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Greece

March 1974

NATIONAL INTELLIGENCE SURVEY

CONFIDENTIAL

37

Transportation and
Telecommunications

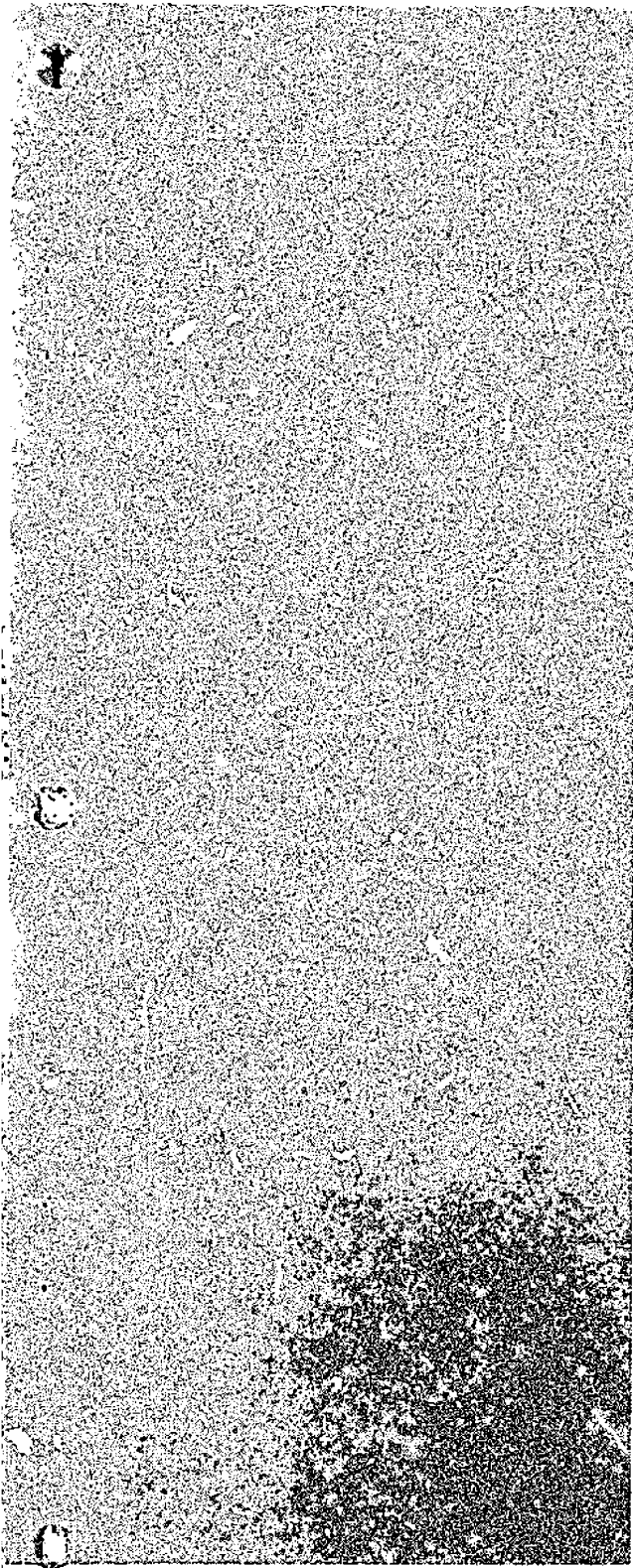
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Greece

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Transportation and Telecommunications

A. Appraisal (C)

The transportation (Figure 8) and telecommunication (telecom) systems of Greece are sparse and of limited capability, comparing unfavorably with those of most Western European countries. Surface transportation, consisting mainly of highway transport and coastal shipping, is severely taxed to meet requirements. Telecommunications, especially international and broadcast facilities, have improved significantly in recent years and now meet basic national requirements. Radio relay is the primary intercity means of transmission.

With the population concentrated mostly along the deeply indented coasts of the mainland and islands, and with the characteristically mountainous terrain inhibiting the development of surface transportation, Greece is heavily dependent upon maritime shipping for domestic and international commerce. Along its lengthy coasts are 17 major and 37 minor ports. These maritime shipping bases provide the only surface transportation outlets on the numerous Greek islands.

Highway transport is the dominant mode of overland transportation; however, the road network is scantily dispersed through the mountainous interior. The railroad system is sparse, poorly developed, and of only secondary importance. Both rail and highway routes provide international connections along the northern border. Construction is underway on a new high-capacity route from Igoumenitsa¹ to Alexandroupolis near the border with Turkey and on a four-lane divided highway extending from Thessaloniki north to Yugoslavia. A 125-mile through road is being built along the northern coast of Crete.

Civil aviation carries a sizable share of the international passenger traffic. The civil air fleet is small but expanding, and the country is served by 36 well distributed airfields. Most of the telecom facilities are owned and operated by the government. With the exception of a 17-mile commuter line, the railroads are

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

owned and operated by the government. The facilities for the other transportation modes are privately owned and operated.

B. Strategic mobility (C)

The surface transportation and telecom systems could not sustain large-scale military operations. The sparsity of the rail and highway networks would seriously limit major force movement and supply. The predominantly single-track rail system, unevenly distributed and lacking in alternate routes, is hindered by light track structure, small yards, and short passing tracks. Standard-gage lines extend northward from the Piraeus-Athens area to the borders of Yugoslavia, Bulgaria, and Turkey and connect with the meter-gage lines in central Greece and with those encircling the northern part of the Peloponnese. However, facilities for interchange between the two gages are very limited. The highway network has many miles of narrow, poorly surfaced roads that would impede heavy military traffic. Movement is further complicated by numerous physical bottlenecks on the network including ferry crossings, fords, underpasses, narrow and low capacity bridges, defiles, sharp curves (including hairpin curves), and steep grades. Climate, principally rain and snow, also affects highway movement. Heavy snow from December through February slows or blocks traffic in pass areas. Rainfall occurring from October through March affects the trafficability of unsurfaced roads, causes inundations and washouts on low-lying routes, and sometimes triggers landslides in the hilly or mountainous areas.

The major ports and most of the minor ports are adaptable to military use. Of the Greek oceangoing merchant fleet of 1,615 ships of 1,000 gross register tons (g.r.t.) and over, at least 1,293 ships totaling about 19,200,000 deadweight tons (d.w.t.) have military-support potential. Of these, the 949 cargo-type units (904 dry cargo, 39 refrigerator, and 6 timber carrier) have extensive potential for short-haul (up to 48 hours' steaming) troop lift and for sustained

logistics support; a large number of these ships have cargo-handling, stowage, and speed characteristics which would enhance their military utility. The dry cargo units are primarily employed in worldwide unscheduled (tramp) trade and thus might not be readily available for military support under emergency conditions. With expansion of the normal passenger capacity, and the advantage of relatively high operating speeds, the 68 passenger and 9 passenger/cargo ships would have an extensive potential for longer haul (more than 48 hours' steaming) troop transport. The tankers, with an estimated capacity of about 70 million U.S. barrels of petroleum and related products, could provide at the outset an extensive fleet-oiler and other military-support capability; however, a considerable amount of tanker tonnage is under long-term foreign charter arrangements and might not be readily available under emergency conditions. In addition to the oceangoing fleet of ships having military potential, there are about 24 automobile/passenger ferries, each of more than 1,000 g.r.t., totaling about 95,000 g.r.t., which would significantly augment the merchant fleet by providing troop lift and logistics support in near seas operations.

The 56 usable airfields are well distributed on the northern plains, along the coast, and on Crete and the other major islands. The efficient air facility system includes 23 military fields, 8 of which are affiliated with NATO. Athens, the most important airfield, can handle the largest jet aircraft. All but three fields in the mainland/Crete complex can handle C-47 or larger aircraft. All Greek civil aircraft would be available under mobilization conditions, and most of the Olympic Airways inventory is included in the air force's contingency planning. Most Olympic pilots are former Hellenic Air Force officers and could be expected to perform well in military operations.

The telecom system has improved considerably in recent years but still compares unfavorably with those of most Western European countries. The rugged terrain exerts a marked influence on construction, operation, and maintenance of telecom facilities. The irregular coastline of the mainland and the many islands originally required extensive use of submarine cables. Mountainous terrain on the mainland makes construction of open-wire lines or buried cable routes difficult and costly, necessitating the use of radio-relay systems. Destruction of a few key installations in the telecom system, particularly radio-relay junctions such as Parnis Oros near Athens and Patrai or Iraklion, would disrupt traffic on important trunk routes.

C. Railroads (C)

The state-owned Hellenic Railway comprises 969 route miles of standard-gage (4'8 1/2"), 598 miles of meter-gage (3'3 3/8"), 13 miles of 2'5 1/2"-gage, and 18 miles of 1'11 5/8"-gage lines. All lines are single track except for 62 miles of standard gage double track between Piraeus and Oinoi and Plati and Thessaloniki. The privately owned Hellenic Electric Railways consist of a 17-mile double-track commuter line in the Athens suburbs. This line, which carries seven times as many passengers annually as the national system, has no connections with the remainder of the Greek system.

The network is sparse and limited by the low throughput capacity of existing lines and the lack of alternative routes. However, the railroad provides access to the major urban and port areas in the east and northeast coastal regions of the mainland and encircles the northern part of the Peloponnese. The dendritic pattern from the main Piraeus-Athens-Thessaloniki line provides connections with the rail systems of Yugoslavia, Bulgaria, and Turkey.

In 1972 the railroad staff numbered about 11,000 of which 2,500 were contract personnel. The supply of labor is abundant, but the general level of competence is low. Greece has a railroad school, but most new skills are acquired by on-the-job training. Selected employees are occasionally sent to foreign countries for specialized schooling.

The system has 12,110 railroad bridges and culverts totaling nearly 100,000 feet in length. Most bridges are less than 250 feet long and are of steel, stone, or concrete construction. Most of the major bridges are of steel construction; the longest is the 2,083-foot structure over the Vardar River, 13 miles northwest of Thessaloniki. A new bridge carrying a second track parallels this bridge. The 135 railroad tunnels in Greece have an aggregate length of over 75,000 feet. The longest is the 6,923-foot Brallo tunnel at Gravia on the Piraeus-Thessaloniki line; it is one of 44 tunnels on a 35-mile section of line. In addition the system has 12 galleries. Most structures are in good condition, and many are of post-World War II construction. A rail ferry crosses Patraikos Kolpos (9.9 miles) and links Krionerion with Patrai on the Peloponnese.

Train movements are controlled by timetable and train orders except on the two sections of double track between Piraeus and Thessaloniki, where automatic block control is in use. Plans call for extending the automatic block to the remainder of this line. Communications are by inadequate telephone and

telegraph systems. Radio telephones are being installed on all locomotives. Signals are mechanically operated, except on the automatic sections, and consist of double-arm semaphores.

Despite modernization efforts much of the Greek equipment is old and in poor condition. Nearly 80% of the total train-miles and gross-ton-miles in 1970 was accomplished by diesel traction, but steam locomotives constituted over half of the motive power pool. Standard-gage lines all interconnect, and equipment is interchangeable. Meter-gage lines are located in three separate areas, and there are three distinct meter-gage equipment pools. Equipment for all lines is imported—locomotives and trainsets from West Germany, France, and Italy, and rolling stock from Czechoslovakia, Romania, Bulgaria, Poland, Italy, Belgium, West Germany, and East Germany. The inventory in early 1971 was as follows:

	STANDARD GAGE	NARROW GAGE
Locomotives:		
Diesel	94	43
Steam	178	90
Total	272	133
Rail cars	55	35
Freight cars:		
Boxcars	4,010	1,200
Gondolas	758	358
Flatcars	637	58
Others	1,780	138
Total	7,191	1,834
Passenger cars	357	217
Vans	94	69

Over 4,600 Greek standard-gage freight cars meet UIC (International Union of Railways) requirements for use in international traffic. Freight cars are predominantly of 2-axle design, and the average capacity is 24.6 short tons for standard-gage and 14.8 short tons for narrow-gage cars. Repair facilities are obsolete and inadequate. Principal standard-gage locomotive repair shops are located at Piraeus and rolling stock shops at Thessaloniki; there are meter-gage shops in Piraeus and Volos.

Fuel and diesel oils are refined domestically at the Aspropirgos and Thessaloniki refineries from crude oil imported from Iraq, Saudi Arabia, Egypt, Libya, Iran, the U.S.S.R., and Italy. Approximately 33,000 short tons of diesel oil are consumed annually by the railroads. Coal is imported from the United Kingdom, Turkey, and West Germany; annual consumption totals about 41,000 short tons. Supplies of water are adequate for most lines, but because of high mineral content the water should be chemically treated before it is used.

Major traffic interruptions, especially in the northern sections of the country, are caused by snowfalls and by heavy rains, which result in flooding and landslides. Steep grades and sharp curves prevailing in the mountainous terrain over much of the network make maintenance difficult. On standard-gage lines the maximum grade is 2.5%, and the minimum radius of curvature is 394 feet. On the rack section of the 2'5½"-gage line between Dhiakopton and Kalavrita, the maximum grade is 14.5%, and the minimum radius of curvature is 273 feet.

Development plans include track renewal, increasing maximum axleloads, electrifying and double tracking the Piraeus-Thessaloniki line, and installing automatic safety equipment at grade crossings. Several proposals for building new lines or widening existing narrow-gage lines to standard-gage are under consideration. New lines may be constructed between Kozani and Kalabaka, from Fanarion on the Kalabaka line to Preveza on the Ionian Sea coast, and from Kozani to Igoumenitsa on the Ionian coast. Additional proposals include building new lines from the Drama area on the Thessaloniki-Alexandroupolis line to Kavala on the coast; a branch from the existing main line, which is to cross into Yugoslavia in the vicinity of Lake Doiran; and a line from Thessaloniki to Amphipolis. Proposals to convert meter gage to standard gage include the Kalabaka to Velesinon line and the Peloponnesus line from Piraeus to Patrai.

After declining in the late 1950's and early 1960's, passenger and freight traffic stabilized during the late 1960's and has been increasing steadily in the last few years. During 1971, freight traffic amounted to 3.7 million short tons and 508.7 million short-ton-miles; passenger traffic amounted to 13.2 million passengers and 1.01 billion passenger-miles. Principal commodities consist of agricultural products construction material, petroleum, minerals, fertilizers, and industrial products.

The railroads, which operate at a loss, are subsidized by the government. The deficit in 1971 was equivalent to US\$3.68 million, and the operating ratio was 196. Over half of the operating receipts are derived from passenger traffic.

Most track maintenance is performed manually and is often inadequate. Plans call for increased mechanization of track maintenance. Track structure is light, and track conditions range from good on the Piraeus to Thessaloniki line to poor on some of the narrow-gage lines. T-section rail on the standard-gage lines is in 39.4-foot lengths and weighs from 60 to 93 pounds per yard; rail on the meter-gage lines is in 26.3-foot lengths and weighs 42 to 63 pounds per yard.

FIGURE 1. Selected railines (C)

TERMINALS AND ROUTE MILES	MAXIMUM GRADE		MINIMUM RADIUS OF CURVATURE	MAXIMUM AXLELOAD	PASSING TRACES		REMARKS
	Going	Coming			Maximum Interval	Minimum Length	
	Percent	Percent			Miles	Feet	
Piraeus-Palaiofarmos 188 miles	2.0	2.1	984	22.0	9	318	Double track Piraeus-Oinol. Two 4'8 1/2"-gauge 14-mile branch lines with similar characteristics: Oinol (MP 44)-Khaliki; Lianokladion (MP 138)-Stilia.
Palaiofarmos-Plati 112 miles	1.1	1.1	984	22.0	11	1,004	Branch line with similar characteristics, Larisa (MP 29)-Volos, 38 route miles.
Plati-Thessaloniki 23 miles	1.9	1.5	984	22.0		Remarks	Double track, 6-mile maximum interval between signals.
Plati-Neos Kavkasos 103 miles	2.5	2.5	984	Remarks	12	898	Maximum axleload: 22 short tons Plati-Amindaion; 15.4 short tons Amindaion-Neos Kavkasos. International rail connection with Yugoslav RR. system at Neos Kavkasos. Two branch lines with similar characteristics: Armenokhorion (MP 95)-Florina, 3 route miles; Amindaion (MP 77)-Kozani, 37 route miles.
Thessaloniki-Idbomeni 47 miles	1.1	0.9	984	22.0	10	1,040	International rail connection with Yugoslav RR. at Idbomeni.
Thessaloniki-Ormenion 364 miles	2.5	2.5	984	Remarks	17	984	Maximum axleload: 23.1 short tons Thessaloniki-Alexandroupolis (MP 274); 9 tons Alexandroupolis-Ormenion. 9-mile branch line with similar characteristics Sidhirokastron (MP 81)-Bulgaria border. International rail connections with Bulgaria RR. N. of Sidhirokastron and 3 miles N. of Ormenion. Main line traverses Turkish territory for several miles, passing through Edirne, Turkey. Just S. of Pithion (MP 345) a short branch line extends E. to border connecting with Turkish RR.
Volos-Kalabaka 99 miles	3.0	2.1	492	0.9	8	465	An 18-mile 1'11 3/4" narrow-gauge line runs Volos-Mileai.
Piraeus-Corinth 62 miles	2.5	2.5	1,640	15.4	9	440	
Corinth-Zevgoulion, via Patrai 147 miles	2.0	2.2	394	15.4	12	413	Six branch lines with similar characteristics: Kavassilas (MP 122)-Killini, 10 route miles; Kavassilas-Loutra, 11 route miles; Pirgos (MP 143)-Katakolon, 7 route miles; Afilos (MP 147)-Arkhain Olimbia, 9 route miles; Kalon-Neston (MP 176)-Kiparissia, 4 route miles; Approkhoma (MP 212)-Messini, 3 route miles. Rack rail 2'3 1/2"-gauge branch line with 14.5% maximum grade, Dhiakopton (MP 48)-Kalavrita, 14 route miles. From Patrai a rail ferry connects with 36-mile Krionerion-Agrinion meter-gauge line on mainland.
Corinth-Kalamai 147 miles	2.5	2.5	394	14.8	9	322	Two meter-gauge branch lines with similar characteristics: Biali (MP 45)-Megalopolis, 3 route miles; Argos (MP 114)-Navplion, 6 route miles.

On the system are 365 miles of welded rail in 177-foot sections. Most ties are of steel on the standard-gage lines, but domestically manufactured concrete ties are to be used increasingly to replace steel ties during the later 1970's; creosote-treated wood ties are used on the meter-gage lines and are spaced 2,475 to 2,680 per mile. Crushed stone is used for ballast on most lines, but some sandy clay is also used. All track materials except ballast and concrete ties are imported—steel ties and rail from Western Europe and wooden ties from the United States and Western Europe.

Characteristics of the most important rail lines are listed in Figure 1.

D. Highways (C)

Highway transport, despite a relatively sparse network of 0.47 mile of highway per square mile, is the principal carrier of both freight and passengers. The pattern and distribution of the highway network have been significantly influenced by the rugged hilly and mountainous terrain of the mainland and the islands. Arterial routes link most parts of the country but are circuitously aligned in order to avoid the central mountain massif, the Pindus Mountains. Road density is greater east of the mountain chain; the greatest density of roads, however, is in the Peloponnese. The primary routes of the network have a north-south alignment, and there are few east-west through routes. The principal artery is the Athens-Larisa-Thessaloniki-Alexandroupolis route. Roads in Crete and other islands of the archipelago are sparse. International highway connections exist with the highway networks of Turkey, Bulgaria, Yugoslavia, and Albania.

The highway network (classified as national, provincial, municipal, and local roads) totals about 24,200 miles, comprising 10,000 miles of bituminous surfaced roads (including bituminous surface treated), 8,500 miles crushed stone and gravel, 3,500 miles of improved earth and light gravel, and 2,200 miles of unimproved earth roads. The condition of the network ranges from poor to good; the national highways are in better condition than other routes. Surface widths range from 8 to 40 feet, with wider surfaces located near urban areas. Shoulder widths range up to 12 feet, but most are only 3 to 4 feet wide, and many miles of roads through hilly or mountainous areas have no shoulders.

About 85% of the approximately 13,000 highway bridges on the network are of reinforced concrete construction (including some prestressed concrete bridges), 10% are of stonemasonry, and 5% or less are



FIGURE 2. Bailey bridge on main route west of Amfissa (C)

of timber and steel. Included in the steel category are an estimated 50 to 75 temporary Bailey bridges (Figure 2). Structures built before 1940 have a maximum load capacity of 25 tons; those built after 1950 were designed and constructed for loads up to 80 tons. There are some weak low-capacity bridges on provincial and local routes. Most structures are deck types and have unlimited vertical clearances. Horizontal clearances range from 19 to 26 feet on national highways and 13 feet or less on other highways.

The network has a few underpasses and three known tunnels; all have a minimum vertical clearance of 15 feet. There are five ferry crossings located on the mainland and nearby islands; outlying islands of the archipelago are served by large seagoing ferries.

Construction and maintenance of national highways are the responsibilities of the Ministry of Public Works operating through its Directorate General of Public Works. Provincial, municipal, and local roads are the responsibility of provincial and other regional authorities.

Major construction problems are attributable to the rugged mountainous terrain. Costly and extensive cuts and fills are required for tolerable curves and grades; most mountain roads require retaining walls. Landslides, erosion, and seasonal frost damage necessitate extensive maintenance. Suitable construction materials such as sand, gravel, and stone are generally available in most parts of the country; cement is produced locally and is in adequate supply. Some bitumen is produced as a petroleum byproduct, but supplemental imports are required. Steel is produced in the country but special structural shapes must be imported.

A continuous program for highway improvement is directed to improving the main routes and some important secondary routes, principally by widening, realigning, and resurfacing. In addition, several new through routes have been constructed and others are planned or under construction. A new high-capacity through route is planned to extend from Igoumenitsa via Thessaloniki to Alexandroupolis; construction by a U.S. contractor began in early 1972, but only a few short stretches have been completed. A new four-lane divided highway extending from the vicinity of

Thessaloniki north to the Yugoslavia border is under construction; completion is scheduled for late 1973. In addition, a segment of divided highway from Katerini north to Thessaloniki is planned or under construction; this segment is part of the high capacity through route extending north from Athens. A new through route having moderate curves and grades is being constructed along the northern coast of Crete. This route, when completed, is to extend for about 125 miles and is to link most of the island's important urban areas.

FIGURE 3. Selected highways (C)

ORIGIN AND DESTINATION	DISTANCE	SURFACE TYPE	SURFACE WIDTH	SHOULDER WIDTH	REMARKS
	<i>Miles</i>		<i>Feet</i>	<i>Feet</i>	
Kalamata—Athens, via Argos, Corinth:	180				
Mile 0—Mile 54 (Tripolis)...	54	Bituminous.....	14-22	0-4	Undulating to hilly terrain.
Mile 54—Mile 123 (Corinth)...	69	....do.....	14-22	0-4	Undulating to mountainous terrain.
Mile 123—Mile 180.....	57	....do.....	24-26	4-10	Undulating terrain.
Tripolis to Corinth:	236				
Mile 0—Mile 94 (Pirgos)...	94	Bituminous, bituminous treated.	13-30	2-4	Hilly terrain.
Mile 94—Mile 167 (Patrai)...	83	Bituminous.....	18-23	2-4	Undulating terrain.
Mile 157—Mile 236 (Corinth)...	79	....do.....	24-28	4-8	Do.
Athens—Thessaloniki, via Lamia, Larisa, Katerini:	374				
Mile 0—Mile 138 (Lamia)...	138	....do.....	24-28	4-10	Hilly terrain.
Mile 138—Mile 311 (Katerini)...	173	....do.....	25	7	Undulating terrain.
Mile 311—Mile 374 (Thessaloniki)...	63	....do.....	18-30	1-3	Do.
Elevsis—Lamia, Levadhia.....	118	....do.....	20-28	1-4	Undulating to hilly terrain.
Levadhia—Albania border, via Amfissa, Navpaktos, Ioannina:	304				
Mile 0—Mile 42 (Amfissa)...	42	....do.....	18-20	0-4	Hilly terrain.
Mile 42—Mile 109 (Navpaktos)...	67	....do.....	15	0-3	Do.
Mile 109—Mile 286 (Ioannina)...	157	....do.....	20-24	0-5	Undulating to hilly terrain.
Mile 286—Mile 286.....	20	....do.....	14-26	0-4	Do.
Mile 286—Mile 304 (Albania border)...	18	....do.....	14-20	0	Hilly terrain.
Igoumenitsa—Larisa, via Ioannina:	196				
Mile 0—Mile 64 (Ioannina)...	64	....do.....	16-24	1-2	Do.
Mile 64—Mile 140.....	76	....do.....	16-25	0-2	Mountainous terrain.
Mile 140—Mile 196.....	56	....do.....	16-18	1-6	Hilly terrain.
Thessaloniki—Bulgaria border:	70	Bituminous, bituminous treatment.	12-19	3-7	Flat to mountainous terrain.
Rte. Jct. 7 miles N. of Thessaloniki to Turkey border:	315				
Mile 0—Mile 209 (Alexandroupolis)...	209	....do.....	16-20	1-7	Undulating to hilly terrain.
Mile 209—Mile 315.....	106	....do.....	12-26	1-4	Do.

Highway movement is restricted by physical and climatic factors. Ferries, fords, underpasses, and narrow road surfaces in most parts of the country impede traffic. In addition, there are defiles and many sharp curves and steep grades in the mountainous or hilly regions. Roads are periodically blocked by landslides, and heavy snow from December through February frequently interrupts traffic. Rainfall from October through March affects the trafficability of unsurfaced roads and occasionally causes inundations and washouts. Occasional earthquakes destroy bridges and sections of road.

The transportation policy of the Greek Government discourages competition between highway transport and the government-owned railroad system. Some restrictions are maintained on the number of licenses issued for common carrier vehicles, especially when the carrier proposes to offer service to areas served by parallel railroad lines. Most of the registered trucks are used by firms to transport their own commodities; the remainder belong to single vehicle owners who operate their vehicles for hire. Most of the trucks have capacities of up to 1.5 tons. In 1970 about 3,500 buses were engaged in interurban transport; about 155,600,000 passengers were carried in that year.

In January 1972 the 393,308 motor vehicles registered consisted of 264,420 passenger cars, 117,888 trucks, and 11,000 buses. There is no domestic motor vehicle production, and all vehicles are imported. The principal sources are West Germany, the United Kingdom, France, and Italy; Japan is an increasingly important source. Agreements were signed in 1972 between the Greek Government and two French and one Austrian motor vehicle manufacturer to assemble passenger cars and trucks; initial assembly operations are scheduled for late 1973 or early 1974. Some bus and truck bodies are fabricated locally for installation on imported chassis. There is also some local production of trailers and semi-trailers, including special purpose tank and refrigerated trailers.

Figure 3 lists characteristics of the most important highways.

E. Inland waterways (C)

The Greek inland waterway system is extremely limited and is insignificant as a mode of transportation. The system consists of three land-cut coastal canals and three unconnected rivers which provide a total navigable length of less than 50 miles. Canals account for 8 miles of the total. The only active waterways are the canals which shorten coastal trade routes by cutting through narrow necks connecting

peninsulas with the mainland. The rivers, the Maritsa, the Struma, and the Vardar, are of no value to inland waterway traffic and are used only by small fishing vessels and flat-bottomed boats.

The Corinth Canal, 3.9 miles long and 80 feet wide, is the only canal of any importance and is used almost exclusively by maritime traffic. It cuts through the Isthmus of Corinth to connect the Gulf of Corinth with the Saronikos Kolpos and is navigable by vessels not exceeding 58-foot beam and a 22-foot draft. The Dhiorix Levkadhos, a canal 3.4 miles long and 65 feet wide, separates the island of Levkas from the mainland and has a controlling depth of 19.3 feet. The third canal, Dhiorix Potidhaia, joins Kassandras Kolpos with Thermaikos Kolpos and is used mostly by fishing vessels operating out of Thessaloniki. It is 0.7 mile long, 127 feet wide, and has about a 10-foot depth.

Heavy silting and rapid currents are the chief factors hampering navigation. Silting in the Corinth Canal requires weekly dredging to maintain normal depths. An occasional landslide may block the canal but available modern equipment permits clearance within a few days.

The only structures on the waterways are a few highway and rail bridges, which in some instances restrict passage of small craft. The one highway and one railroad bridge over the Corinth Canal have vertical under-bridge clearance of 171 feet.

Inland waterway ports are insignificant and have virtually no facilities. Greece has no inland waterway fleet. The domestic coastal fleet comprises about 740 vessels with an estimated cargo capacity of 126,000 tons.

The Ministry of Shipping, Transport and Communications is responsible for coastal shipping and inland waterway activities. Any waterway construction comes under the jurisdiction of the Ministry of Public Works. The government reportedly is interested in improving all domestic transportation routes, but no waterway development program is either in progress or planned.

F. Pipelines (C)

Greece has about 356 miles of major petroleum pipelines in commercial and military systems. The principal commercial pipelines are connected with the Greek national refinery at Aspropirgos. They include a single crude oil line from a receiving marine terminal at Megara and two lines for refined products leading to the Piraeus area. The military systems, comprising

FIGURE 4. Selected pipelines (C)

TERMINALS		LENGTH Miles	DIAMETER Inches	PRODUCTS	CAPACITY Bbl./day	REMARKS
From	To					
Megara.....	Aspropirgos Refinery.....	16	12	Crude oil.....	40,000	One pump station at Megara.
Aspropirgos Refinery...	Piraeus area.....	10	5	Mogas, kerosene, diesel fuel..	na	
		10	8			
Andikira.....	Aspropirgos Refinery.....	75	6	Refined products.....	11,300	NATO. Marine terminal and pump station at Andikira. Flow reversible.
Aspropirgos Refinery...	Elevis and Tanagra Airfields..	12	4	Avgas.....	4,400	NATO. One pump station at refinery.
Andikira.....	Larisa.....	108	6	Jet fuel, mogas.....	11,500	NATO. Pump stations at Andikira, Modhion, Rakhsai, Mikrothivai. Flow reversible.
Larisa.....	Kozani.....	57	6	Mogas.....	9,250	NATO. Pump stations at Larisa, Elaseon. Flow reversible.
Kozani.....	Verola.....	28	6	...do.....	4,900	Pump station at Kozani.
Verola.....	Army depot.....	40	4	...do.....	2,500	NATO. One pump station at Verola. Army depot near Thessaloniki.

na Data not available.

about 90% of the country's total pipeline mileage, were constructed by NATO to support air and ground forces with refined products.

NATO has two basic 6-inch-diameter pipeline systems, both connecting with marine terminal facilities at Andikira. The pipelines are of welded joints, are buried, and the direction of flow is reversible at full rate in much of their lengths. One system connects Andikira with the Aspropirgos refinery in the southeast. From the refinery, 4-inch branch lines extend to air bases at Elefsis and Tanagra. The other system extends northward from Andikira via Larisa to Veroia, with a 4-inch extension to the army depot near Thessaloniki. The latter system is jointly administered through the POL Distribution Command located at Larisa. Operational control is vested in the air force, with primary army interest being in the portion of the pipeline north of Larisa. Storage and loading and discharge points along the route are located at Andikira, Mikrothivai, Larisa, Kozani, Veroia, and the army depot near Thessaloniki. Air bases at Nea Ankhialos and Larisa are connected by 4-inch lines to the Mikrothivai and Larisa storage facilities, respectively.

Available details of selected pipelines are given in Figure 4.

G. Ports (C)

Along the lengthy and irregular coastline of Greece are 17 major and 37 minor ports and many small harbors for fishing vessels and small craft. The rugged mountainous nature of the mainland and islands has greatly hampered development of overland transportation, and a long and indented coastline with many sheltered bays and gulfs has strongly favored development of ports and maritime transportation. Coastal trade plays a very important role in the economy of the mainland, and for the many islands of the Aegean and Ionian Seas, ports are a necessity because the sea provides the only surface access. Many of the ports are very old, dating back to the era of the Hellenic city states or to the medieval period, but most of the larger ports are relatively modern. The major ports have reasonably good facilities; the minor ports are poorly equipped and normally are used by small coasters and fishing vessels. The two largest and most important ports, Piraeus (Figure 3) and Thessaloniki are on the Aegean side of the mainland. They are receiving and shipping points for most of the country's foreign trade and handle large amounts of coastal trade. Of the other 15 major ports, only 3—

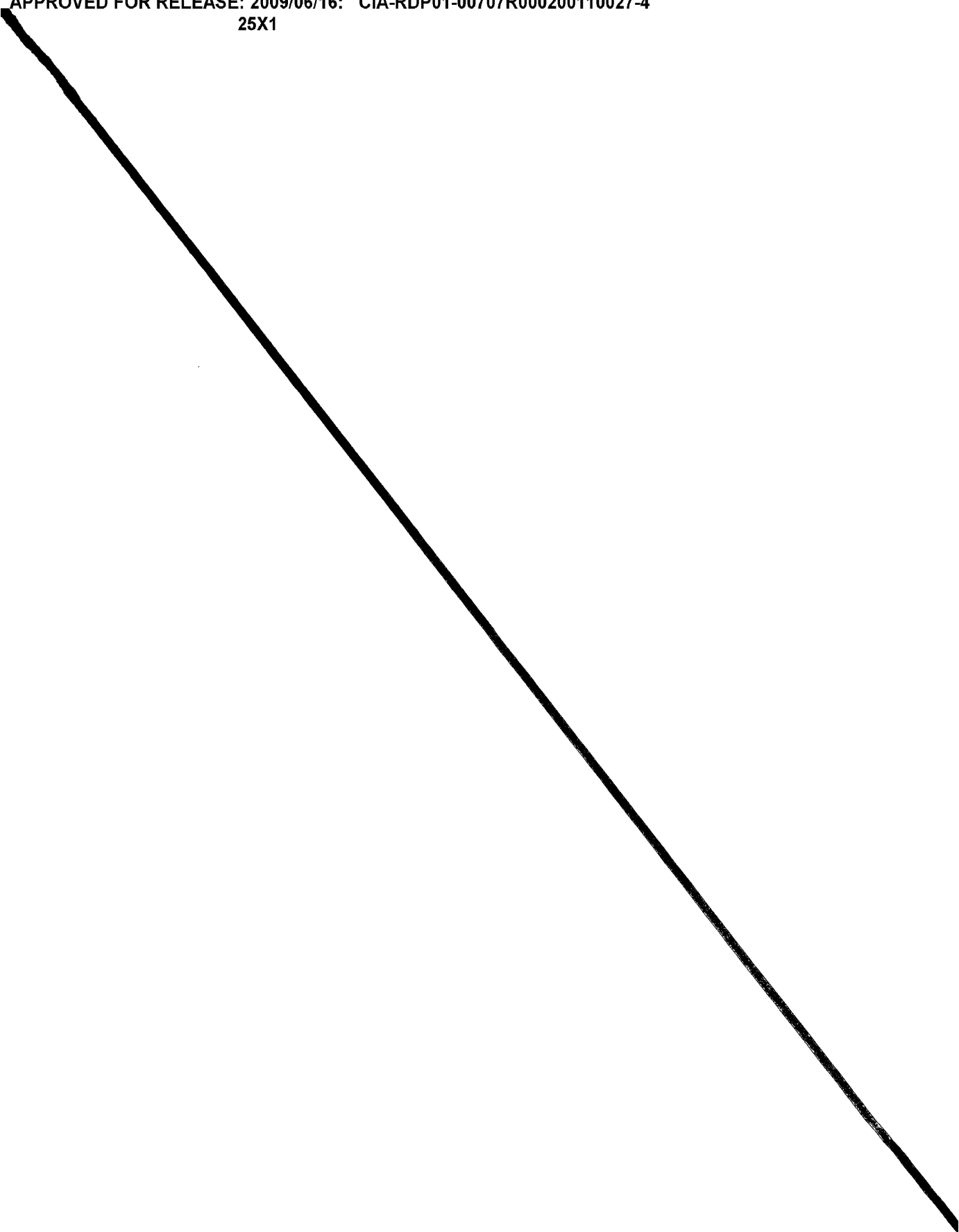
Alexandroupolis, Elefsis, Kavala, Skaramangas, and Volos—are on the mainland. Kalamai and Patrai are on the Peloponnesus; the rest are located on the islands. Salamis, the main naval base, is on Salamis Island; Soudha and Iraklion are on Crete; Khalkis, Kerkira, Ermoupolis, Mitilini, and Rodhos are on the islands of Euboea, Corfu, Siros, Lesbos, and Rhodes, respectively. Except for the three naval bases of Salamis, Soudha and Skaramangas, the other major ports handle some foreign trade but mostly are engaged in coastal shipping.

The shipping industry is being encouraged by the government to play its part in adding to the income and economy of the country. Renovation projects of a routine nature are being carried out in most major ports and in some of the minor ports. Improvements to the larger ports of Piraeus, Thessaloniki, and Rodhos are of more significance.

The Piraeus Port Authority announced a 1973-77 investment program providing a total outlay of \$112 million for port works, new buildings, road construction, land purchase, and equipment. Expansion of the existing container terminal and construction of a new facility are planned. A detailed study is being made by port authorities aimed at making several Greek ports "feeder container ports." Piraeus is to be the main port for container transport to the Eastern Mediterranean. Because of improvement in relations and a growing volume of trade between Greece and her northern neighbors, Yugoslavia and Bulgaria, the port of Thessaloniki is to be organized to facilitate container trade with the Balkan and Eastern European countries. An idea of making Thessaloniki the "Trieste of Greece" was underlined by the establishment of a customs-free zone in the port. Tourism has become a heavy earner of foreign exchange for Greece, and the Greek islands are popular with foreign tourists. Several islands ports, namely, Iraklion, Kerkira, and Mitilini are building new quays, extending breakwaters, and dredging the harbor to provide deep water berths for ocean liners. National policy has encouraged a strong shipbuilding and ship repair industry. New shipyard facilities are planned for Elefsis and Skaramangas. Elefsis plans to build ships up to 250,000 tons and to repair supertankers. Skaramangas plans a new 300,000-ton drydock by 1974 and a large mole to be used in conjunction with its shipyard.

The port system is adequate for normal shipping requirements. Administratively the ports fall into three categories. Piraeus and Thessaloniki are each administered by a port authority, and the naval bases

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FIGURE 6. Major ports (C)

NAME; LOCATION; ESTIMATED MILITARY PORT CAPACITY*	ACTIVITIES	HARBOR	BERTHS
Alexandropolis..... 40°50'N., 23°52'E. 5,073	A focal point for coastal traffic; also handles some overseas trade. Receipts—coal, timber, cement, manures. Shipments—cereals, beef, silkworms, lignite. One minor shipyard for coastal and small craft.	Fairly well-protected artificial coastal harbor consisting of an Outer and Inner Harbor having a total water area 87 acres and general depths 8 to 23 ft. Fairway limitations—approach deep and clear; controlling depth of 23 ft. in harbor entrance. Largest vessel accommodated would occupy alongside berth with a least depth of 23 ft.; length not limiting.	Alongside—3 small ocean-type; 2 standard coaster-type cargo vessels; 32 lighters. Anchorage—Unlimited exposed anchorage outside harbor in open roadstead in depths over 28 ft.; over good holding ground of mud and sand.
Elevisa..... 38°02'N., 23°32'E. 3,960	Important because of location near large POL refinery, major steel works, and Skaramangas naval base. Port serves small industrial center and inland agricultural region. One major shipyard can build ships to 45,000 tons; 3 floating drydocks, largest has lifting capacity of 115,000 tons.	Irregularly shaped, well-protected natural harbor consisting of 3 adjoining coves having area of about 10 square miles and general depths of 13 ft. to 40 ft. Fairway limitations—E. approach has controlling depth of 35 ft.; W. approach has controlling depth of 13 ft. Largest vessel accommodated would occupy alongside general berth with least depth of 30 ft., length not limiting; or tanker berth with least depth of 35 ft., length not limiting.	Alongside—1 standard and 2 small ocean-type, 3 standard and 9 small coaster-type cargo vessels; 24 lighters; 1 large, 3 standard, 1 small ocean-type tankers; 1 standard coaster-type tanker (alternative berth). Anchorage—Numerous berths for all sizes about 200 yd. offshore in depth of 39 ft.
Ermoupolis..... 37°28'N., 24°56'E. 3,560	Most important port and capital of Cyclades islands, for which it serves as collection and distribution center. Receipts—raw cotton, foodstuffs, manufactured products. Shipments—grain, flour, vegetables, wine, cotton. One large, one minor shipyard; largest repair facility is floating drydock with lifting capacity of 70,000 tons.	Well-protected semicircular natural harbor with a total water area of 270 acres and general depths of 18 to 30 ft. Fairway limitations—approach deep and clear; only limitation to navigation in harbor imposed by depth. Largest vessel accommodated would occupy alongside general berth with least depth of 30 ft., length not limiting; or tanker berth with least depth of 42 ft., length not limiting.	Alongside—1 large, 1 standard, 1 small ocean-type; 2 standard, 1 small coaster-type cargo vessels; 41 lighters; 1 large ocean-type tanker. Anchorage—3 ocean-type, 3 coaster-type vessels about 1 1/2 miles SE. of harbor in depths 84 to 144 ft. over good holding ground of sand and shells, exposed to N. and SE.
Iraklion..... 35°20'N., 25°08'E. 4,900	Largest city and most important port on Crete. Chief industry, processing and shipping agricultural products. Receipts—coffee, cereals, sugar, rice, tea, milk, machinery. Shipments—wine, olive oil, raisins, locust beans, citrus fruit. One minor shipyard for coasters and small craft; can repair vessels to 50 tons.	Breakwater-protected artificial harbor consisting of Inner Harbor and Middle Harbor; planned third section to have total water area of about 110 acres, general depths 7 to 23 ft. Fairway limitations—approach deep and clear; 650-ft.-wide harbor entrance has channel 250 ft. wide and controlling depth of 32 ft. Heavy swells in channel can be dangerous. Within harbor, depths are only limit to navigation. Largest vessel accommodated would occupy alongside berth with least depth of 29 ft., length not limiting.	Alongside—8 standard, 2 small ocean-going; 1 standard coaster-type cargo vessel; 10 lighters. Anchorage—Numerous berths for all sizes in open roadstead 2 1/2 mile N. of port in depth of 108 ft. over good holding ground of mud and sand; usually safe except from strong N. and W. winds

*Footnote at end of table.

FIGURE 6. Major ports (C) (Continued)

NAME; LOCATION; ESTIMATED MILITARY PORT CAPACITY*	ACTIVITIES	HARBOR	BERTHS
Kalamai..... 37°02'N., 22°07'E. 5,251	Second most important commercial center and maritime port of Peloponnese. Receipts—constructional timber, machinery. Shipments—cotton, cottonseed, wine. Minor ship repairs can be effected.	Artificial breakwater-protected harbor consisting of Inner and Outer harbor with a total water area of about 100 acres and general depths of 7 to 30 ft. Fairway limitations—approach deep and clear; 550-ft.-wide entrance has controlling depth of 24 ft.; periodic dredging required. Largest vessel accommodated would occupy alongside berth with least depth of 25 ft., length not limiting.	Alongside 1 standard, 1 small ocean-type, 1 standard, 1 small coaster-type cargo vessels; 19 lighters. Anchorage—Unlimited exposed anchorage available for all sizes in roadstead in depths of 72 ft. over holding ground of sand.
Kavala..... 40°56'N., 24°25'E. 5,960	Center for tobacco trade; ore shipping point. Principal activities: fish packing, manufacture of cigarettes, flour, brick tiles, cement products. Receipts—iron and steel, sugar, petroleum, timber, coal, fertilizers. Shipments—tobacco, grain, ore. One small shipyard with 2 marine railways, each having hauling capacity of 300 tons.	Fairly well-protected improved natural harbor consisting of breakwater-protected Inner Harbor, small boat basin, and Outer Harbor used mainly for anchorage; total water area of 320 acres and general depths of 11 to 60 ft. Fairway limitations—approach deep and clear; entrance to small boat basin has controlling depth of 12 ft.; only limitations to navigation are imposed by depths and dimensions of components; vessels over 500 ft. long must be handled with care. Largest ship accommodated would occupy alongside berth with least depth of 32 ft., length not limiting.	Alongside 6 standard, 2 small ocean-going, 1 standard, 2 small coaster-type cargo vessels; 16 lighters. Anchorage 1 ocean-type, 2 coaster-type vessels in Outer Harbor in depths of 18 to 54 ft. over good holding ground of mud and sand; unlimited, partially exposed anchorage outside harbor for all sizes; subject to swells from S winds.
Kerkira..... 39°36'N., 19°55'E. 5,340	Largest city and commercial center of Ionian Islands. Headquarters, Greek Naval Station Corfu. Receipts—textiles, cattle, cereals, fish, coal, oil, jute, hemp, woodpulp. Shipments—olive oil, sulphur oil, wine, fruits and vegetables, hides, soap, wrapping paper, cardboard. Several minor shipyards for coasters and small craft.	Fairly well-protected strait about 1 1/2 miles long, 1/2 to 1 mile wide, depths 60 to 102 ft., and a breakwater-protected Inner Harbor with general depths of 24 ft. Fairway limitations—approach deep and clear; no obstacles to navigation inside harbor. Largest vessel accommodated would occupy berth with least depth of 24 ft., length not limiting.	Alongside 3 standard, 2 small ocean-type, 1 standard, 1 small coaster-type cargo vessels; 20 lighters. Mooring 1 buoy outside E. breakwater. Anchorage 3 large ocean-type vessels outside breakwaters in depths of 60 to 90 ft; over mud and clay; well protected.
Khalikia..... 38°28'N., 23°36'E. 1,690	Principal port, commercial and administrative center of Euboea island. Receipts—grain, timber, iron, clay. Shipments—wine, oil, fruit, magnesite, potatoes, resin, cement. One small shipyard builds ships to 200 gross; minor engine and electrical repair can be effected.	Well-protected natural coastal harbor consisting of 2 bodies of water having area 1 1/2 square miles and central depths 18 to 66 ft. Fairway limitations—N. approach unobstructed; S. approach entrance 1/2 mile wide, 24 ft. controlling depth; swing bridge in harbor restricts vessels to those with drafts of not more than 24 ft. and beam of not more than 98.5 ft. Largest vessel accommodated would occupy alongside berth with least depth of 22 ft., length 300 ft.	Alongside 1 small ocean-type cargo vessel; 0 lighters. Mooring 2 fixed berths for small craft. Anchorage 25 coaster-type cargo vessels in S. Harbor in depths 31 to 36 ft. over good holding ground of mud, well-protected; 1 ocean-type, 1 coaster-type vessel in N. Harbor in depths 60 to 102 ft. over fairly good holding ground of mud and sand, fair protection.

Mitilini.....
 39°06'N., 26°33'E.
 5,520

Capital and principal port of Lesbos, largest island in Aegean Sea; main shipping center for rich olive producing district. Receipts—general merchandise. Shipments—olive oil, sulphur oil, tobacco, valonia extract. Three small shipyards can perform minor repairs to small craft; marine railway has hauling capacity of 150 tons.

Patrai.....
 38°15'N., 21°44'E.
 5,800

Industrial and trading center of Peloponnese. Site of naval headquarters and major communication center. Receipts—fertilizers, timber, steel, manufactured goods, containers. Shipments—currants, wine, grapes, citrus fruits, containers. One small shipyard for minor repairs; 6 marine railways, largest having hauling capacity of 200 tons.

Piraeus.....
 37°57'N., 23°38'E.
 40,375

Most important Greek port; port of entry for Athens; industrial and commercial center. Naval facilities involve miscellaneous activities of training, communications, supply. Receipts—wheat, sugar, iron, coal, fuel oil, timber, industrial materials, meat, paper, chemicals, containers. Shipments—cement, ores, fertilizers, cotton, tobacco, raisins, salted hides, olive oil, oil seeds, fruits, marble, containers. Two large shipyards and numerous small yards engage in ship repair and building vessels to 5,000 tons; largest drydock has length of 483 ft.

Rodhos.....
 36°28'N., 28°13'E.
 4,275

Major port and capital city of Dodecanese islands. Receipts—manufactured goods, cottons, woollens, flour, tobacco, rice, coffee. Shipments—fresh and dried fruits, vegetables, sponges, olive oil, wine, spirits, firwood, canned fruit and vegetables. Small boatyard repairs wooden boats up to 56 tons.

Small coastal breakwater-protected harbor with 3 components: S. Harbor, Inner Basin, N. Harbor, having total water area of about 170 acres and general depths 7 to 42 ft. Fairway limitations—approach deep and clear; entrance to S. Harbor 165 ft. wide, over 23 ft. deep; Inner Basin has 100-ft.-wide channel over 19-ft. depth; N. Harbor entrance has maximum depth of 33 ft.; frequent dredging essential. Largest vessel accommodated would occupy alongside berth with least depth of 23 ft., length 350 ft.

Two harbor areas: Artificial breakwater-protected harbor, and open roadstead, at Riton, 5 miles NE. of port; harbor has water area of about 180 acres and general depths 20 to 35 ft.; roadstead is undefined area. Fairway limitations—W. approach free and clear; E. approach restricted by canal, depth 26 ft.; dredging required. Largest vessel accommodated would occupy alongside berth with a least depth of 33 ft., length 565 ft.

Harbor consists of roadstead and 6 coastal harbors in 6 small bays having total water area of 450 acres and general depths 6 to 66 ft. Fairway limitations—approach deep and clear; only limitation to navigation in harbor is imposed by depths. Largest vessel accommodated would occupy alongside berth with a least depth of 38 ft., length not limiting.

Port comprises open roadstead and 3 small artificial harbors: area of roadstead undefined, area of harbors about 14½ acres, depths 7 to 32 ft. Small POL facility located 1 mile S. of port. Fairway limitations—approach from Aegean and Mediterranean deep and clear; minimum harbor entrance width to primary commercial facilities is 665 ft. over 32 ft. depth. Largest vessel accommodated would occupy alongside berth with least depth of 32 ft.; length not limiting.

Alongside—1 small ocean-type; 1 standard, 5 small coaster-type cargo vessels; 27 lighters. Anchorage—2 well-protected berths for ocean-type vessels in S. Harbor in depths 30 to 42 ft.; unlimited exposed anchorage in roadstead E. of port in 60 ft. depths over fair holding ground of sand and weeds.

Alongside—1 large, 4 standard, 4 small ocean-type cargo vessels; 17 lighters. Anchorage—Unlimited, fairly well-sheltered anchorage for all sizes in Gulf of Patrai over good holding ground of mud and sand in depths 72 to 96 ft.

Alongside—26 large, 13 standard, 18 small (1 alternative berth) ocean-type; 9 standard, 12 small coaster-type cargo vessels; 53 lighters; 2 standard, 1 small ocean-type tankers; 6 standard (1 alternative berth) coaster-type tankers. Mediterranean mooring—1 large ocean-type cargo vessels. Anchorage—Unlimited protected anchorage for all sizes in Keratinion Bay in depths 60 to 100 ft. over sand and shell; 2 large ocean-type 8 coaster-type vessels in Faliron Bay, 3 miles E. of main harbor, in depths 18 to 64 ft. over sand and mud, exposed SE. to SW.

Alongside—1 large, 2 standard, 4 small ocean-type; 3 small coaster-type cargo vessels; 28 lighters; 1 standard coaster-type tanker. Anchorage—Unlimited exposed anchorage in roadstead in 34 to 120 ft. over good holding ground of mud and sand.

Footnote at end of table.

FIGURE 6. Major ports (C) (Continued)

NAME; LOCATION; ESTIMATED MILITARY PORT CAPACITY*	ACTIVITIES	HARBOR	WATER
Salamis..... 38°58'N., 23°29'E. 8,000	Principal operating base of Greek Navy. Components include principal supply depot, major ship repair yard. One large shipyard performs all types of repairs including drydocking for vessels up to destroyer size. 3 floating drydocks with lifting capacities from 820 to 3,000 tons.	Harbor consists of 2-mile-long relatively well-protected stretch of Ayiou Yeoryiou, a large bay between Salamis island and mainland, having depths of 36 to 84 ft. Fairway limitations - approach deep and clear; controlling depth of 28 1/2 ft. at entrance. Largest vessel accommodated would occupy alongside berth with least depth of 30 ft., or 34 ft. 535 ft.	Alongside - 1 large, 16 medium, 34 small naval vessels. Mooring - 7 fixed for large naval vessels; several free-swinging for medium-size naval vessels. Anchorage - Several berths for small vessels E. of wharves in depths 20 to 72 ft. over sand and clay; sheltered except from N. winds.
Skaramangas..... 38°00'N., 23°35'E. 10,000	Major naval training center, operating base, ordnance depot. Site of one of largest shipyards in Mediterranean. One large shipyard can build ships to 35,000 tons; 3 floating drydocks with lifting capacities of 22,000, 24,000, 30,000 tons; graving dock to handle ships up to 250,000 tons; 130-ton floating crane.	Improved natural, consisting of breakwater-enclosed basin in cove on E. side of Ayiou Yeoryiou Bay, N. side of which is formed by a peninsula and a bight on N. side of peninsula. Depths in cove range from 13 to 18 ft., in the bight the 18-ft. curve lies nowhere more than 1,100 ft. from shore, and at the shipyard at N.E. end of the bight deep water extends close to shore. Fairway limitations S. approach has width of 340 ft. and controlling depth of 35 ft.; N. approach has controlling depth of 13 ft. Fairways do not limit size of vessels. Largest vessel accommodated would occupy alongside general berth with least depth of 23 ft., length not limiting; or tanker berth with least depth of 42 ft. length not limiting.	Alongside - 6 standard, 5 small ocean-going, 9 standard coaster-type cargo vessels; 7 lighters; 1 large ocean-type; 4 standard coaster-type tankers; 1 representative sound-and-reef-type tank barge; 15 medium, 13 small naval vessels. Anchorage - Extensive, well-protected anchorage for all sizes N.W. of port in Eleftherios Bay in depths 30 to 108 ft. over good holding ground of mud or clay.
Soudha..... 35°29'N., 24°05'E. 7,745	Second most important Greek naval base; provides logistic and operational support to Navy and NATO forces. One large shipyard can perform major repairs on vessels up to and including destroyers; largest repair facility is floating drydock with length on floor of 330 ft. and lifting capacity of 3,000 tons.	Improved natural coastal harbor in almost land-locked bay; water area about 7 1/2 square miles; general depths 18 to 700 ft. Fairway limitations approach deep and clear; no fairway limitations limit use of harbor. Largest vessel accommodated would occupy alongside general berth with least depth of 32 ft.; largest naval vessel would occupy alongside berth with least depth of 25 ft.; length not limiting in either case.	Alongside - 2 standard, 3 small ocean-type; 1 small coaster-type cargo vessel; 18 lighters; 8 medium, 14 small-sized naval vessels; 2 medium sized naval tankers. Mooring - 5 fixed for medium-size naval vessels; 1 free-swinging for large naval vessel, 2 for medium-size naval vessels. Anchorage - 4 large, 6 small naval vessels at W. end of harbor in depths 20 to 240 ft. over good holding ground of mud and sand, protected except from E.; additional unprotected anchorage available outside harbor for 9 large naval vessels in depths 20 to 102 ft. over fair holding ground of sand.

Thessaloniki.....
 40°38'N., 22°56'E.
 16,020

Important transportation, commercial, industrial center. Headquarters of northern Aegean Naval Command, site of major shore communication center. Receipts—general cargo, timber, hardware, petroleum, oil, ore, coal. Shipments—cotton, minerals, tobacco, fruit. Several small boatyards build and repair boats to 600 tons.

Improved well-protected coastal natural harbor covering almost circular area of about 10 square miles with depths of 20 to 60 ft. Fairway limitations—approach free and clear; controlling depth at entrance 35 ft. Largest vessel accommodated would occupy alongside berth with a least depth of 30 ft., length 600 ft.; or tanker berth with least depth of 48 ft., length not limiting.

Alongside—6 large, 13 standard, 2 small ocean-going; 3 standard coaster-type cargo vessels; 11 lighters; 3 large ocean-type tankers. Anchorage—20 ocean-type, 20 coaster-type cargo vessels in E. half of Outer Harbor in depths 18 to 72 ft. over good holding ground of mud; protection adequate except from S.

Volos.....
 39°21'N., 22°57'E.
 10,680

Important trading, shipping center of Thessaly, one of most fertile areas of Greece; also base for considerable fishing industry. Receipts—iron, tin, coffee, refined sugar, spices, rice, preserved fish, hides, paper, textiles, earthenware, glassware, wheat, corn, tools; timber, fertilizer. Shipments—tobacco, olives, hides, chrome ore, cotton. Two small repair yards, several auxiliary repair facilities.

Roughly semicircular bay; area 15 square miles, depths 6 to 180 ft. Fairway limitations—approach and entrance deep and clear; turning area in Inner Harbor limited. Berths rather than fairways limit size of vessels accommodated. Largest vessel accommodated would occupy alongside general berth with least depth of 30 ft., length not limiting; or tanker berth with least depth of 33 ft., length not limiting.

Alongside—5 standard, 9 small ocean-type; 4 standard, 4 small coaster-type cargo vessels; 46 lighters; 1 standard ocean-type tanker; 1 standard coaster-type tanker (alternative berth). Fixed mooring—1 standard ocean-type vessel in Inner Harbor. Anchorage—25 ocean-type vessels in Outer Harbor in depths 30 to 180 ft. over good holding ground of mud and sand, considered safe at all times.

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.

Greek-flag ships carry about 40% of the country's total volume of international seaborne imports and exports and almost all coastal and Greek island shipping. Most of the cargo ships operate worldwide in nonscheduled (tramp) service; cargo ships in scheduled (liner) service are employed primarily in Mediterranean and Greek coastal trade. Tanker tonnage is operated primarily under foreign charter arrangements.

In February 1973 the merchant fleet comprised 1,615 ships of 1,000 g.r.t. and over, totaling 16,916,114 g.r.t. or 27,172,509 deadweight tons (d.w.t.) as follows:

TYPE	No. OF SHIPS	G.R.T.	D.W.T.
Tanker	267	5,897,302	10,459,182
Dry cargo	904	5,571,733	8,193,964
Bulk cargo	288	3,727,172	6,297,974
Tanker/ore carrier	17	812,977	1,535,831
Passenger	68	507,419	216,952
Refrigerator	39	194,662	207,991
Passenger/cargo	9	74,438	71,586
Miscellaneous*	23	130,413	169,023
Total	1,615	16,916,114	27,172,509

*2 wine tankers; 4 liquefied gas tankers; 1 passenger/refrigerator ship; and 1 chemical, 4 car/bulk, 5 cement, and 6 timber carriers.

Additional data on the fleet are as follows:

	PERCENT OF D.W.T.	No. OF SHIPS
Age (years):		
To 10	53	456
11-15	19	297
16-20	18	424
21-25	6	246
Over 25	4	192
Size (d.w.t.):		
Under 10,000	12	690
10,000-19,999	31	583
20,000-49,999	28	200
50,000-99,999	14	59
100,000 and over	15	21*
Speed (knots):		
18 and over		64**
14-17		954
Under 14		597
Power:		
Diesel		1,342
Oil fired steam		262
Coal fired steam		10
Gas turbine		1

*Includes 12 tankers, 2 tanker/ore carriers each over 250,000 d.w.t.

**36 passenger, 17 refrigerator, 11 dry cargo.

The government has no direct ownership or other financial interest in the fleet. More than 1,575 private

corporations, individuals, or groups of individuals, including 366 known beneficial owners (entities which receive profits or assume losses from operations), are concerned with ownership, management, or operation of the fleet. Some 70 vessels are not identified with a definite beneficial owner. Each of 17 shipowners own more than 300,000 d.w.t. The 6 largest Greek shipowners, each owning more than 500,000 d.w.t. under Greek flag, are as follows:

SHIPOWNER	No. OF SHIPS	D.W.T.
United Shipping & Trading Co. of Greece, S.A., Piraeus	24	2,761,541
Colocotronis, Ltd., London	64	2,178,032
Karageorgis, Michail A., Piraeus	41	913,814
Carras, J. C. & Sons (Shipbrokers), Ltd., London	23	752,434
Goulandris, N. J. (Agencies), Ltd., London	15	663,616
Vardinoyannis, N. J., Piraeus	18	543,400

Known foreign financial interest in the Greek-flag fleet, other than that of Greeks residing in foreign countries, is nominal.

The Greek merchant fleet, decimated by the loss of three-fourths of the tonnage during World War II, was considerably expanded between 1946 and 1950, primarily by the acquisition of many U.S. surplus cargo ships and several tankers by Greek shipowners, financed from their wartime profits and war casualty insurance payments. By the end of 1951 the fleet numbered 221 ships of about 1,860,000 d.w.t., including 198 dry cargo, 14 tanker, 7 passenger-cargo, and 5 passenger ships, and by 1959 the fleet had been increased by about 130 ships and 1,500,000 d.w.t. As a direct result of government shipping policies designed to attract Greek shipowners with extensive shipping under foreign flags, large amounts of both new and used Greek-owned tonnage were transferred from foreign registries to the national flag between 1956 and 1959.

Within the last 5 years, there has been a spectacular expansion in fleet tonnage, amounting to a 155% increase in deadweight tonnage and a 64% increase in total number of ships. During this period, tanker tonnage has been increased by 234%, bulk cargo tonnage by 231%, and dry cargo tonnage by 58%.

In order to compete more effectively with fleets of other traditional maritime nations and "flags of convenience," particularly the Liberian and Panamanian convenience flags, Greek shipowners have been engaged in both structural and technical modernization of their fleets. Rapid changes in fleet structure have been necessitated by the demands of shippers and by technical innovations affecting

international shipping standards. By scrapping and selling ships, owners have continually disposed of overage and other uneconomical tonnage and have acquired as replacements more profitable used ships and newly built specialized units to more adequately satisfy shippers' needs. Many small and medium size tankers have been replaced by new, highly automated units of much larger tonnage. Most of the small bulk and dry cargo ships have been replaced by medium size units for which there is more demand in Greek-flag trading. In addition to the modernization and expansion of the cargo and tanker fleets, Greek owners have successfully developed the Greek-flag passenger fleet into the world's largest in total number of ships. Transatlantic and transpacific service is provided, but the passenger fleet is employed primarily in lucrative cruise operations, particularly in the ever increasing tourist trade in the Greek islands, the Mediterranean, and the Caribbean. Not only have the traditional Greek passenger ship owners converted to cruise service but some Greek owners previously engaged only in cargo carrying operations are now operating passenger ships in cruise trade.

In January 1973, Greek-flag shipowners had on order for delivery through 1976, a total of 112 new ships aggregating about 7,830,000 d.w.t. About 90% of this tonnage represented 41 tankers, including 16 of 132,000 to 420,000 d.w.t., and 26 bulk cargo ships of 21,000 to 80,000 d.w.t.; the remaining tonnage consisted of 27 dry cargo ships, 13 container ships, 3 cement carriers, 1 passenger ship, and 1 tanker/oil carrier.

In addition to the ships of 1,000 g.r.t. and over, many hundreds of smaller merchant ships are employed primarily in domestic trade in the eastern Mediterranean; included among the smaller ships are 63 tankers ranging from 100 to 990 g.r.t. and totaling about 34,000 g.r.t.

In mid-1972, the Greek oceangoing fishing fleet (ships greater than 100 g.r.t.) totaled 71 ships of 41,102 g.r.t., including 59 between 100 and 999 g.r.t. and 12 between 2,000 and 3,999 g.r.t.

Merchant marine functions are administered by the Ministry of Merchant Marine principally through the Directorate-General of Shipping Policy and the Harbor Corps Command. The Directorate-General formulates policies in maritime development, navigation control, maritime labor, seamen's welfare, port supervision and organization, and research and planning. The Harbor Corps Command is vested with broad executive authority over the administration and policing of ports, control of coastal navigation, maritime training, and state-of-emergency planning.

Greece is a member of the Inter-Governmental Maritime Consultative Organization (IMCO) and a party to the following IMCO conventions: Safety of Life at Sea, 1960; Prevention of Collisions at Sea, 1960; Oil Pollution, 1954 and 1962; Facilitation of International Maritime Traffic, 1965; and Load Lines, 1966.

The Greek Government's primary objective in the development of the merchant fleet has been the encouragement of Greek shipowners to transfer all their tonnage from foreign registries to the national flag. It is estimated that less than 50% of the total Greek-owned gross register tonnage is registered under Greek flag. In 1972, Greek-owned merchant tonnage of all ship sizes registered under the three largest flags of convenience was as follows: Liberian flag, 767 ships of about 17,300,000 g.r.t. (more than 29,000,000 d.w.t.); Cypriot flag, 434 ships of about 2,300,000 g.r.t.; and Panamanian flag, 86 ships of about 780,000 g.r.t. Much tonnage, mostly dry cargo and bulk cargo types, has been transferred within the last few years as a result of governmental legislation and administrative measures which have provided favorable tax benefits and credit facilities.

Since 1958, Greek-flag ships that are owned by companies controlled by Greek interests have not been taxed until they are 10 years old (12 years if built in Greek yards). They are then taxed annually on net register tonnage (20¢ to 40¢ per net register ton, depending on the ship's age); Greek-owned ships under 30 years of age upon transfer from foreign registries to the Greek flag are not taxed for a period of 5 years. In order to attract foreign economic interest to establish regional or home offices in Greece, including shipping companies which may or may not be controlled by Greek nationals, the government offers certain tax benefits. Foreign-flag shipowners and charterers using the foreign companies established in Greece as agents, managers, or representatives are exempt from income tax, as well as duties and tariffs on income derived from transactions with these companies.

Government-guaranteed loans are extended for the purchase of both new and used tonnage. The government through the National Bank of Greece finances commercial banks at an interest rate of 3.5% for the extension of long-term, low-interest loans to Greek shipowners who place new-ship orders in domestic shipyards intended for either domestic- or foreign-flag registry. Shipbuilding loans extended to Greek shipowners by any Greek commercial bank, the Hellenic Industrial Development Bank, or any foreign bank legally established in Greece, qualify for

government guarantees. Loans may be extended by Greek financial institutions for as much as 80% of the cost of a Greek-flag ship built in a domestic shipyard, with the government underwriting up to 30% of the total costs. To promote the modernization of the Greek-flag cargo fleet employed in coastal trade, the government guarantees loans for the purchase of used ships of 500 to 3,000 g.r.t., providing these ships are less than 10 years old and are purchased as replacements for obsolete units; these loans cover up to 50% of the total value of the used ships.

No direct government subsidies are provided Greek-flag shipowners engaged in international trade; however, some direct financial assistance is provided certain shipowners employed on national interest lines in Greek coastal trade. The carriage of coastal trade is reserved for Greek-flag ships.

In 1971 a total of 53,582 seafaring personnel, mostly Greeks, was employed on Greek-flag ships of 100 g.r.t. and over as follows: 7,306 master and deck officers (including radio officers, apprentices, and cadets); 6,780 engineering officers (including apprentices and cadets); 27,739 deck and engineering department ratings; 10,983 steward department personnel; and 774 miscellaneous personnel. At the same time, more than 40,000 Greek mariners were serving aboard Greek-owned foreign-flag ships.

Of vital concern to the government and Greek shipowners is the acute shortage of qualified officers and ratings. It is estimated that more than 10,000 additional Greek seafaring personnel will be required annually to keep pace with the anticipated growth in Greek-owned tonnage under domestic and foreign flags.

As part of a long-range program the government, with some financial assistance from Greek shipowners, has financed the modernization of existing training facilities and newly established merchant marine schools during the last few years. Of more than 50 Greek merchant marine training facilities, about 20 schools are government sponsored (10 for deck and engineer officers, 1 for radio officers, and 9 for ratings and miscellaneous training). Of the private facilities, 17 schools provide training for deck officers, 12 for radio officers, and 6 for ratings and miscellaneous training. The government offers many maritime training scholarships and loans as further incentive to attract Greek youth to a sea career. It is estimated that about 1,300 students are attending the tuition-free government-sponsored training schools for deck, engineer, and radio officers.

Recent measures to benefit seamen include a 2-year working agreement which not only provides for across-

the-board increases in basic wages, sick pay, and overtime rates but a shorter working week and longer paid holidays.

I. Civil Air (U/OU)

Civil aviation constitutes an essential component of the overall transportation system by linking areas not well served by rail and highway. It also provides essential links to the widely scattered islands. The location of Greece on major inter-continental air routes has also made the nation an important transit point for international commerce. The 43 foreign airlines that provide scheduled services link Athens with 92 cities in 60 countries. Both domestic and international air traffic have increased considerably in the last 5 years, contributing to the growth of tourism and aiding the Greek economy.

The principal civil air activity in Greece is conducted by the privately owned national air carrier, Olympic Airways, and its subsidiary, Olympic Aviation. Olympic Aviation formerly was the light aircraft division of its parent company but was made a separate company to exploit the increasing charter and vacation traffic to the Greek islands. These airlines provide scheduled service to 25 domestic points and 26 cities in 19 foreign countries. Olympic Airways operates two Boeing 707-320B's, four 707-320C's, six 727-200's, eight 720's, and seven NAMC YS-11's. In addition, it has six DC-6 and six DC-3 aircraft which have been withdrawn from service. Olympic Aviation operates about 13 light aircraft ranging from the Short Skyvan to a Cessna 150.

There is little Greek civil air activity apart from Olympic Airways and its subsidiary. The Ministry of Social Services employs light aircraft for antimalaria control and other tasks. The Ministry of Communications and Transportation uses two Douglas DC-3's as executive and flight check aircraft. The Royal Aero Club of Greece, several other small aeroclubs, and a few private owners also operate light aircraft.

Registered in Greece are 85 civil aircraft; of these 42 are over 20,000 pounds gross weight. All the major transports are owned by Olympic Airways except the two government-owned DC-3's and a Grumman 159 Gulfstream. The other 43 planes are light aircraft owned by the airlines, aeroclubs, private individuals, and nonaviation enterprises.

At least 6,800 personnel are engaged in civil aviation activities, 5,500 employed by Olympic Airways. Included in the total personnel figures are 132 turbojet pilots (4 of whom are British nationals), 100 transport pilots qualified on piston-driven aircraft

(1 of whom is an American national), and 87 navigators and flight engineers. In addition there are at least 1,180 skilled maintenance personnel.

Greece has no major civil aviation schools. Olympic Airways pilots who are not former air force officers receive training outside the country. New student pilots of Olympic Airways receive training at the Oxford Air Training School in England. Advanced and conversion training in the Boeing aircraft is provided by Trans World Airlines (TWA) in the United States. Transitional training in YS-11 aircraft is provided locally. Several small aeroclubs and Olympic Aviation provide primary flight training. In-country training for Olympic employees is conducted by a department of professional training for administrative and commercial personnel. The Civil Aviation Administration, under the Ministry of Communications and Transportation, is concerned with the organization, development, and control of air transportation. Its functions include the operation and administration of airfields, aids to navigation and related communications facilities, control of air traffic, and supervision of aviation technical matters. It also monitors foreign air carrier operations in Greece as well as the international agreements related to civil aviation.

Greece belongs to the International Civil Aviation Organization and has signed the principal multilateral civil aviation conventions. Olympic Airways is a member of the International Air Transport Association. Greece has entered into formal or informal civil air agreements and arrangements with at least 43 nations, including Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and Yugoslavia.

J. Airfields² (C)

The Greek air facilities system consists of 56 airfields, 7 sites, and 2 inactive seaplane stations; 23 airfields are military, 22 civil, and 11 joint civil/military. The airfields are evenly distributed on the plains of the northeast and east along the coast of the west end of the Peloponnese. The greatest density is in the Athens area. Crete has five airfields, and Khios, Kerkira, Kos, Lesbos, Limnos, Mikonos, Rhodes, Samos, and Zakynthos have at least one airfield each. There are some smaller airfields in mountain valleys in the north and west.

²For detailed information on individual airfields in Greece, Crete and the Dodecanese Islands see Volume 15A, *Airfields and Seaplane Stations of the World*, published by the Defense Mapping Agency, Aerospace Center, for the Defense Intelligence Agency.

The Greek air facility system, with U.S. aid, is modern and efficient. Athinai and Thessaloniki handle most of the civil air traffic. Through agreements with 20 or more foreign countries, Greece is steadily increasing its volume of international traffic. Athinai, the most important airfield in Greece, has a runway capacity for the largest civil or military jet aircraft. Agrinion New, Andravidha, Araxos, Elefsis, Larisa, Nea Ankhialos, and Tanagra airfields in conjunction with Athinai airfield are also used as NATO airfields. All but three airfields in the Greek/Crete complex can handle C-47 or larger aircraft.

Permanent surfaced runways are found on 37 airfields, and the other fields have temporary or natural surfaces. Airfield maintenance personnel are well trained, and runway maintenance is generally adequate to maintain facilities in an operable condition.

Airfield construction and runway improvements are underway at several locations. The most important development is on the island of Rhodes, where the new airfield has a runway in excess of 10,000 feet.

Figure 7 lists characteristics of the most important airfields.

K. Telecommunications (C)

Greece's telecom system has improved considerably in the last 5 years and now provides generally adequate service to the public, government agencies, and industry. Even with a growth rate of 15% per year, the telecom organization has difficulty meeting rapidly increasing demands for services. Combinations of radio-relay links, open-wire lines, and radiocommunication circuits form networks reaching all areas on the mainland and most of the islands. Older facilities in the larger cities have been replaced by modern equipment, and numerous localities have been incorporated in the national direct-dial telephone system. Broadcast services have been vastly improved, particularly facilities for FM and TV programs. International telecom facilities have been strengthened through the introduction of satellite circuits and new submarine cables. The telecom system of Greece is still less developed than those of most other Western European countries, but it is superior to those of neighboring Albania, Bulgaria, and Turkey.

The government owns all telecom facilities except for some NATO operations and a few privately owned broadcast stations. The Ministry of Communications

FIGURE 7. Selected airfields (C)

NAME AND LOCATION	LONGEST RUNWAY: SURFACE; DIMENSIONS; ELEVATION ABOVE	ESWL*	LARGEST AIRCRAFT NORMALLY	REMARKS
	SEA LEVEL		SUPPORTED	
	<i>Feet</i>	<i>Pounds</i>		
Agrinio New. 38°36'N., 21°21'E.	Concrete. 9,810 x 100 75	35,500	C-130.	Military. Standby NATO airfield. Aviation and jet fuel available in underground tanks.
Andravida.	Asphalt. 10,290 x 148 50	56,600	C-135.	Joint. NATO/HAFC jet fighter bomber and airport of entry. Aviation and jet fuel available in underground tanks.
Athina.	Asphalt. 10,499 x 197 90	105,500	B-52.	Joint. Major civil/military airfield. International airport. Aviation and jet fuel available in aboveground and underground tanks.
Araxos.	Concrete. 9,810 x 98 50	35,500	C-130.	Military. NATO/HAFC jet fighter base. Aviation and jet fuel available in underground tanks.
Elevis.	Asphalt. 9,810 x 131 143	60,500	C-141.	Military. NATO/HAFC. Weather alternate for Athina. Aviation and jet fuel available in aboveground and underground tanks.
Iraklion.	Asphalt. 8,793 x 148 121	58,500	DC-8.	Civil. International airport. Aviation and jet fuel available in underground tanks.
Kalamata.	Concrete. 9,810 x 100 23	35,500	C-130.	Military. HAFC pilot training base. NATO reserve base. Aviation and jet fuel available in semi-buried tanks.
Kerkira.	Asphalt. 7,874 x 144 6	35,500	Boeing 720.	Civil. Airport of entry. Aviation and jet fuel available in semi-buried and aboveground tanks.
Larisa.	Concrete. 10,660 x 148 239	56,600	C-133.	Military. NATO/HAFC reconnaissance and jet fighter base. Aviation and jet fuel available in semi-buried and underground tanks.
Limnos.	Asphalt. 9,843 x 148 15	40,000	Boeing 737.	Civil. Aviation and jet fuel available in semi-buried and underground tanks.
Mitilini.	Asphalt. 8,476 x 148 16	30,700	DC-9.	Civil. Airport of entry. Aviation and jet fuel available in limited amount.
Nea Anklialos.	Asphalt. 9,810 x 148 98	56,600	C-135.	Military. NATO/HAFC jet fighter base. Aviation and jet fuel available in semi-buried tanks.
Rodos.	Asphalt. 7,874 x 148 204	58,500	DC-8.	Civil. Airport of entry. Aviation and jet fuel available in underground and aboveground tanks.
Soudha.	Asphalt. 9,809 x 148 480	45,500	C-133.	Military. HAFC jet fighter bomber base. Aviation and jet fuel available in underground tanks.
Tanagra.	Asphalt. 9,810 x 148 485	35,500	C-130.	Military. NATO and HAFC fighter bomber base. Aviation and jet fuel available in underground tanks.
Thessaloniki.	Asphalt. 8,085 x 148 28	45,500	C-133.	Joint. NATO/HAFC airfield. International airport of entry. Aviation and jet fuel available in aboveground tanks.

*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 Transportation is the nominal regulatory authority, but it exercises little control. The Hellenic Telecommunications Organization S. A. (OTE), a semiautonomous government-owned company, operates the facilities providing public domestic and international telephone and telegraph services. The government-owned National Radio-Television Institute (EIRT) has separate directorates for radiobroadcast and TV and operates all broadcast facilities except those of the Greek Army and the VOA.

The domestic network is a mixture of radio-relay links, open-wire and cable systems, and high-frequency (HF) radiocommunications. Open-wire lines provide the greatest geographic coverage on the mainland, but radio-relay links constitute the most significant part of the intercity network and now carry the greatest share of the public traffic. Microwave radio-relay links extend from Athens north to Larisa and Thessaloniki, west to Patrai and Kerkira, and south through Tripolis to the island of Crete. Maximum capacity on these major routes ranges from 300 to 966 telephone channels. A 1,800-channel system was recently inaugurated between Athens, Servia, and Thessaloniki. From Patrai very-high-frequency (VHF) routes of up to 24 channels are operated to Levkas and Zakynthos; a similar series of radio-relay links extends southeastward from the mainland into many of the Cyclades and Dodecanese islands. One buried coaxial cable system having 2,700 channels connects Athens with Patrai and a submarine cable terminal at Lekhaina; a 1,260-channel buried coaxial cable extends north from Athens to Larisa. Complementing these systems is an extensive network of open-wire lines which provides good service into the key frontier towns in northern Greece. A number of HF radiotelephone circuits offer important backup routes into many of the Aegean islands. Greece now has about 1.3 million telephone sets, an increase from 3.2 sets per 100 in 1961 to 14 per 100 in 1972. Most local urban telephone exchanges have automatic equipment, and nearly 90% of all long-distance calls can be dialed directly by the subscriber. There are about 1,600 subscribers in the domestic telex network, which involves some 21 exchanges in the major cities.

Excellent, largely automated international service is furnished by coaxial submarine cables, a satellite ground station, HF radiocommunications, radio-relay links, and open-wire lines. Most of the traffic is routed via coaxial cables connecting Khania with Sicily (60 channels) and Lekhaina with southern Italy (480 channels). The satellite ground station at Thermiopylai provides 132 high quality circuits to the United Kingdom, Canada, and the United States by way of

the Atlantic Ocean satellite; a recently installed second antenna works with the Indian Ocean satellite. A tropospheric-scatter circuit having 106 channels is operated between eastern Crete and Cyprus, and radio-relay routes connect Greece with Turkey and Italy. The Italian route carries 960 channels plus a TV link into the Eurovision network. Open-wire lines cross into Albania, Yugoslavia, Bulgaria, and Turkey. Radiocommunication stations near Athens provide direct HF circuits to 14 countries. A modern, 400-line international exchange in Athens handles almost all traffic, including direct-dial telephone and telex service to at least 12 countries.

The most extensive special-purpose telecom network is that operated by the Greek armed forces. Consisting for the most part of radiocommunications and some radio-relay circuits, it includes circuits leased in the two domestic coaxial cables. Some circuits in these cables are also leased to NATO, which operates a number of radio-relay and tropospheric-scatter circuits throughout Greece and into Italy, Turkey, and Cyprus. Other important special-purpose systems are administered and operated by the Hellenic State Railways, the Public Power Corporation, and various police organizations.

The Greek broadcasting service has been vastly improved through the implementation of several contracts for many new radiobroadcast and TV stations. In operation are 30 AM broadcast stations, and services are provided by the EIRT government organization through 13 stations, the Greek Army with 12 stations, and 5 other privately owned or foreign stations. The Athens station broadcasts three programs; other EIRT stations rebroadcast the national program and regional programs originating in local studios. A new high-frequency international broadcast station with two 100-kw transmitters has been inaugurated northeast of Athens near Khalkis. The Voice of America (VOA) station, formerly in Thessaloniki, has been moved to a new site near Kavala and equipped with 150-kw transmitters, comparable to their station at Rodhos. There are at least nine separate FM broadcast stations, all collocated with new TV stations. Some of the stations have two or three transmitters. TV programs are transmitted by 10 stations operated by the EIRT, 13 Greek Army stations, and 1 operated by the U.S. Armed Forces Network at Iraklion. The entire EIRT network has been installed within 3 years as part of a contract entered into with *Page Europa* (Italy). In operation are 10 of the 17 planned stations; the remainder are scheduled to be operating by the end of 1973. The army network consists of 3 basic stations

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and 10 rebroadcast transmitters. The number of radiobroadcast receivers is estimated at 1.4 million, and the number of TV sets at 500,000.

Greece's expanding telecom industry is able to manufacture some types of telecom equipment including telephone handsets, all types of telephone switching equipment, wire and cable, and TV and radiobroadcast receivers. Output is not sufficient to meet local needs. Civilian equipment is imported mainly from Japan, the United Kingdom, and West Germany; virtually all military equipment has been provided by the United States. The three major companies—*Siemens Teleotomichaniki S.A.*, *ITT Hellas S.A.*, and *Philips S.A.*—are subsidiaries of foreign companies. A number of small, locally owned firms assemble radio and TV receivers from imported components.

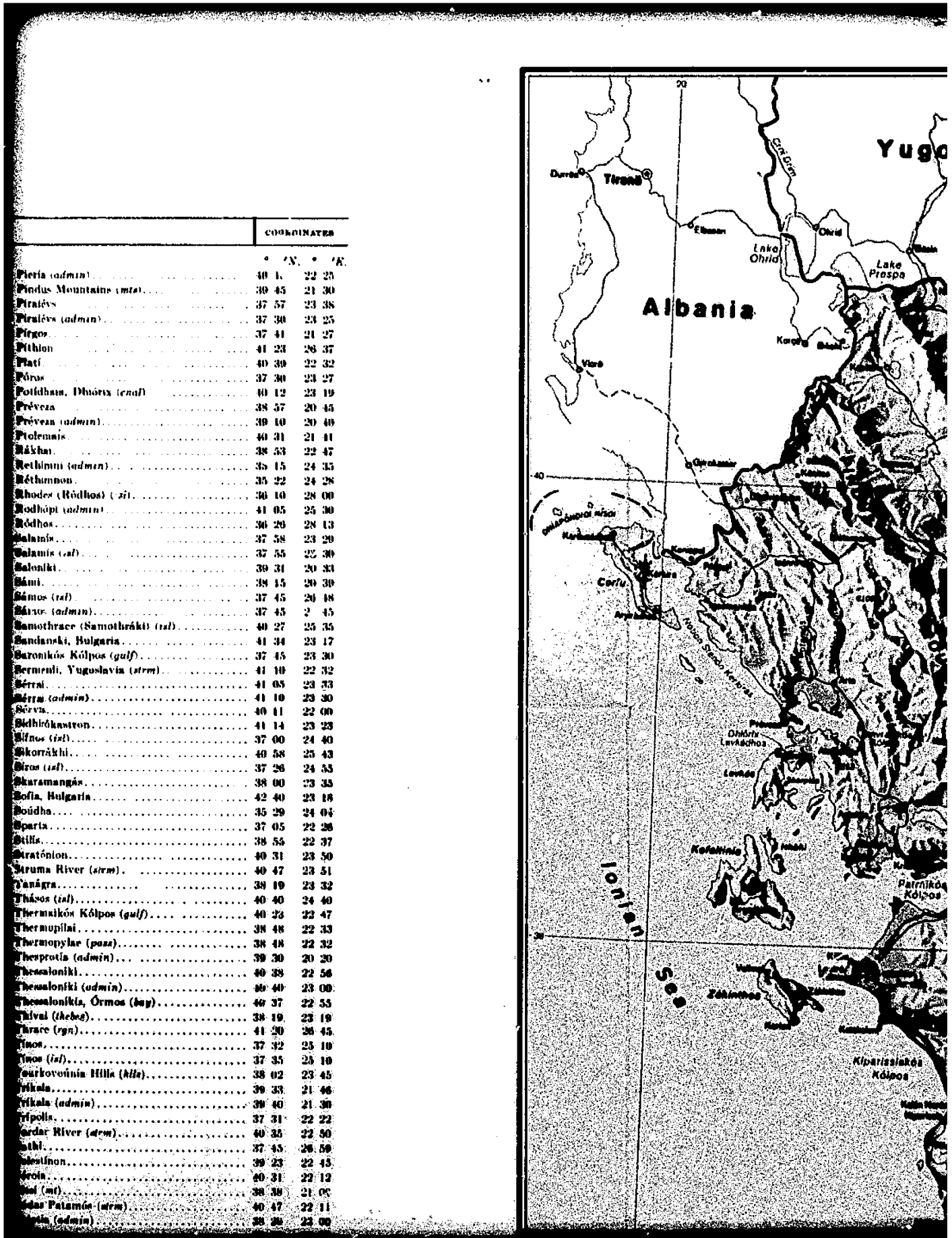
The number of skilled telecom personnel remains small. Most technicians are former army personnel trained at the Hellenic Army Signal Corps Training

Center where the quality of instruction is good. In line with extensive system expansion programs, OTE operates its own training school for telecom technicians. The National Technical University in Athens offers degrees in electrical engineering.

A broad range of telecom improvement plans are currently being implemented or are under contractual discussion. Most important are the high-capacity international links, including the 1,800-channel radio-relay system from Kavala to Istanbul, Turkey; a 960-channel system into Sofia, Bulgaria, and a 300-channel tropospheric-scatter link to Darnah, Libya. Submarine cables of 480 channels capacity are to be laid from Crete to Lebanon, and 640 channels from Crete to Marseille, France. Another coaxial submarine cable is to be laid from Crete to Athens to interconnect with the remaining international routes. The OTE is installing 280,000 local telephone lines, and orders have been placed for 12-channel open-wire and cable carrier equipment as part of the 1971-76 investment program.

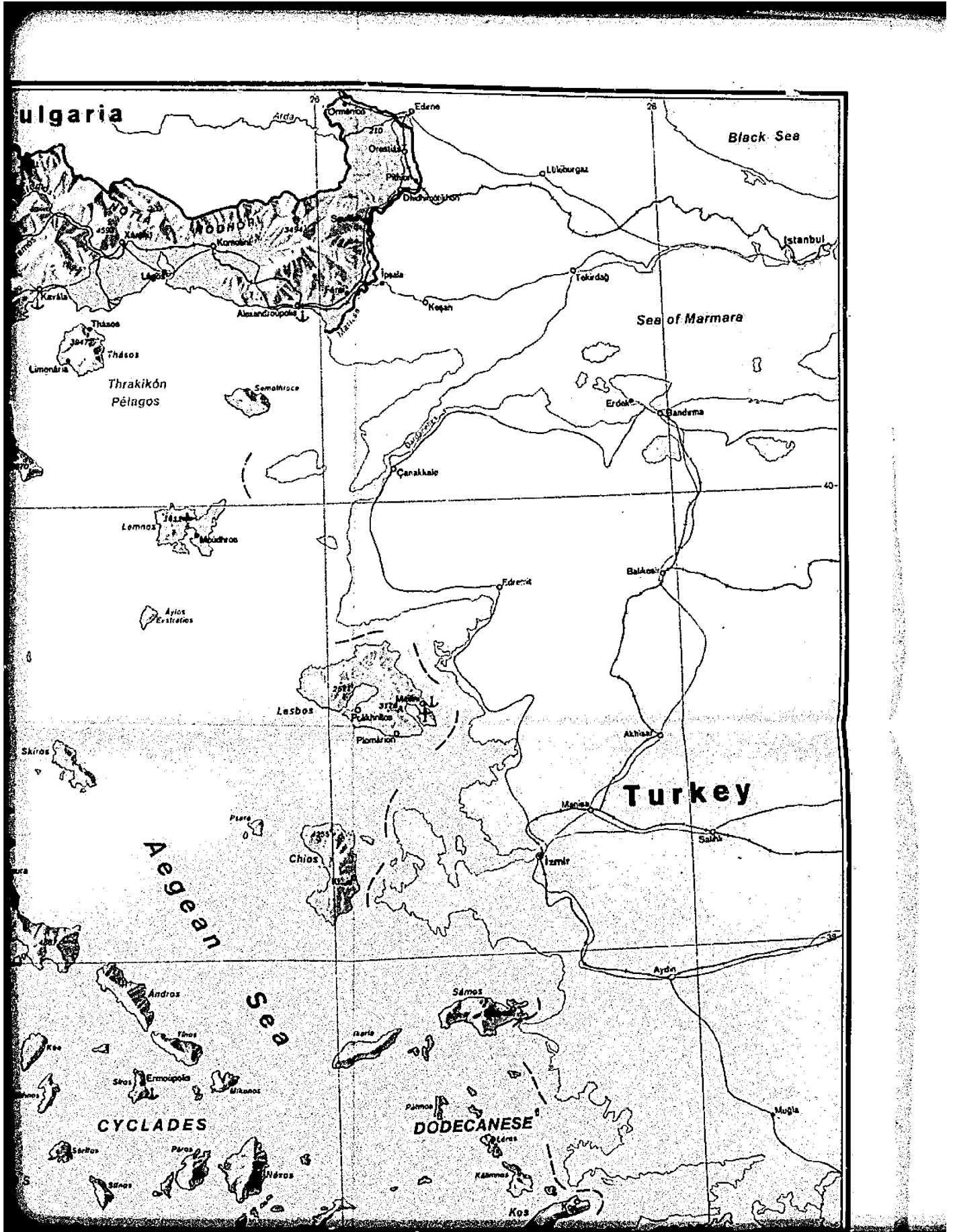
Places and features referred to in this General Survey (u/ou)

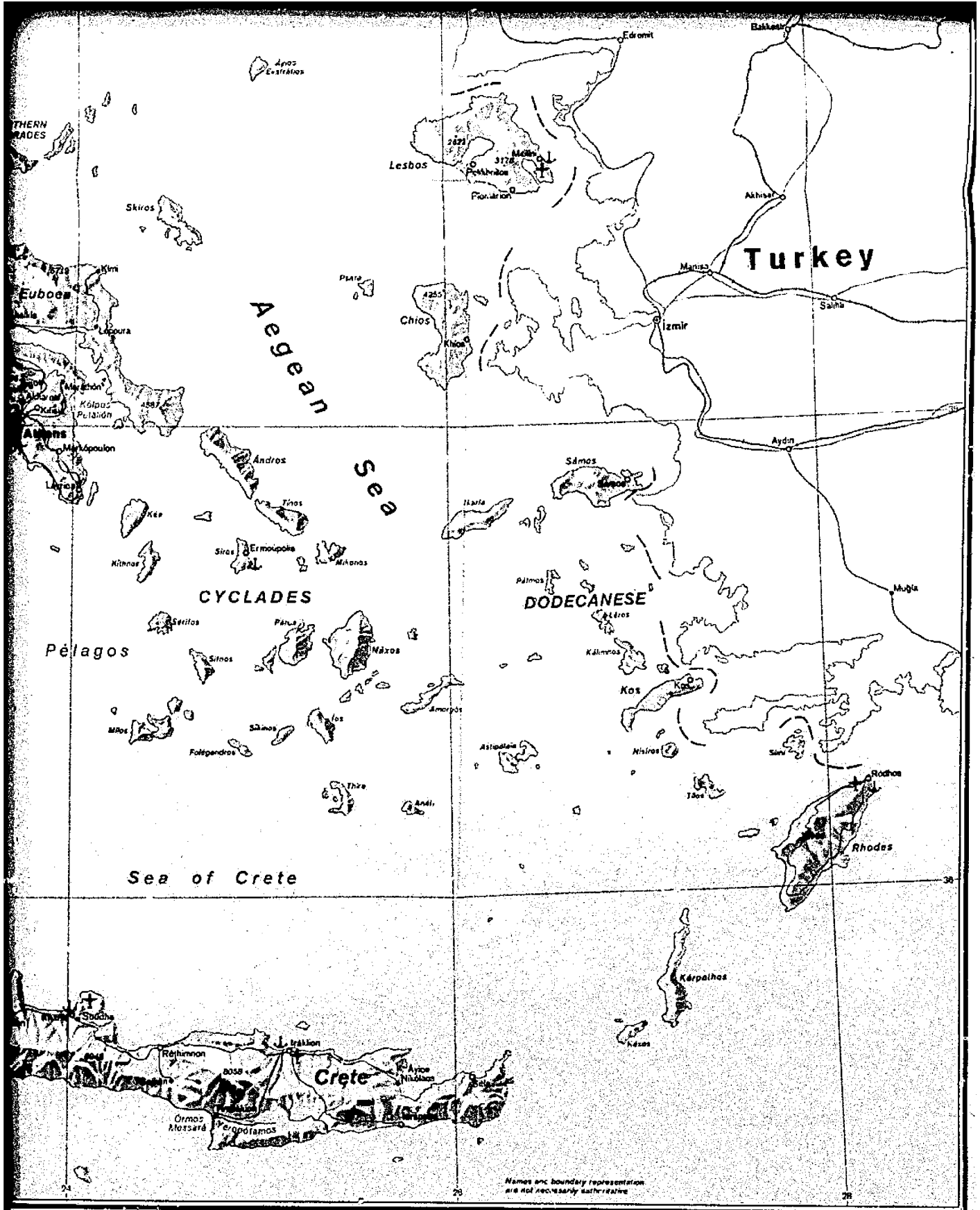
	COORDINATES				COORDINATES				COORDINATES		
	°	'N	° 'E		°	'N	° 'E		°	'N	° 'E
Aeropolis (hill)	37	58	23 44	Kardhia	40	27	21 48	Pieria (admin)			
Adhama	38	44	24 26	Kardhiza (admin)	39	20	21 45	Pindus Mountains (mts)			
Agros	40	48	22 00	Karistos	38	00	24 25	Piraeus			
Agriou	38	38	21 25	Kassandras Kolpos (gulf)	40	08	23 30	Pirgos (admin)			
Aitolia kas Akarnania (admin)	38	30	21 30	Kastoria (admin)	40	30	21 10	Pirgos			
Alyion	38	15	22 05	Kastrakion	38	44	21 21	Pithion			
Akhia (admin)	38	00	22 00	Kataholon	37	39	21 19	Platf.			
Akhelios Potamos (strm)	38	20	21 00	Katerini	40	16	22 30	Poros			
Alexandroupolis	40	51	25 52	Katochi	38	25	21 15	Potidhaia, Dhioria (cnal)			
Alfiou	37	39	21 30	Kavala	40	56	24 25	Preveza			
Alfiou Potamos (strm)	37	37	21 27	Kavala (admin)	41	00	24 30	Preveza (admin)			
Aliakmon Potamos (strm)	40	30	22 40	Ko-fasilas	37	52	21 16	Ptolmais			
Alivertion	38	25	24 02	Kefallinia (isl)	38	15	20 35	Rakhi			
Amfipolis	40	50	23 51	Kefallinia (admin)	38	15	20 30	Rethimni (admin)			
Amfissa	38	32	22 23	Kerkira	39	36	19 55	Rethimnon			
Amindaion	40	41	21 41	Kerkira (admin)	39	40	19 45	Rhodes (Ródhos) (isl)			
Andikira	38	23	22 38	Kerkira (admin)	40	25	23 30	Rodhópi (admin)			
Andros	37	50	24 58	Khalchidhiki (pen)	40	25	23 27	Ródhos			
Argolis (admin)	37	40	22 50	Khalchidhion	40	44	22 36	Salamis			
Argos	37	38	22 44	Khalchis	38	28	23 36	Salamis (isl)			
Argostolion	38	11	20 29	Khania	35	31	24 02	Saloniki			
Arkadhia (admin)	37	35	22 15	Khania (admin)	35	20	24 00	Sami			
Arkhaia Olimbia	37	39	21 38	Khios	38	22	26 08	Samos (isl)			
Armenokhorion	40	48	21 28	Khios (isl)	38	22	26 00	Samos (admin)			
Arta (admin)	39	10	21 00	Khios (admin)	38	25	26 00	Samothrace (Samothráki) (isl)			
Asprókhoma	37	03	22 05	Kifiniá	38	04	23 49	Sandanski, Bulgaria			
Asprópirgos	38	04	23 35	Kikládhes (admin)	37	25	24 55	Sasonikós Kolpos (gulf)			
Asproválta	40	43	23 42	Kilkis (admin)	41	00	22 40	Sermenth, Yugoslavia (strm)			
Astakos	38	32	21 05	Killini	37	56	21 09	Serrai			
Athens	37	58	23 44	Kimi	38	18	24 06	Sérrai (admin)			
Attiki (admin)	38	05	23 30	Kiparisia	37	25	21 40	Sérrai (admin)			
Áyion Óros (admin)	40	15	24 15	Knosós	35	18	28 19	Sérrai (admin)			
Áyion Óros (Athos) (pen)	40	15	24 15	Komotini	41	07	25 24	Sérrai (admin)			
Áyios Nikólaos	38	53	21 34	Korinthia (admin)	37	55	22 40	Sérrai (admin)			
Biléfi	37	22	22 09	Kos (isl)	36	50	27 10	Sérrai (admin)			
Bilisht, Albania	40	37	20 59	Kozani	40	18	21 47	Sérrai (admin)			
Bitola, Yugoslavia	41	02	21 20	Kozani (admin)	40	20	21 43	Sérrai (admin)			
Bosporus (str)	41	00	29 00	Krionerion	38	21	21 36	Sérrai (admin)			
Chios (Khios) (isl)	38	22	26 00	Ládhon Potamos (strm)	37	36	21 40	Sérrai (admin)			
Corfu (isl)	39	40	19 45	Lake Iliki (Iliki Limni) (lk)	38	25	23 15	Sérrai (admin)			
Corinth	37	56	22 36	Lake Marathonas (Marathónos, Limni) (lk)	38	10	23 53	Sérrai (admin)			
Corinth Canal (cnal)	37	57	22 58	Lakonia (admin)	37	00	22 35	Sérrai (admin)			
Corinth, Gulf of (bay)	38	12	22 30	Lamia	38	54	22 26	Sérrai (admin)			
Crete (isl)	35	15	24 45	Larimna	38	34	23 17	Sérrai (admin)			
Cyclades (isls)	37	00	25 10	Lárisa	39	38	22 25	Sérrai (admin)			
Dardanelles (str)	40	15	26 25	Lárisa (admin)	39	30	22 30	Sérrai (admin)			
Darnah, Libya	32	46	22 39	Ladithi (admin)	35	05	25 50	Sérrai (admin)			
Dhinkopton	38	12	22 12	Lávrio	37	43	24 03	Sérrai (admin)			
Dhlyavata	40	41	22 51	Lekhalia	37	56	21 16	Sérrai (admin)			
Dhionisos	38	06	23 53	Lemnos (Limnos) (isl)	39	55	23 15	Sérrai (admin)			
Dhodhekánisos (admin)	38	50	27 05	Leonidhion	37	10	22 52	Sérrai (admin)			
Dhomokós	39	06	22 18	Léros (isl)	37	08	26 50	Sérrai (admin)			
Dodecanese (isls)	36	00	27 05	Levos (Léavos) (isl)	39	10	26 32	Sérrai (admin)			
Doiran, Lake (lk)	41	13	22 44	Levos (admin)	39	10	26 20	Sérrai (admin)			
Dráma	41	09	24 09	Levadhia	38	26	22 53	Sérrai (admin)			
Dráma (admin)	41	15	24 15	Levkádhos, Dhióris (cnal)	38	47	20 44	Sérrai (admin)			
Dráma (plain)	41	05	24 06	Levkia (admin)	38	45	20 40	Sérrai (admin)			
Edirne, Turkey	41	40	20 34	Levká (isl)	38	43	20 38	Sérrai (admin)			
Elasón	39	54	22 11	Lianokládhion (str)	38	53	22 22	Sérrai (admin)			
Elevtheráfi	40	51	24 15	Likavittós (hill)	37	59	23 45	Sérrai (admin)			
Elevsis	38	02	23 32	Litókhonon (str)	40	09	22 33	Sérrai (admin)			
Elevsinos, Kolpos (bay)	38	01	23 52	Loutrá (str)	37	39	21 19	Sérrai (admin)			
Filinikón	37	53	23 44	Macedonia (rgn)	41	00	23 00	Sérrai (admin)			
Ermoupolis	37	27	24 56	Magnisia (admin)	39	15	22 45	Sérrai (admin)			
Euboea (Évvoia) (isl)	38	30	24 00	Maláza	35	26	24 04	Sérrai (admin)			





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Terrain and Transportation Figure 8