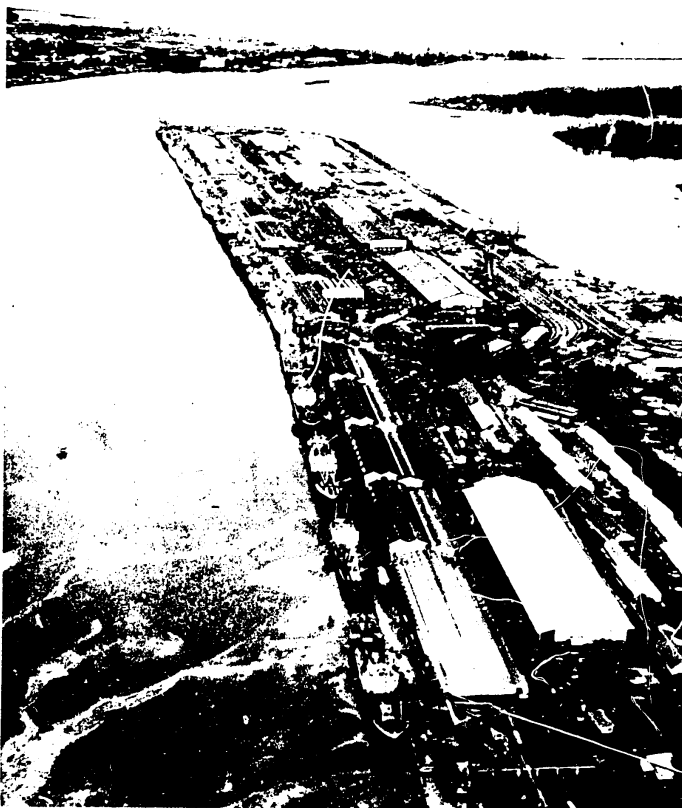


FIGURE 8. Cargo handling and storage facilities at Lagos (U/OU)

and regular calls at Nigerian ports. Although the merchant fleet carries only a small portion of the country's international trade, the government takes pride in the fact that Nigerian-flag ships have been seen in some of the world's major ports.

Merchant marine functions are administered by the Commissioner of Transport. Included in Nigerian laws and regulations is a provision that no individual or organization engaged in Nigerian shipping may enter into any charter agreement with foreign interests without government approval. By the terms of a government decree, the armed forces may requisition ships, including requisition of and compensation payments for ships owned by aliens in Nigeria; during

the Biafran conflict in 1968, the Nigerian Navy requisitioned one or more foreign-owned merchant ships for the transport of troops and supplies. Nigeria is a member of the Inter-Governmental Maritime Consultative Organization (IMCO) and a party to the following IMCO conventions: Safety of Life at Sea, 1948 and 1960; Prevention of Collisions at Sea, 1960; Oil Pollution, 1954 and 1962; Facilitation of International Maritime Traffic, 1965; and Load Lines, 1966.

The government provides no direct subsidies for ship operations or ship construction. However, in the past, indirect assistance has been furnished in the form of a government-guaranteed loan obtained by NNSL for the construction of ships in a foreign shipyard.

FIGURE 9. Major ports (C)

NAME; LOCATION; MILITARY PORT CAPACITY*	ACTIVITIES	HARBOR	BERTHS
Port Harcourt, 4°46'N., 7°00'E., in E. Nigeria, on Bonny River, about 115 statute miles W. of Cameroon border. 5,000	Chief commercial port of E. Nigeria and naval base; has some 4,700 linear ft. of wharfe, covered and refrigerated storage, POL tanks, limited open stacking space, and mechanical handling equipment; road and rail clearance from shipside to national systems, and inland waterway clearance. Under pre-civil war conditions about 1.75 million tons of bulk and general cargoes transferred annually. Shipping activities were erratic after the end of the war, but the port has since recovered. Nigerian Ports Authority shipyard repairs lighters and harbor craft; largest drydocking facility has lifting capacity of 300 tons.	Improved natural river harbor 34 nautical miles above estuary of Bonny River; length of harbor 2 nautical miles, average width 200 yards, and general depths 20 to 66 ft.; controlling depth through estuary 37 ft. at mean low water springs; and controlling depth in channel from Bonny oil terminal to Port Harcourt 20 ft. at mean low water springs because of obstructions; harbor has good natural protection.	Alongside—9 small ocean-type cargo vessels, 3 lighters, and 4 standard coaster-type tankers. Fixed mooring—3 small ocean-type cargo vessels. Anchorage—Large numbers of standard berths of all classes in unprotected roadstead S. and W. of entrance to estuary channel in depths from 50 to 78 ft., over good holding ground of mud, sand, and shells; none in harbor area.
Lagos, 6°24'N., 3°24'E., on W. coast of Nigeria, 45 statute miles E. of Dahomey border. 14,700	Capital, chief commercial port, and naval base has some 15,000 linear ft. of wharfe, covered storage, POL tanks, open stacking space, and mechanical handling equipment with lifting capacities up to 100 tons; road and rail clearance from shipside to national systems, and inland waterway clearance along coastal lagoons W. to Porto-Novo, Dahomey and E. to Niger River Delta ports. About 4.7 million tons of bulk and general cargoes transferred annually, of which 70% represents receipts of foodstuffs and beverages, wood, cement and masonry construction materials, iron and steel, tools and machinery, vehicles and transportation equipment, textiles, clothing and footwear, chemicals, bulk POL, and coal, and 30% comprise shipments of cocoa, groundnuts and groundnut oil, palm kernels and palm oil, sawn timber, rubber, scrap iron, tin, grain, and assorted agricultural products. One naval and 2 commercial shipyards make minor repairs to naval and small ocean-type vessels. Largest ship-repair facility is floating drydock with lifting capacity of 4,000 tons.	Improved natural harbor in coastal lagoon with total length of 7 nautical miles, width from 700 to 3,300 ft., and general depths from 6 to 58 ft.; approach through Bight of Benue clear; entrance protected by 2 breakwaters; dredged channel has controlling depth of 30 ft. at mean low water springs.	Alongside—5 large, 13 standard, and 4 small ocean-type cargo vessels, 1 standard and 1 small coaster-type cargo vessel, and 5 lighters; 2 small ocean-type tankers, 1 standard coaster-type tanker; 2 ocean-type minesweepers, and 8 motor torpedo boats. Fixed mooring—2 standard and 4 small ocean-type cargo vessels; 3 standard coaster-type cargo vessels, and 1 ocean-type minesweeper. Anchorage—4 standard ocean-type cargo vessels and 1 standard coaster-type cargo vessel in Lagos harbor, and large numbers of standard berths of all classes in open roadstead S. of harbor entrance in depths of 36 to 60 ft. over good holding ground of mud, but subject to heavy swells.

\*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 wharf 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.

Nigerians are trained as deck and engineer officers on selected oceangoing ships under the sponsorship of the Nigerian Ports Authority. On board, the cadets learn all phases in ship operation, receive some training overseas, and usually take a correspondence course for preparation of shore-based studies at the end of their sea term. These apprentice cadets are fully occupied in training for about 8 years before qualifying as master mariners.

**H. Civil air (C)**

Nigeria Airways, Ltd.—formerly known as West African Airways Corporation WAAC (Nigeria), Ltd.—is the national flag carrier providing both domestic and international services. The airline was initially organized in partnership with British Overseas Airways Corporation (BOAC) and the Elder-Dempster Shipping Co., also a British firm; Nigeria Airways became a state enterprise in April 1961 when the government purchased the British holding. The carrier, which suffers financially from a lack of technical and managerial competence, has recently signed an agreement with Trans World Airlines, Inc. (TWA) to serve as management consultant. International service is scheduled between Nigeria and 12 countries in Europe, the Middle East, and Africa, to some extent in a pool with British Caledonian and other airways. Direct service to New York and London is available through blocked space agreements with Pan American World Airways, Inc. (Pan Am). Domestic air travel is provided to 12 cities and towns—Benin City, Calabar, Enugu, Ibadan, Jos, Kaduna, Kano, Lagos, Maiduguri, Port Harcourt, Sokoto, and Yola. Nigeria Airways is a member of the International Air Transport Association (IATA) and the regional Association of African Airlines, which plays a complementary role to IATA in Africa.

Domestic and international charter services are provided primarily by Pan African Airlines (Nigeria), Ltd. (PAA), which is based at Ikeja Airfield (Lagos). This American-owned company conducts chartered flights for the U.S. Government, the Government of Nigeria, and private companies. PAA currently operates a number of helicopters on charter to Nigerian Gulf Oil Company. PAA's sister corporation, Tropical Aircraft Sales, with headquarters in Lagos, is the Cessna Aircraft agent for West Africa. A new company, ARAX Airlines, also provides charter services.

Aero Contractors Company of Nigeria, Ltd., offers nonscheduled and general aerial work, including contracting charters for oil companies operating in

Nigeria. The carrier, a subsidiary of Schreiner Air Transport N.V. of The Hague, started operations in Nigeria in 1960 and at times has operated scheduled services, chiefly in northern Nigeria.

Air taxi and air utility services are also provided by two other charter operators—Bristow Helicopters (Nigeria), Ltd., a subsidiary of British Caledonian, and Delta Maritime and Aviation Co., both of which operate out of Lagos airfield. Other organizations participating in flying activities include the Nigerian civil aviation school, the Lagos Flying Club, missionary groups, government agencies, and business firms.

Approximately 100 civil aircraft are registered in Nigeria. Of these, 13 have a gross weight of 20,000 pounds or more. Nigeria Airways owns nine of these major transport aircraft: one Boeing 707-320C, three Fokker F-27-200's, two F-27-600's, and three F-28's. It also owns a Piper PA-23-250 Aztec which is used for charter services and leases one Boeing 737 which is used for scheduled services. The remaining four major planes are distributed as follows: the federal government, one Hawker Siddeley HS 125 ARAX Airlines, two Douglas DC-3's; and PAA, one Douglas DC-6. PAA also owns 13 light fixed-wing and rotary-wing aircraft with Nigerian registration and operates a varying number of DC-4/C-54-type aircraft with U.S. registration. In addition, Nigeria Airways has ordered one Boeing 707-320C and two 737-200's, which are to be delivered by early 1973.

An estimated 3,000 persons are engaged in civil aviation activities in the nation. Nigeria Airways employs approximately 2,500 personnel, including 45 pilots (24 Nigerian) and 570 maintenance personnel. PAA employs about 60 persons, including 12 pilots, and Aero Contractors has a staff of 80, including 14 pilots. There are an estimated 100 additional private and commercial pilots in the country. The number of pilots and mechanics fluctuates considerably.

Training programs are conducted both at home and abroad. The government, in cooperation with the International Civil Aviation Organization (ICAO), operates the Nigerian Civil Aviation Training Center at Zaria. The center provides training for commercial pilots, aircraft mechanics, radio mechanics, communications operators, air traffic controllers, and meteorologists. Courses for various airline positions are also conducted at Nigerian Airways' aviation school at Lagos airfield. Airline personnel are sent overseas for advanced and specialized training. The Lagos Flying Club, which operated from Kiri Kiri airstrip (Lagos), provides basic flying instruction.

Electronics and engineering courses are offered at the five Nigerian universities.

Aircraft maintenance facilities are located chiefly at Lagos airfield. Nigeria Airways' engineering base is used for routine airframe and engine servicing. Major maintenance and engine overhaul are accomplished in Europe. PAA's hanger facility at Lagos handles routine engineering services. Spare parts stocks are located at Nairobi, Kenya, where Safari Air Services (Kenya) undertakes all PAA engine overhauls. Other firms with a maintenance capability at Lagos airfield include Aero Contractors Company of Nigeria, which does contract work for the government and private firms; and Aeronautical Services West Africa, Ltd., and Delta Maritime and Aviation Company, both of which service light aircraft and engines. Bristow Helicopters' maintenance facility is located at Port Harcourt airfield; minor maintenance service is also available at Kano airfield. The quality of maintenance varies.

Responsibility for control and regulation of civil aviation is vested in the Aviation Division of the Ministry of Transport. The Civil Aviation Act of 1964 came into force on 1 December 1965 and replaces all former orders and regulations on civil aviation in Nigeria.

Nigeria is a member state of the ICAO and is represented on the ICAO Council. The Nigerian Government has civil aviation agreements or provisional arrangements with at least 30 countries, including the U.S.S.R. Eighteen foreign airlines, including the Soviet carrier Aeroflot, conduct scheduled services between Nigeria and 35 cities in 33 countries.

#### I. Airfields<sup>1</sup> (C)

The air facilities system of Nigeria consists of 77 usable airfields, of which six are civil, one is military, three are joint military/civil, and the remainder have limited or no facilities. In addition, there are 13 emergency landing sites and four seaplane stations. The airfields are evenly distributed throughout the country, generally near cities and towns along the lines of surface communication.

The two most important international airfields, Kano and Lagos, are capable of handling aircraft of the C-135 and C-141 classes, respectively. Both are equipped with navigational aids and have hydrant

<sup>1</sup>For detailed information on individual airfields in Nigeria see Volume 20, *Airfields and Seaplane Stations of the World*, published by the Aeronautical Chart and Information Center for the Defense Intelligence Agency.

refueling accommodations, complete repair service, and support facilities. Taxiways and aprons are generally well maintained and are in fair condition. Twelve airfields have hard-surfaced runways; the remainder have temporary or natural surfaces. Most of the latter have no facilities. One airfield can support C-135-type aircraft; two airfields, C-130; one, C-124; one, C-141; four, C-54; one, C-46; sixteen, C-47; two, C-97; the remainder can handle liaison-type aircraft. The four seaplane stations, Calabar, Burutu, Lagos, and Port Harcourt, could be used in an emergency; they have no known support facilities. The 13 emergency landing sites have little or no significance.

Maintenance of the airfields is generally good. It may vary from minor repairs at lesser airfields to periodic major repairs at larger airfields which have support and service equipment readily available. The extension of Makurdi airfield is still in the planning stage. Lagos airfield has been strengthened and extended from 7,600 feet to 9,050 feet.

Figure 10 lists characteristics of Nigeria's most important airfields.

#### J. Telecommunications (C)

The Commissioner of Communications has the responsibility for administering Nigeria's telecommunications (telecom) system. Radio and television broadcasting are managed by the Nigerian Broadcasting Corporation (NBC), a government corporation. There are also several commercial radiobroadcast and TV companies. Domestic telecom facilities are owned and operated by the Posts and Telegraph Department under the Commissioner of Transport. International telecommunications are managed by Nigerian External Telecommunication, Ltd., a joint-stock corporation, 51% owned by the Nigerian Government and 49% by the British company, Cable and Wireless Ltd. Some private companies and organizations operate their own telecom networks under license by the government.

The domestic long-distance system is based on radio-relay links. The highest capacity radio-relay circuit, 1,200 channels, connects Lagos to Kano via Ibadan, Oshogbo, Ilorin, Minna, Kaduna, and Zaria. Two important branches extend from this circuit. They are the Minna-Enugu route (via Baro, Lokoja, and Nsukka) and the Kaduna-Maiduguri route (via Jos, Bauchi, and Potiskum). These high-capacity links were completed in the first phase of the current long-range telecom development program. Older, very-high-frequency (VHF), radio-relay extensions provide most of the long-distance connections between Bauchi

FIGURE 10. Selected airfields (C)

NAME AND LOCATION	LONGEST RUNWAY: SURFACE; DIMENSIONS; ELEVATION ABOVE SEA		ESWL*	LARGEST AIRCRAFT NORMALLY SUPPORTED	REMARKS
	LEVEL	Feet			
Benin City..... 6°19'N., 5°36'E.	Asphalt..... 10,000 x 200 260		59,893	C-124.....	Joint. Scheduled internal services. Aviation fuel available.
Calabar..... 4°58'N., 8°21'E.	Asphalt..... 7,400 x 150 206		28,160	C-54.....	Joint. Domestic airways. Scheduled services available.
Enugu..... 6°29'N., 7°34'E.	Asphalt..... 6,000 x 151 461		14,200	C-47.....	Joint. Aviation fuel available, sup- ports scheduled airline flights.
Gusau..... 12°10'N., 6°42'E.	Laterite..... 4,800 x 150 1,520		14,200	DC-3.....	Civil. Scheduled internal services.
Ibadan..... 7°26'N., 3°54'E.	Asphalt..... 4,540 x 150 769		14,200	DC-3.....	<i>Do.</i>
Jos..... 9°52'N., 8°54'E.	Asphalt..... 5,100 x 150 4,250		14,200	DC-3.....	Civil. Scheduled services. Aviation fuel is available.
Kaduna..... 10°35'N., 7°26'E.	Macadam..... 8,530 x 150 2,126		17,034	C-131.....	Joint. Aviation and jet fuel is avail- able. Scheduled services.
Kano..... 12°03'N., 8°31'E.	Asphalt..... 8,600 x 200 1,562		56,607	Boeing 707.....	Civil. International airfield. Aviation and jet fuel is available.
Lagos..... 6°35'N., 3°19'E.	Asphalt..... 9,050 x 150 132		65,100	C-141.....	Joint. International airfield. Avia- tion and jet fuel is available. Scheduled services.
Maiduguri..... 11°51'N., 13°04'E.	Asphalt..... 6,000 x 150 1,162		28,160	DC-4.....	Civil. Aviation and jet fuel is avail- able. Scheduled services.
Port Harcourt..... 4°51'N., 7°01'E.	Asphalt..... 7,000 x 150 58		35,500	C-130.....	Joint. Scheduled internal services.
Sokoto..... 13°00'N., 5°15'E.	Asphalt..... 4,900 x 150 1,150		35,500	L382B..... (Lockheed 100)	Civil. Domestic services scheduled. Aviation fuel is available.
Wawa..... 9°54'N., 4°28'E.	Asphalt..... 4,000 x 100 750		28,160	DC-4.....	Civil. Scheduled internal services.

\*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.

and Yola, Jos and Makurdi, Oshogbo and Lokoja, Zaria and Sokoto, and Aba and Ogoja. Carrier-equipped open-wire lines extend beyond the radio-relay system to several outlying towns, including Nguru, Benin City, Ijebu Ode, Enugu, and Kafanchan. Radiocommunication stations supplement these networks. A continuing program of installing automatic exchanges has resulted in more and better telephone service in major towns, but smaller towns still have manual exchanges. In early 1972 Nigeria had about 82,000 telephones.

The principal international facility is a high-frequency radiocommunication station of the Nigerian External Telecommunications, Ltd. (NET), with transmitting and receiving sites at Lagos. Direct radiocommunication circuits to some 20 African and world capitals provide two-way telephone, telegraph, and telex service. Secondary international radiocommunication stations are at Kano (circuits to Fort-Lamy, Chad, and Zinder, Niger) and Yola (circuit to Garoua, Cameroon). Old single-channel submarine telegraph cables connect Lagos to Accra, Ghana, and

Cotonou, Dahomey. Low-capacity VHF radio-relay links cross the border westward to Porto-Novo, Dahomey, and eastward to Buea, Cameroon. A recently completed earth satellite communication station is located at Lalate, approximately 90 miles north of Lagos. In addition to improving international telephone and telegraph communications with Nigeria, the station will be equipped to relay international TV programs. International communications are integrated with Nigeria's telephone and

telegraph nets in Lagos and relayed between Lagos and the Lalate station by a microwave circuit.

Special-purpose telecom facilities are operated by government and private organizations, such as the police; aeronautical, maritime, and railway authorities; and marketing and export organizations. Business enterprises operate networks for various purposes, one of the largest being the radio-relay system of the Shell-BP Petroleum Development Company of Nigeria, Ltd., for pipeline control in the

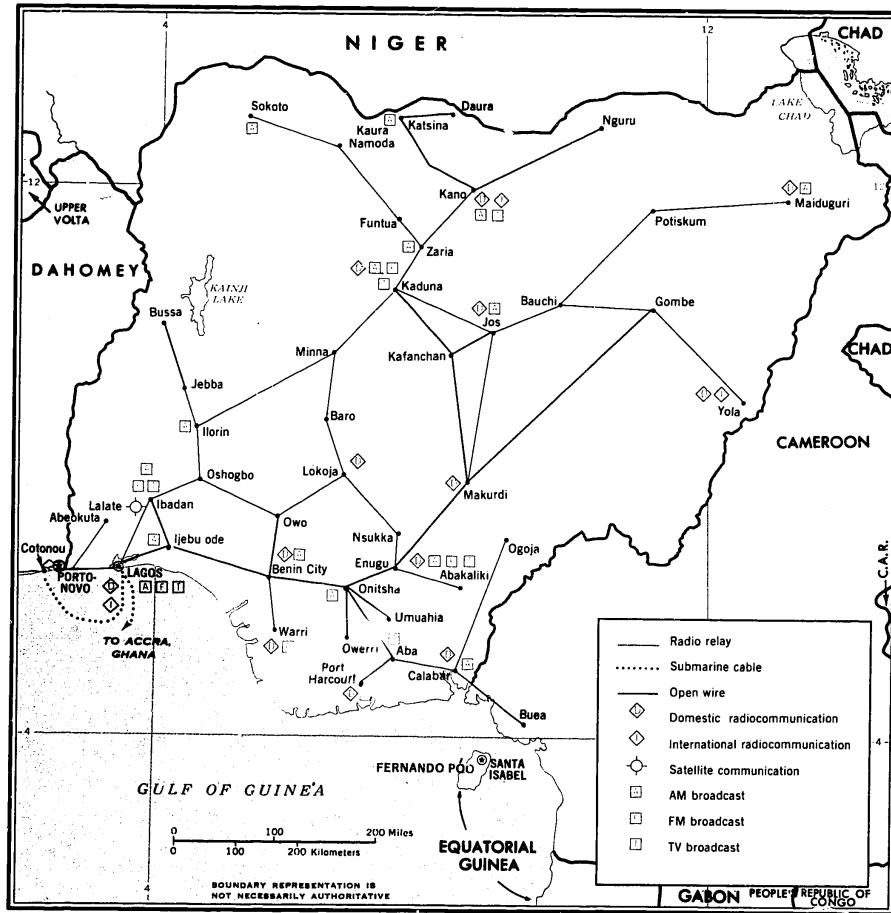


FIGURE 11. General telecommunications pattern (C)

vicinity of Port Harcourt. Special military radiocommunication facilities are operated by Nigerian Signals, an organization which employs some British Army personnel. In the event of a national emergency, the internal security organization is authorized to assume control of any government or private facilities needed to augment those of the military forces and the police.

The Nigerian Broadcasting Corporation (NBC) has AM radiobroadcast transmitters at 17 towns throughout the country. They range in power from 0.25 to 250 kilowatts (kw.) and broadcast on both medium and high frequencies for local and international coverage. The largest NBC high-frequency transmitters, 100 kw. for international broadcasts, are at Lagos. In addition, the Broadcasting Company of Northern Nigeria (*Radio Television Kaduna*) has a station with 10- and 250-kw. transmitters at Kaduna. The Western Nigeria Radiovision Service (*Western Nigeria Broadcasting Service*) has stations with 10-kw. transmitters at Ibadan and Lagos. The largest AM radiobroadcast station in the country is a 500-kw. transmitter of the Eastern Nigeria Broadcasting Corporation (*East-Central State Broadcasting Service*) at Enugu. The NBC also has 1-kw. FM stations at Enugu, Ibadan, Kaduna, and Lagos; the Western Nigeria Radiovision Service has a small 50-watt FM station at Ibadan.

Separate TV stations at Ibadan and Lagos are owned by the NBC and the Western Nigeria Radiovision Service; those at Zaria, Kaduna, and Kano by the Broadcasting Company of Northern Nigeria, and those at Aba and Enugu by the Eastern Nigeria Broadcasting Corporation. The number of radio receivers in Nigeria is estimated at between 1.3 million and 3 million and the number of TV receivers at 75,000.

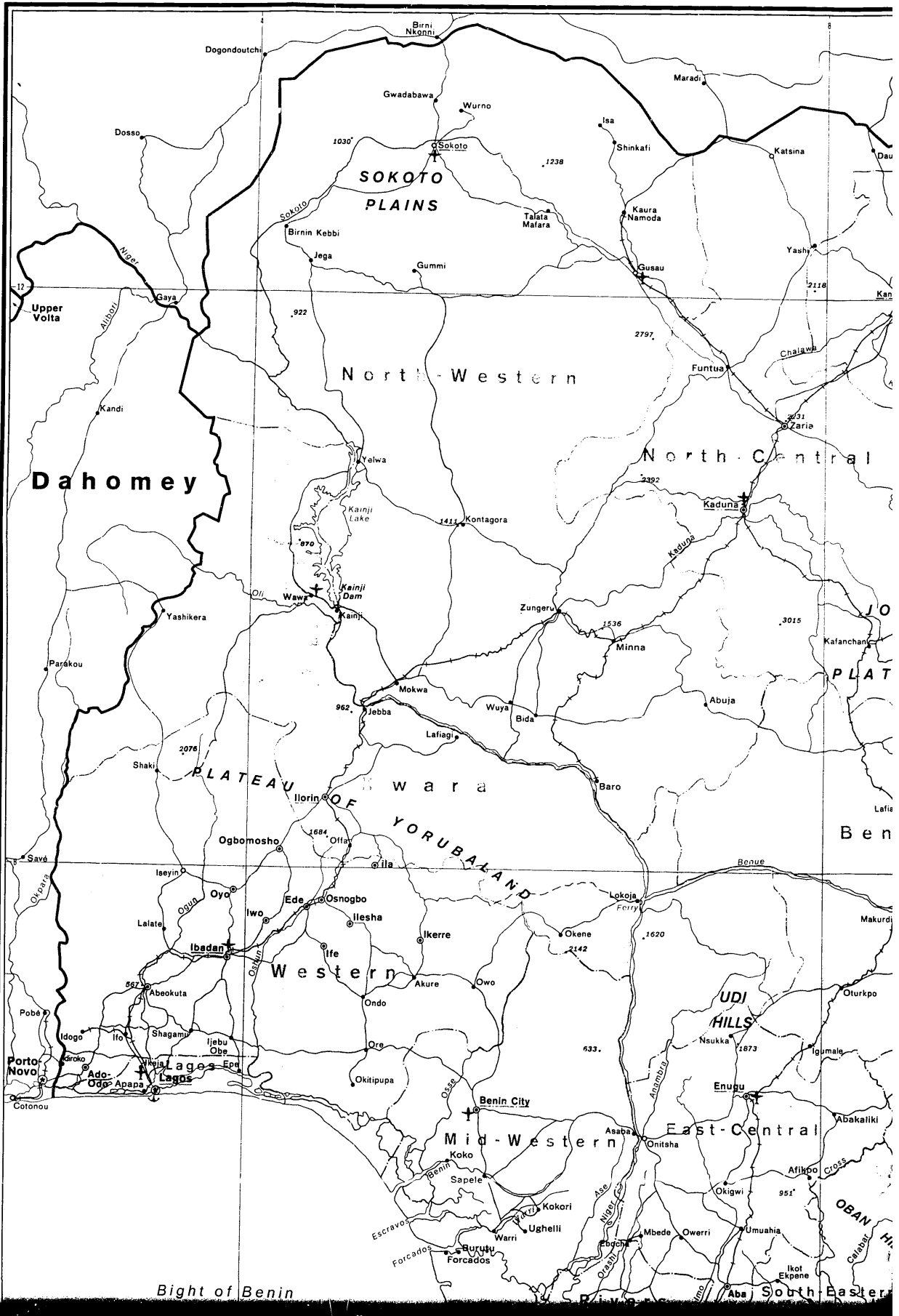
Telecommunication manufacturing is limited to the assembly of radio receivers at a factory near Lagos. All other equipment must be imported. The major items of equipment required for the telecommunication development program are obtained from world suppliers, the largest of which have been U.K., Canadian, and U.S. companies. Technical training of personnel has been provided by the foreign suppliers of newly installed complex equipment.

Future projects envision a continuation of the fourth step of the Nigerian National Telecommunication Plan, which includes increases in automatic telephone exchanges, in urban cable systems, and in radio-relay links.

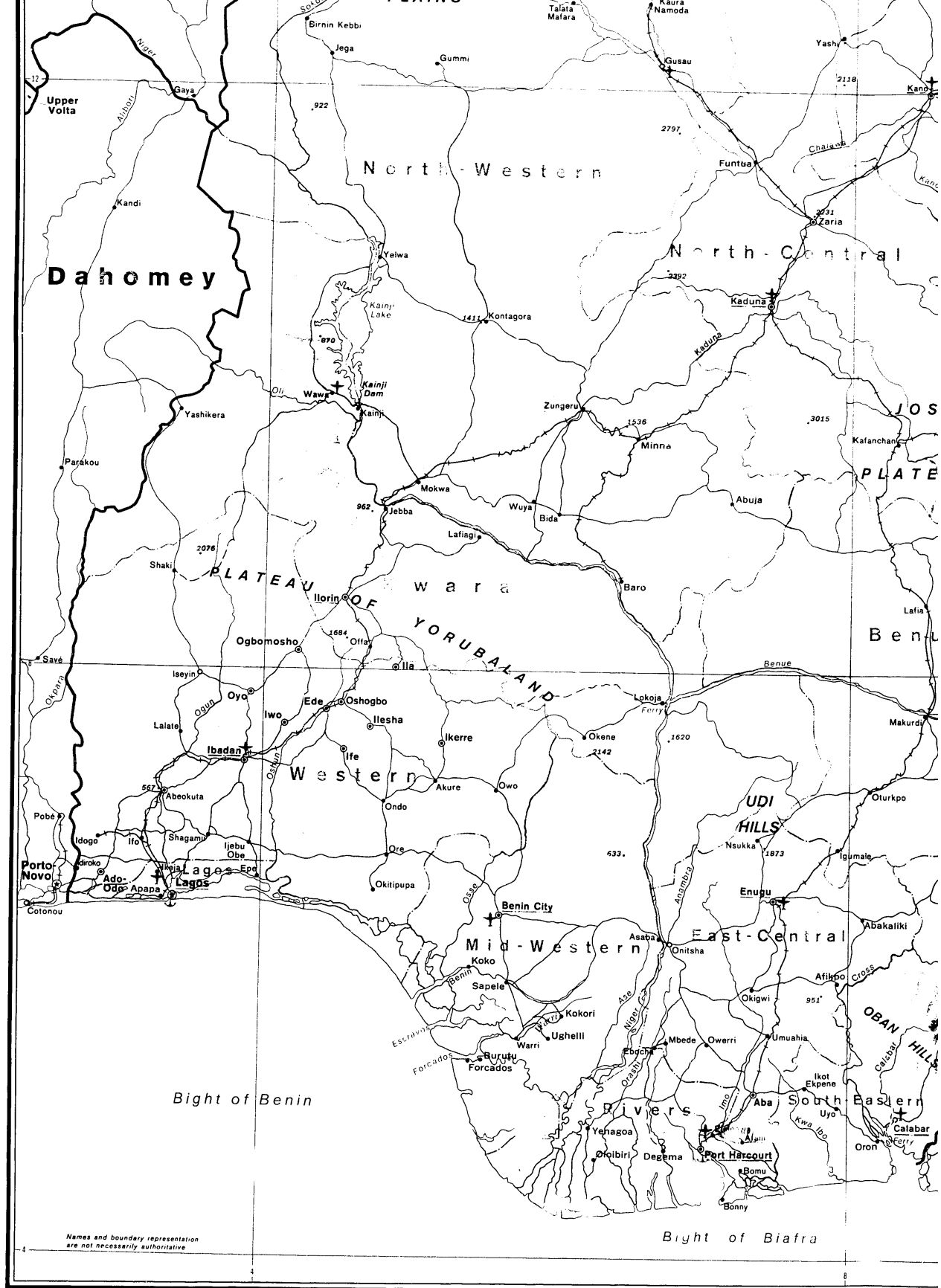
The telecommunication pattern of Nigeria is shown in Figure 11.









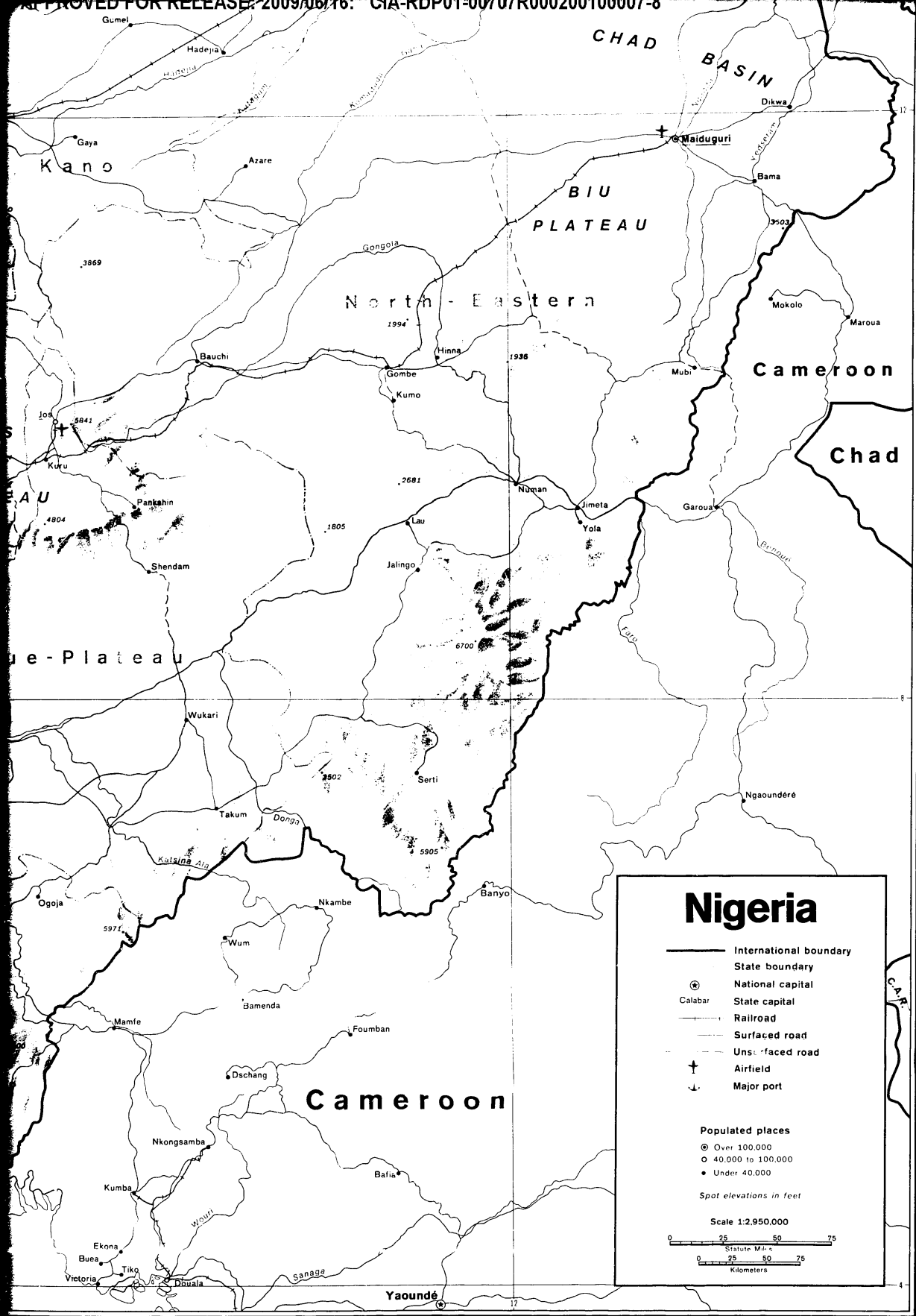


Names and boundary representation are not necessarily authoritative

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Terrain and Transportation Figure 12

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