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Yemen (Ṣan'a')

April 1973

Transportation and Telecommunications

NATIONAL INTELLIGENCE SURVEY

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NATIONAL INTELLIGENCE SURVEY PUBLICATIONS

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APPROVED FOR RELEASE: 2009/06/16: CIA-RDP01-00707R000200100030-2

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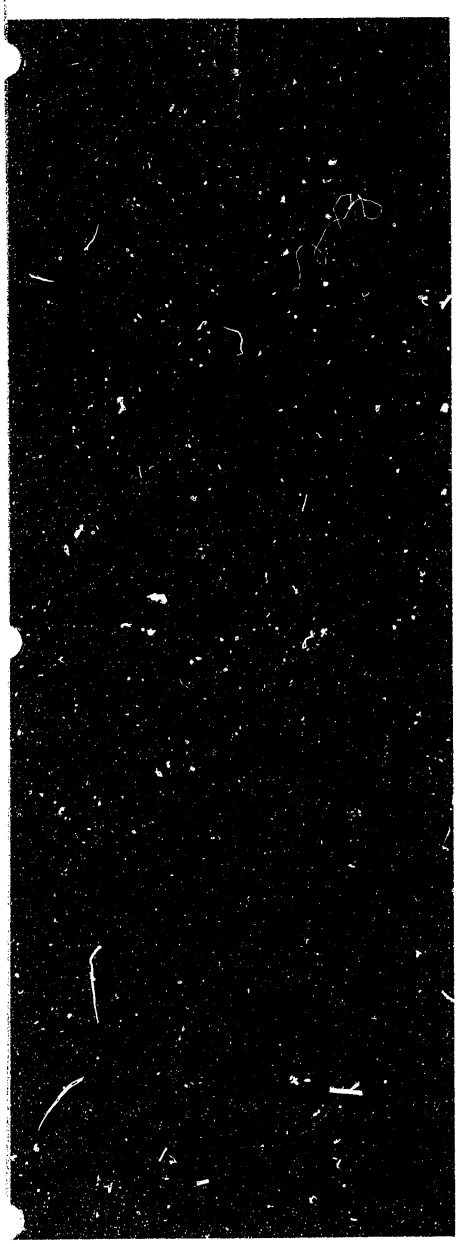
This chapter was prepared for the NIS by the Defense Intelligence Agency and includes a contribution on airfields from the Defense Mapping Agency, Aerospace Center. Research was substantially completed by January 1973.



YEMEN (SAN'A')

CONTENTS

This General Survey supersedes the one dated June 1970, copies of which should be destroyed.

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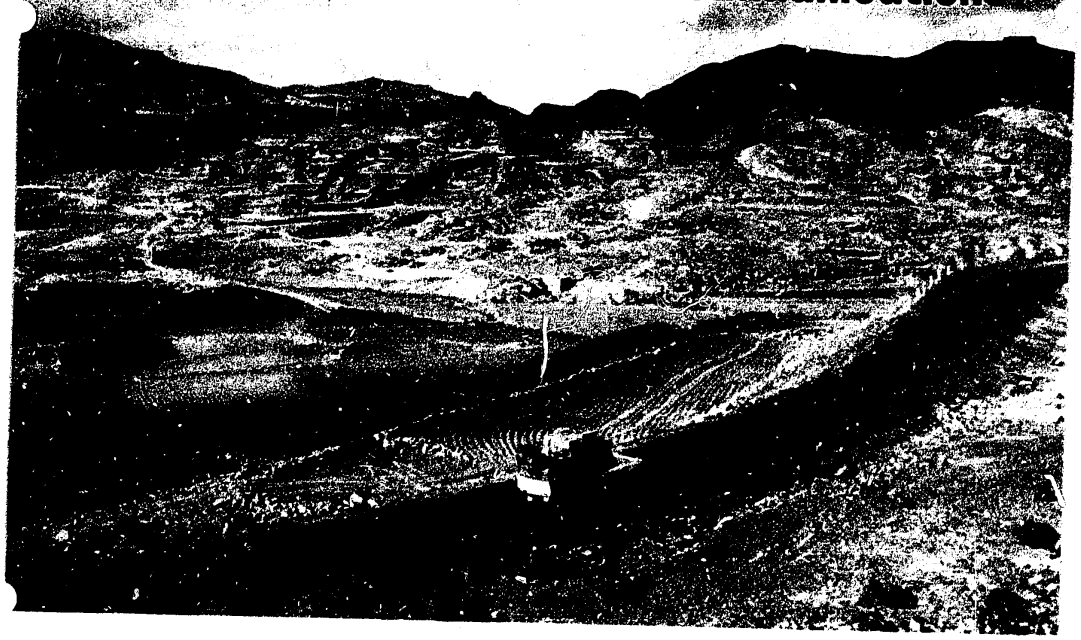
FIGURES

Transportation and Telecommunications



A. Summary (C)

1. Systems

Transportation and telecommunications (telecom) in the Yemen Arab Republic (Y.A.R.) are minimal and are inadequate to serve the country's requirements. The roads are the sole means of surface transport; there are no railroads, pipelines, or navigable inland waterways (Figure 12, the map at the end of the chapter). Al Hudaydah, the leading port, is the only maritime facility that has alongside accommodations for oceangoing vessels. Yemen has no merchant marine and only limited civil aviation facilities.

Beasts of burden, especially camels, provide transportation in many areas served only by trails and tracks. The lack of roads has hindered the development of agricultural areas, impeded trade, and made the distribution of commodities to isolated towns and villages difficult. Transportation is the responsibility of the Ministry of Works. Projects for improving transportation include construction of new roads from Zahran (Saudi Arabia) to Sa'dah; and bituminous surfacing of the San'a' to Ta'izz road.

The meager telecommunications system consists of intercity service provided mainly by an antiquated open-wire telegraph network supplemented by high-frequency point-to-point radiotelegraph stations. A new high-frequency transmitter at San'a'[1] carries telephone and teleprinter messages into the worldwide Cable and Wireless, Ltd. net via Aden and the satellite ground station at Bahrain. The Ministry of Communications controls telecommunications; radiobroadcasting is operated by the Yemeni Broadcasting Authority.

2. Strategic mobility

The supply and movement of military forces in Yemen would be greatly impeded by the poor land transportation system. There are no railroads, and the

[1]For diacritics on place names see the list of names on the apron of the Terrain and Transportation map, the map itself, and the maps in the text.

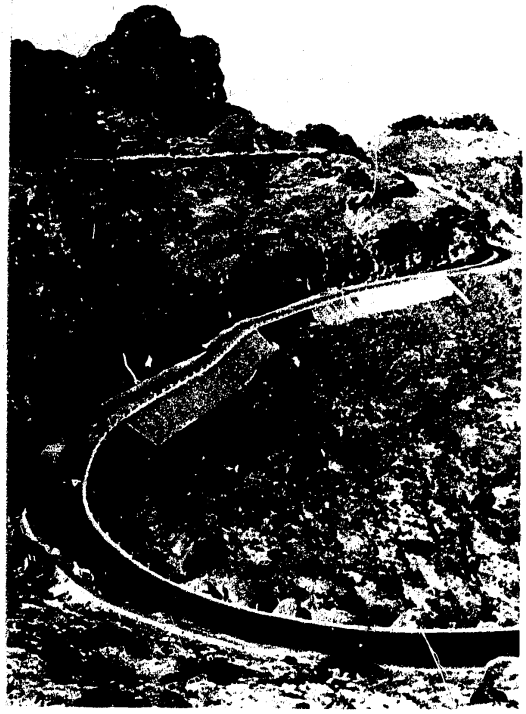


FIGURE 1. The mountainous portion of the Chinese-built San'a' to Al Hudaydah road has been reinforced to prevent collapse during periods of heavy rainfall (U/OU)

highway network could not support sustained military movement. A severe lack of surfaced highways and suitable alternate routes and the extremely rugged terrain make land movement very difficult. Lacking a merchant marine, Yemen would have to rely on the leasing of ships or other assistance to provide for any seaborne supply operations. The coastline has few harbors, and only the port of Al Hudaydah has alongside accommodations for oceangoing vessels; these modern facilities have been used by Egypt and the U.S.S.R. to land military stores. The remaining port facilities are worked mainly by lighterage and have limited military port capacity.

All civil aircraft and indigenous personnel would be available to the military in case of war or national emergency; however, the withdrawal of foreign pilots and technical personnel would severely limit operational capability. The only significant international airfield, Rawdah, is capable of supporting C-130 type aircraft and has limited maintenance and communications facilities. Sadah New can also support C-130 aircraft. Al Hudaydah New and Sana South, both military fields, can support C-131 type aircraft, while Al Bayda, Harad, and Qaflat Udhr can support C-47's. All have limited to poor auxiliary facilities. Only the runways at Al Hudaydah New, Rawdah, Sadah New, Sana South, and Taizz New have permanent surfaces.

Telecommunications facilities, among the worst in the Middle East, consist of meager open-wire lines and low-power radio communications stations. Vulnerability is high because of the isolation of many installations, the tenuous nature of the wire lines, and the absence of alternative routes. Conditions impeding

FIGURE 2. The San'a' – Al Hudaydah road a few miles west of San'a' (U/OU)

construction and maintenance include the mountainous terrain and sand and dust storms.

B. Highways (C)

The highway system of Yemen is sparse and confined mainly to the southwest quarter of the country. The basic system consists of three routes: 1) Al Hudaydah to San'a' (Figures 1 and 2), 2) Mocha to San'a' via Ta'izz (Figure 3), and 3) Al Hudaydah southeast to the Mocha-Ta'izz road. These roads link the major population centers and port areas. Access roads are planned or under construction to connect the basic system to nearby towns and villages. The remaining three-quarters of the country is served by unsurfaced roads and motorable desert tracks (Figure 4). The roads are comparable to those of neighboring countries. International connections with Saudi Arabia are by motorable track or unsurfaced earth roads; connection with Yemen (Aden), a traditional trading area, is via a single gravel-surfaced road and several tracks and earth roads.

The highway network totals about 2,160 miles consisting of approximately 290 miles of bituminous and bituminous surfaced highways, 270 miles of gravel, and 1,600 miles of earth roads and motorable tracks. Surface widths on the bituminous surfaced highways range from 20 to 26 feet; shoulders are 3 to 6 feet wide. These roads are in fair to good condition.

Gravel surfaced roads are 24 feet wide and have 3- to 6-foot shoulders; condition of these routes is probably fair to good. Unsurfaced roads and motorable tracks are 6 feet or more wide; the width is dependent on restrictions of the adjoining terrain. Dry

FIGURE 3. Steep gravel segment about 50 miles north of Ta'izz on the Ta'izz to San'a' road (U/OU)

FIGURE 4. Typical desert track, located north of Al Hudaydah (U/OU)

wadi beds often serve as roads. Condition of unsurfaced roads and tracks varies from poor to fair.

The only two major structures on the network are on the Al Hudaydah to San'a' route. The longest is a 155-foot reinforced-concrete deck bridge located about 30 miles east of Al Hudaydah. Another large reinforced concrete structure is located just west of San'a'. Many smaller bridges and culverts are located on the main routes. Because of the lack of perennial streams, many wadies are crossed by paved fords. The network has no tunnels, galleries, or ferries.

The Ministry of Works is nominally responsible for road construction and maintenance. All of the major surfaced roads, however, have been designed and constructed by engineers from the United States, the Soviet Union, and the People's Republic of China, using their own trained personnel to supervise local unskilled or semiskilled labor. Chinese and Soviet contractors have left small maintenance teams to help administer those roads built by them. Most construction and maintenance problems stem from the rugged terrain and the climate. In highland areas, where much of the population is concentrated, considerable excavation, blasting, embankments, and retaining walls are required. Maintenance problems in highland areas include clearing rock slides and removing debris from paved fords. In desert areas, sand dunes, drifting sand, intense summer heat, sand and dust storms, and lack of water present construction and maintenance problems. Road construction and maintenance require special efforts along the Red Sea coast, because occasional thunderstorms result in flash floods that overflow wadi beds and undermine paved fords and culverts. In irrigated areas numerous ditches and culverts are required. There is an abundant supply of sand and gravel and of stone suitable for crushing. Bituminous materials, lumber and timber, and reinforcing and structural steel must be imported. The U.S. contractors left behind an assortment of roadbuilding equipment.

Highway development in Yemen continues to be largely performed by foreign contractors. A West German firm is currently applying a bituminous surface and realigning the San'a'–Ta'izz highway. Chinese contractors are applying a bituminous surface to the road from San'a' to Sa'dah, and may be involved in improving a spur from this road west to Hajjah. The U.S.S.R. has been surveying potential road links from Al Hudaydah to Maydi and Maydi to Sa'dah. All of these projects will provide the northern part of Yemen with its first bituminous highways. The government of Saudi Arabia has recently awarded contracts to a U.S. company for the construction of roads from Qizan, Saudi Arabia, to Al Hudaydah and Zahran, Saudi Arabia, to Sa'dah.

In addition to these projects, the International Development Association (IDA) has granted Yemen US$7.7 million for a number of highway projects to include the construction of a 42-mile road from Ta'izz to At Turbah including supervision of construction by consultants; feasibility studies of three secondary roads of about 290 miles, and detailed engineering of about 160 miles of these roads determined to be of high economic priority; purchase of equipment for feeder road construction, highway maintenance, and engineering; technical assistance to help establish and operate a highway authority; and overseas staff training. The estimated completion date for these projects is late 1975.

The greatest seasonal traffic hazard results from the intense heat and accompanying dust and haze. Infrequent rains occur in sudden cloudbursts and wash out sections of roads. Usually no road drainage is provided, because it is less expensive to repair occasional washouts than to provide adequate drainage facilities. Other restrictions include narrow, poor road surfaces, sharp curves and steep grades in the mountains, and sand drifts in the deserts.

Some government control over highway transportation exists, but the development of the industry is at a low level. Most trucks are owner operated, and the number of firms having more than a few vehicles is probably small. Operations are mainly limited to local short-distance hauling and the transport of farm-to-market commodities. There is some long-distance hauling between the Red Sea ports and the highland consumer areas, and between Yemen (San'a') and Yemen (Aden), particularly on the route from Ta'izz southeast to Aden. Camels and donkeys are still used for local traffic and afford access to many populated areas not served by roads. Buses offer service on the Mocha-Ta'izz-San'a'-Al Hudaydah route.

In January 1971, there were 12,596 vehicles registered in Yemen of which 10,294 were passenger cars and 2,392 were trucks and buses.

Figure 5 lists characteristics of the most important roads.

C. Ports (C)

Use of the coastline is limited by the scarcity of harbors, foul nearshore approaches (particularly in the north), and difficulty of access to the interior. The country has three major ports: Al Hudaydah (Figures 6, 7, and 8), As Salif, and Mocha; and two minor ports: Al Luhayyah and Maydi. Al Hudaydah was

FIGURE 5. Selected highways (C)

ORIGIN AND DESTINATION	DISTANCE	SURFACE TYPE	SURFACE WIDTH	SHOULDER WIDTH	REMARKS
	Miles		*Feet*		
Mocha to San'a' via Ta'izz	225	Gravel	24	3-6	Built by U.S. in 1965-66. No major bridges. Flat to mountainous alignment. The segment from Mocha to Ta'izz has many culverts and is subject to flooding (Apr.-Sept.). From Ta'izz to San'a' the road has numerous curves and grades, but is being realigned, widened, and bituminous surfaced.
Ta'izz to Yemen (Aden) border	40	Gravel; some improved earth	24	3-6	Built by U.S. in 1966. Hilly to mountainous alignment. Subject to flooding.
Al Hudaydah to San'a'	140	Bituminous	20-26	3	Built by People's Republic of China, 1962-67. Many sharp curves and steep grades; 55 bridges/culverts. Concrete causeway, 540 ft., over a wadi, 14 miles east of Al Hudaydah. Flat to mountainous alignment.
San'a' to Saudi Arabia border via Sa'dah	*200				
Mile 0 to 40	*40	Bituminous treatment	18-20	*na*	Built by China. Undulating to mountainous alignment.
Mile 40 to 160	*120	Improved earth	*na*	*na*	Being surfaced with bituminous materials by Chinese. Undulating to mountainous alignment.
Mile 160 to 200	*40	Unimproved earth	*na*	*na*	Hilly to mountainous alignment. Road connects with Najran oasis.
Al Hudaydah to vicinity Ta'izz via Zabid	110	Bituminous treatment	20	6	Built by U.S.S.R. 1966-69. Flat to hilly alignment.

na Data not available.
*Estimated.

FIGURE 6. Port facilities of Al Hudaydah at top center, airfield in center, and urban area at bottom (U/OU)

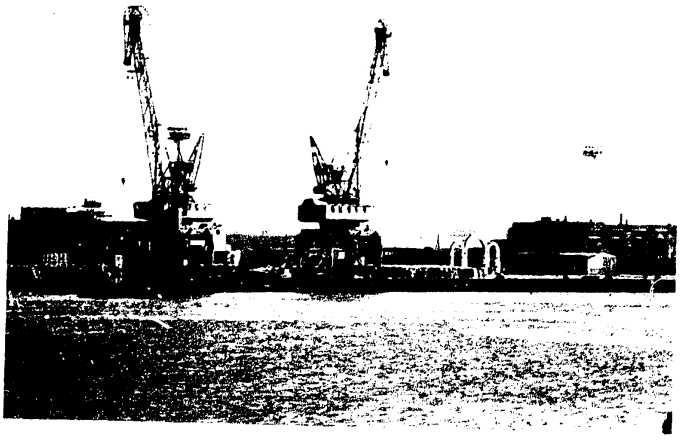


FIGURE 7. Port of Al Hudaydah (C)

FIGURE 8. Cargo loading facilities at Al Hudaydah (C)

built by the U.S.S.R. and is the only port with alongside accommodations for oceangoing vessels and modern facilities. The remaining ports are small and are worked mainly by lighterage.

Al Hudaydah is under military control; the other ports are administered by local authorities acting on behalf of the government. Al Hudaydah has important military significance, and during the civil war it was used by Egypt for landing military stores, equipment, and personnel. It is also utilized as a naval base for light craft. An extensive development program underway at As Salif includes construction of a salt-loading facility for deep draught vessels. Feasibility studies for the development of Mocha are being conducted. The ports are adequate now, but further development would be needed if Yemen were to be denied use of Aden, which at present handles a substantial but dwindling portion of Yemeni receipts.

FIGURE 9. Major ports (C)

NAME; LOCATION; MILITARY PORT CAPACITY*	ACTIVITIES	HARBOR	BERTHS
Al Hudaydah 14°48′N., 42°57′E.; SW. coast of Arabian Peninsula, 200 miles NW. of Aden. 1,600	Principal port of entry; naval base for light craft. Receipts—rice, cereals, flour, sugar, cement, petroleum products, cotton goods, machinery, manufactured goods. Shipments—coffee, cotton, hides. Minor ship repairs for harbor craft.	Open roadstead; improved basin; well protected quays and offshore pipeline berths in Khawr Kathib, shallow and shoal-encumbered bay of 20 sq. miles; depths 6 to 26 ft. Fairway limitations—5-mile-long approach channel dredged to depth of 24 ft. with width of 196 ft. leads to basin dredged to depth of 24 ft. Largest vessel accommodated—Would occupy alongside general cargo berth having depth of 26 ft., length not limiting; tanker berth with least depth of 22 ft., length 320 ft.	Alongside—2 standard ocean-type, one standard coaster-type cargo vessels; 2 standard coaster-type tankers (offshore pipeline). Anchorage—Several berths for all classes off the entrance to Khawr Kathib.
As Salif 15°18′N., 42°40′E.; 35 miles NW. of Al Hudaydah. 150	Salt shipping center; base for petroleum explorations. Receipts—machinery, manufactured goods. Shipments—salt.	Roadstead in Madiq Kamaran; protected by Kamaran Island; depths 3 to 18 ft. Fairway limitations—Berthing capability limited by berths rather than fairways. Largest vessel accommodated—Would occupy alongside berth having least depth of 7 ft.	Alongside—3 lighters. Anchorage—Numerous berths for all classes 1/4 to 1 mile offshore.
Mocha 13°19′N., 43°15′E.; 40 miles N. of Perim Island. 400	Coffee shipment port. Receipts—rice, cereals, cotton goods, petroleum products, machinery, manufactured goods. Shipments—coffee. Minor repairs for local wooden-hulled craft.	Roadstead; quay on inner side of breakwater extending from S. shore of bay; depths 5 to 13 ft. Fairway limitations—Clear and deep to roadstead; depths 5 to 13 ft. in bay restrict vessel size. Largest vessel accommodated—Would occupy alongside general cargo berth having least depth of 13 ft., length 200 ft.	Alongside—One small coaster-type cargo vessel; 2 lighters. Anchorage—Numerous berths for all classes 2 to 3 miles offshore.

*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.

Significant details of major ports are tabulated in Figure 9.

D. Civil air (C)

Civil air transport is important chiefly because of the sparseness of surface transportation facilities. Activities of the nation's flagcarrier, Yemen Airways Corporation (YAC), consist mainly of domestic operations. The YAC was created in May 1967 from Yemen Arab Airlines (YAAL), a privately owned company which had provided scheduled air services since 1961. Under the terms of an agreement with Lufthansa, the West German airline, YAC receives technical and financial assistance including scholarships. Saudi Arabian Airlines also has provided assistance in the form of aircraft and scholarships and is likely to continue its assistance. YAC is a member of the Arab Air Carriers Organization, which is patterned upon the International Air Transport Association (IATA), assuming a regional role similar to that of IATA.

YAC operates three Douglas DC-3 aircraft on scheduled domestic routes between Barat, Al Hudaydah, Sa'dah, San'a', and Ta'izz, and to the neighboring countries of Ethiopia, the French Territory of Afars and Issas, and the People's Democratic Republic of Yemen. The carrier also operates five Douglas DC-6B's (one in cargo configuration) providing international air service between Yemen and Kuwait, Qatar, and Saudi Arabia.

YAC employs about 160 persons. All of the DC-3 crews and the DC-6 first officers are Yemeni nationals. In the past, many Yemeni flight and technical personnel received training in Yugoslavia or the U.S.S.R. Currently, selected personnel are sent to the Civil Aviation Directorate School in Syria for specialized technical training. In addition, 26 students are receiving instructions at the Lufthansa training centers in Germany under scholarships provided by the West German Government. Duration of the Lufthansa training which is for pilots, air traffic controllers, and mechanics is from 2 to 3 years.

YAC's aircraft maintenance capability has been limited to routine repairs, and most of the major maintenance and overhaul requirements have been handled by airlines in Ethiopia, Jordan, and Lebanon.

Administrative functions relating to civil aviation activities are directed by the Civil Aviation Department of the Ministry of Communications. The Y.A.R. has been a member of the International Civil Aviation Organization since 1964. Yemen has civil aviation agreements or provisional arrangements with eight countries including the U.S.S.R. Yemen is served by five foreign airlines which conduct scheduled flights to six regional countries and the U.S.S.R.

E. Airfields[2] (C)

Yemen has 24 airfields and 10 former airfield sites; there are no seaplane stations. Eighteen airfields are civil landing grounds, five are military airfields, and two are joint military/civil facilities. Airfields are distributed almost evenly across central and western Yemen with the largest concentration along the southwestern coast.

The airfield system is barely adequate, not nearly as well developed as those of other Arab countries such as Egypt. The only significant international airfield, Rawdah, has a 10,650-foot asphalt runway capable of supporting C-130-type aircraft. This airfield has taxiways and aprons plus limited maintenance and communications facilities. Sadah New, a recently completed civil/military airfield is capable of supporting C-130 type aircraft. Taizz New, also a joint civil/military airfield, handles civil airlines as well as medium-size military transports. As Salif East, Harib, Marib, and Wadi Jauf are civil airfields capable of handling light civil or military aircraft, but all have extremely limited auxiliary facilities. Al Hudaydah New, the best military base in Yemen, and Sana South are the two largest military airfields. Each is able to support up through C-131-type aircraft. The smaller military landing strips such as Al Bayda, Harad, and Qaflat Udhr can support C-47's, but have poor auxiliary facilities.

Al Hudaydah New, Rawdah, Sadah New, Sana South, and Taizz New have permanent surfaced runways. Al Hudaydah New and Rawdah have taxiways and aprons capable of handling operational military aircraft or supporting cargo and airline schedules.

Yemen has 14 airfields with temporary surfaces and six with natural surfaces. Very few have taxiways, lighting, communications, or maintenance facilities. Airfield maintenance practices and support and service facilities are believed to be inadequate. There is no new airfield construction underway.

Figure 10 lists characteristics of the most important airfields.

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[2]For detailed information on individual air facilities in Yemen (San'a'), consult Volume 16, *Airfields and Seaplane Stations of the World*, published by the Defense Mapping Agency, Aerospace Center for the Defense Intelligence Agency.

FIGURE 10. Selected airfields (C)

NAME AND LOCATION	LONGEST RUNWAY: SURFACE DIMENSIONS; ELEVATION ABOVE SEA LEVEL	ESWL*	LARGEST AIRCRAFT NORMALLY SUPPORTED	REMARKS
	Feet	*Pounds*		
Al Bayda 14°06′N., 45°26′E.	Gravel 6,000 x 175 6,000	14,200	C-47	Military. Military staging field.
Al Hudaydah New 14°45′N., 42°59′E.	Asphalt 9,845 x 130 39	60,160	C-131	Military. Aviation and jet fuels, oxygen, lighting, lube, and maintenance available.
As Salif East 15°18′N., 42°52′E.	Graded earth 6,000 x 150 100	14,200	DC-3	Private. Oil company field.
Qalat Marinaf 16°00′N., 43°11′E.	Graded earth 8,202 x 098 1,500	28,160	C-54	Military. Auxiliary field.
Rawdah 15°28′N., 44°13′E.	Asphalt 10,650 x 150 7,218	35,500	C-130	Joint. Fuel, oil, lighting, oxygen, navaids and servicing available.
Sadah New 16°58′N., 43°44′E.	Asphalt 9,850 x 115 5,940	35,500	C-130	Joint. Newly completed airfield.
Sana South 15°19′N., 44°12′E.	Asphalt 7,800 x 165 7,800	17,034	C-131	Military. Aviation fuel, oil, lighting and minor maintenance available.
Sukhne 14°48′N., 43°26′E.	Gravel 4,500 x 200 1,160	14,200	DC-3	Civil.
Taizz New 13°41′N., 44°08′E.	Asphalt 9,130 x 170 5,840	35,500	C-130	Joint. Aviation and jet fuel available.

*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.

F. Telecommunications (C)

The telecommunications system is a meager one that dates from the early 1900's and the Turkish occupation, but it has been somewhat improved under the republican government. The original skeletal network of open-wire lines only carrying telegraph was one of the most primitive in the world. The principal towns in the central, coastal, and southern regions are connected by low capacity facilities—supplemented by radio at towns not on the wire lines; improvements over the past decade have been made with a greater reliance on radio equipment. The principal telecommunication center is San'a'; other towns with sizable facilities are Al Hudaydah and Ta'izz. Although somewhat improved over the obsolete and deteriorated system, facilities are still inadequate to support desired administrative and economic advances. Such progress as has been made would have been impossible without outside aid, and Yemen still ranks among the lowest Middle Eastern countries in telecommunication development. The total of 3,550 telephones is less than any other Middle Eastern country except Oman.

Telecommunications are administered by the Ministry of Communications. International telecommunications are under the control of Cable and Wireless Ltd., a British firm, since an agreement signed in August 1970 with the Ministry of Communications. Radiobroadcasting is managed by the Yemeni Broadcasting Authority with programing under the Ministry of Information.

Under a telecommunication aid program from East Germany, open-wire lines between Al Hudaydah, San'a', and Ta'izz have been improved and are now capable of handling 12 telephone and teleprinter channels. Supplementing the wire lines are about 20 low-power radiocommunication telegraph stations, the more important of which are shown on the map (Figure 11). Under the aid program, the automatic

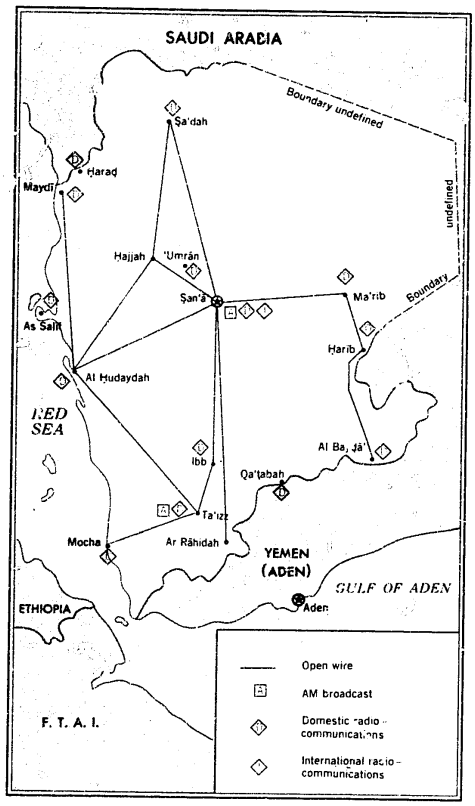


FIGURE 11. General telecommunications pattern (C)

telephone exchanges at San'a', Al Hudaydah, and Ta'izz have had new 1,000-line switchboards installed. In addition, 200-line exchanges have been installed at several smaller towns.

Cable and Wireless Ltd. completed augmentation of the San'a' radio station with a 1-kw. high-frequency transmitter early in 1971. The new station is designed to transmit telephone and teleprinter messages into the worldwide C&W net via Aden and the satellite ground station at Bahrain. Yemen, its dues paid by Kuwait, is a member of the International Telecommunication Satellite Consortium (INTELSAT); however, it has no earth station or definite plans to build one.

Special-purpose telecommunication facilities are as meager as the general civil facilities. There is one ship-to-shore coastal radiocommunication station at Al Hudaydah built in 1961 with U.S.S.R. aid. A few Yemeni airports have radio navigation equipment.

AM radiobroadcast programs are transmitted from a station at San'a' utilizing several transmitters. A 5-kw. and a 60-kw. transmitter broadcast on medium frequency for local coverage, and 5- and 25-kw. transmitters on high frequency provide national and international coverage. A 60-kw. medium wave AM transmitter is in operation in Ta'izz. Yemen is estimated to have 25,000 radio receivers.

There is no electronic equipment manufacturing capability; imports have come from the U.S.S.R., East Germany, France, the United Kingdom, and West Germany. Technical personnel are few despite Yemeni efforts to have them trained at home and abroad by foreign contractors. Government efforts to develop telecommunications face great obstacles because of these shortages. There is some prospect of Saudi Arabian aid for a communications satellite station, and for United Arab Emirates' assistance in the form of a radiobroadcast transmitter. Disappointment with Arab-world response to appeals for aid were a factor in the renewal of relations with the United States, from which Yemen expects help in the telecommunications field.

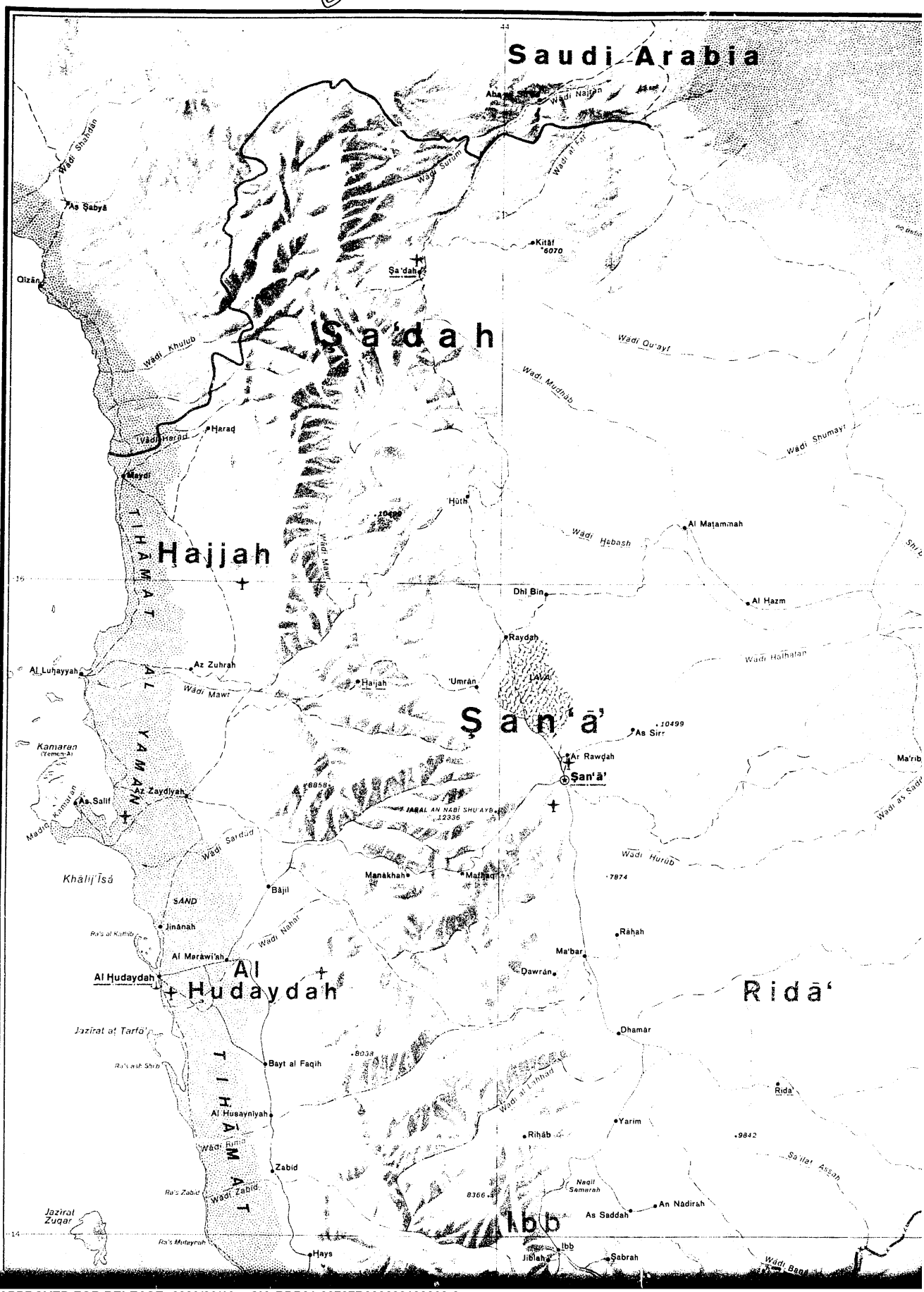
Places and features referred to in the General Survey (U/OU)

	COORDINATES	
	° 'N.	° 'E.
Abā as Su'ūd, Saudi Arabia	17 28	44 06
Aḍ Ḍali'	13 42	44 43
Aden, Yemen (Aden)	12 46	45 01
Aḥmadī	14 48	42 57
Al Bayḍā'	13 58	45 36
Bayt al Faqih	14 31	43 17
Al Ḥudaydah	14 48	42 57
Al Luḥayyah	15 43	42 42
Al Luḥayyah (*port*)	15 42	42 42
Ar Rāhidah	13 20	44 17
Asir, Saudia Arabia (*region*)	19 00	42 00
As Salif	15 18	42 41
At Ta'if, Saudi Arabia	21 16	40 24
At Turbah	13 02	43 54
Az Zaydīyah	15 18	43 04
Bab el Mandeb (*strait*)	12 30	43 20
Bahrain (*island*)	26 00	50 30
Bājil	15 04	43 17
Balaq	15 19	45 23
Banī al Ḥarith	15 38	45 10
Banī al Ḥarith (*tribal area*)	15 38	44 10
Bu'set	13 35	44 39
Da'ān	16 01	43 50
Dhamār	14 46	44 23
Dhofar, Saudi Arabia (*region*)	17 00	54 10
Hadhramaut (*region*)	15 00	50 00
Ḥajjah	15 42	43 34
Ḥaraḍ	16 28	43 04
Ḥarib	14 57	45 30
Ibb	13 58	44 12
Jiblah	13 56	44 10
Jidda (Juddah), Saudi Arabia	21 30	39 12
Jīsayn	16 59	44 11
Kamarān, Yemen (Aden) (*island*)	15 21	42 34
Khawr Kathib (*bay*)	14 52	42 57

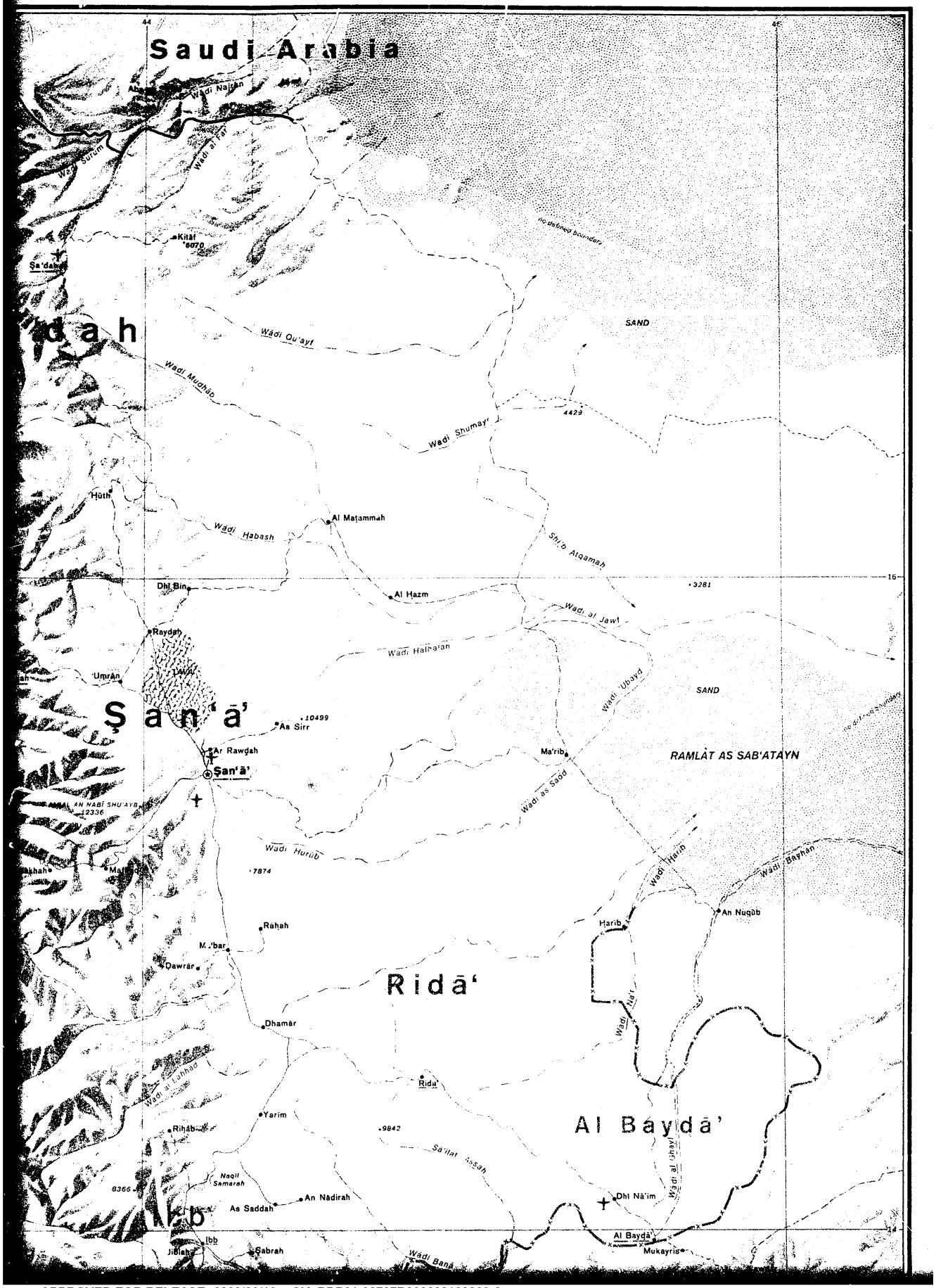
	COORDINATES	
	° 'N.	° 'E.
Kirsh, Yemen (Aden)	14 37	46 45
Maḍiq Kamarān (*channel*)	15 20	42 38
Mafḥaq	15 07	43 54
Manākhah	15 07	43 44
Ma'rib	15 30	45 21
Maydī	16 18	42 48
Mocha	13 19	43 15
Najran, Saudi Arabia (*oasis*)	17 30	44 10
Perim, Yemen (Aden) (*island*)	12 39	43 25
Qa'ṭabah	13 51	44 42
Qizān, Saudi Arabia	16 54	42 32
Ramlat as Sab'atayn (*dunes*)	15 30	46 00
Ridā'	14 28	44 53
Riyadh, Saudi Arabia	24 38	46 43
Rub' al Khali (*desert*)	20 00	51 00
Sa'dah	16 57	43 44
Salif, Ra's as (*point*)	15 19	42 40
San'a'	15 23	44 12
Ta'izz	13 38	44 02
Tihāmah (*area*)	14 03	47 55
Uqdah, Saudi Arabia	14 07	43 05
Wādī Zabīd (*wadi*)	14 09	43 18
Zabīd	14 12	43 18
Zahrān, Saudi Arabia	17 40	43 30
Selected Airfields		
Al Bayda	14 06	45 26
Al Hudaydah New	14 45	42 59
As Salif East	15 18	42 52
Qalat Marinaf	16 60	43 11
Rawdah	15 28	44 13
Sadah New	16 58	43 44
Sana South	15 19	44 12
Sukhne	14 48	43 26
Taizz New	13 41	44 08

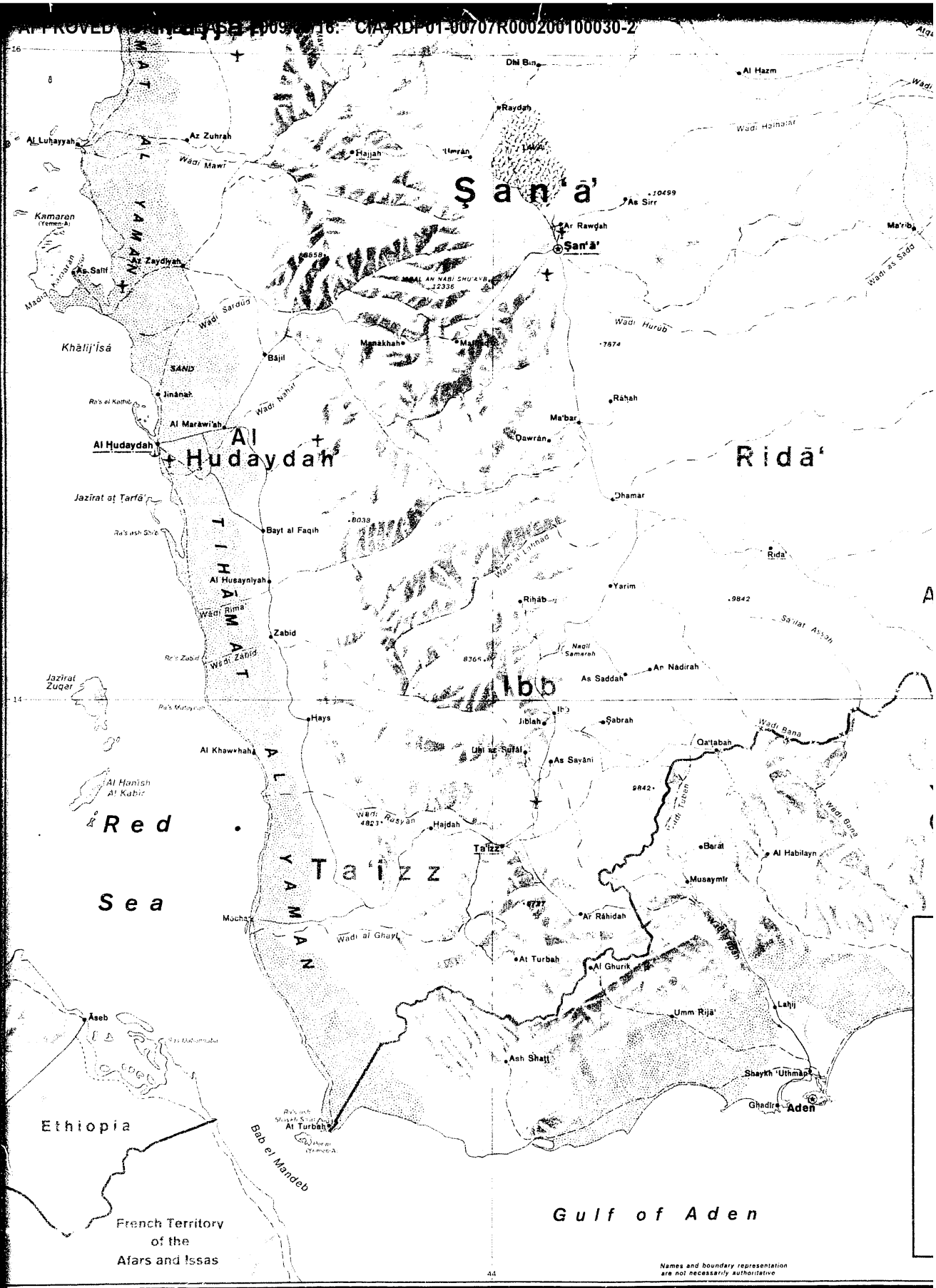
(1)

(2)



(3)





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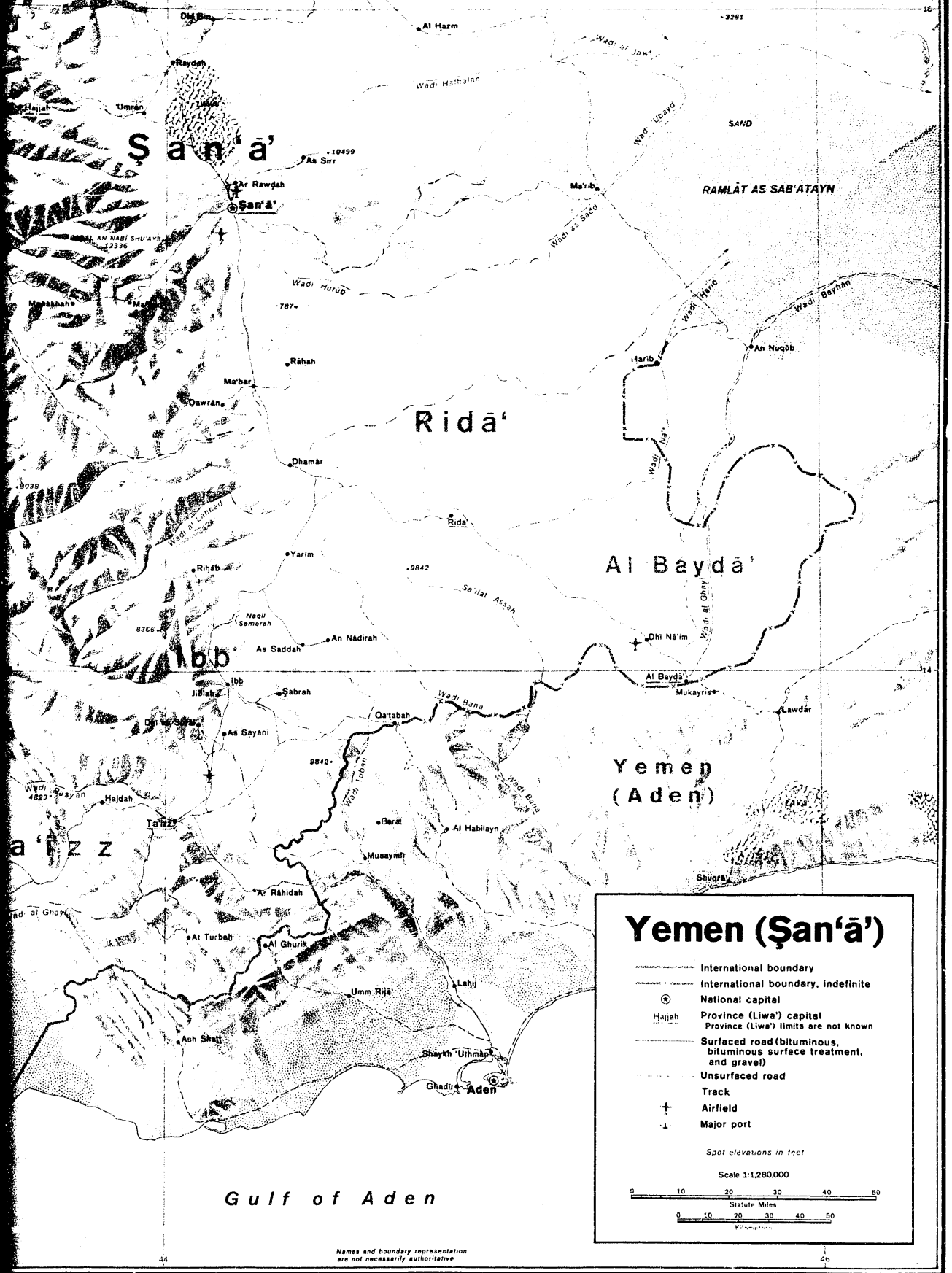

Use Only (4) (5)

Terrain and Transportation Figure 12

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